

# Using SAAM II

## Saving and Restoring Solutions

Introduction

SavRestUS-1

Part 1. Working with saving and restoring solutions

SavRestUS-2



## **Saving and Restoring Solutions**

### **Prerequisites**

The prerequisite for this tutorial is having worked through the SAAM II introductory tutorial, “Getting Started with **SAAM II Compartmental.**”

### **What you will learn in this tutorial**

The purpose of this tutorial is to show you how save and restore solutions.

- How to save solutions and compare results among other solutions
- How to restore a specifically saved solution.

### **Files Required**

Study Files: The study file for this tutorial is

**study\_0.stu**

This file is included as part of this tutorial. This file is the same as **study\_0.stu** that is installed in the SAAM II program folder and referred to in the **SAAM II** User Guide.

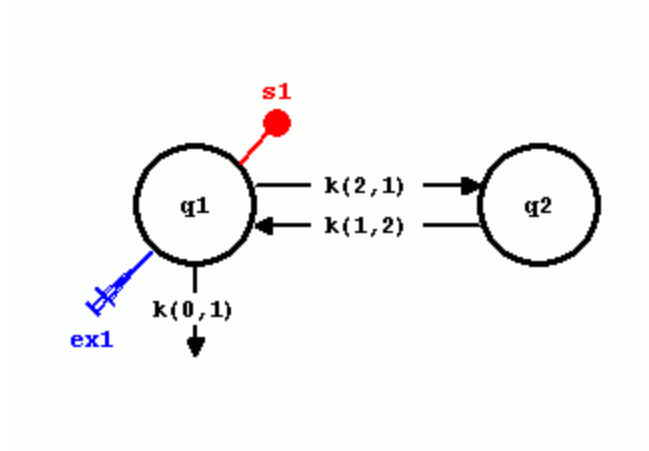
### **Introduction**



SAAM II enables you to save and work with different solutions of the model you are using. When you save a solution you are, in effect, saving the state of the model (i.e., the current values of the model parameters). Additionally, you may save selected variables with their values as calculated during the last solve or fit. This can be used to compare results from other solutions.

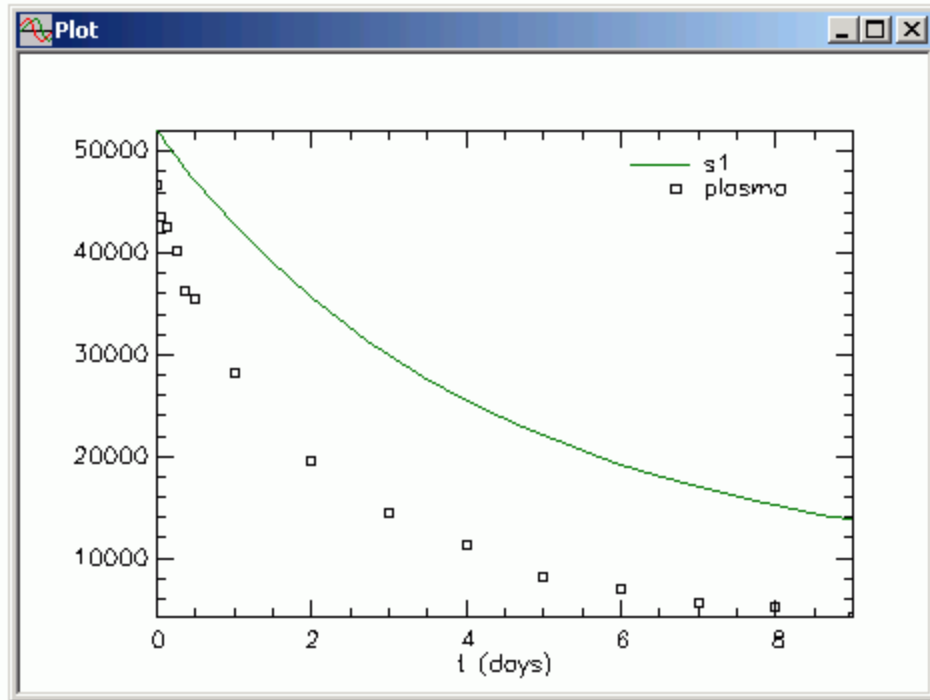
When you restore a solution, you are merely resetting the parameter values back to the saved state for that solution. You are not resetting the values of any other variables. You must solve to restore all other values.

### Part 1. Saving and restoring solutions

1. **Start** the SAAM II **Compartmental** application. The SAAM II **Compartmental** main window will open.
2. Open the SAAM II **Compartmental** study file **study\_0**.
  - a. The file **study\_0.stu** should appear in the file list; if it does not, find the folder where you put this file.
  - b. In the **File** menu, click **Open**. The SAAM II **Compartmental** main window will appear. In the SAAM II **Toolbox**, click **Experiment**. The model of the experiment for **study\_0.stu** will appear on the **Drawing Canvas** as follows:

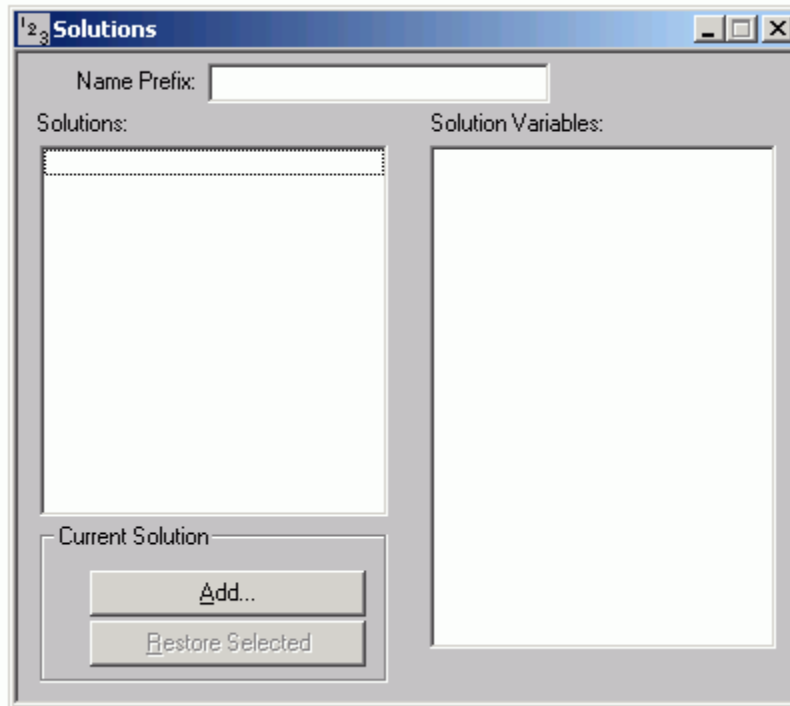


3. Solve the model and view the solution.
  - a. In the **Compute** menu, click **Solve**, or alternatively, on the SAAM II **Toolbar**, click **Solve** .
  - b. In the **Show** menu, click **Plot**, or alternatively, on the SAAM II **Toolbar**, click **Plot** . The **Plot and Table Variables** dialog box will open. Be sure the **List All Variables** check box is not selected.
  - c. Click **s1:plasma** to move this to the **Current Selection** pane.
  - d. Click **Done**. Your plot will appear as shown below (in linear mode):



Leave the **Plot** window open.

4. Save the solution.
  - a. In the **Compute** menu, click **Solutions**. The **Solutions** dialog box will open as follows:



The *Solutions dialog box*. The **Solutions** dialog box contains

The **Name Prefix** box. Here you can type the name of the solution; the default name is “1.” If you type, for example, “base”, the solution will be saved with the name “base1”; thus a number is always added to your name. This allows you to create a sequence of solutions such as “base1”, “base2”, etc.

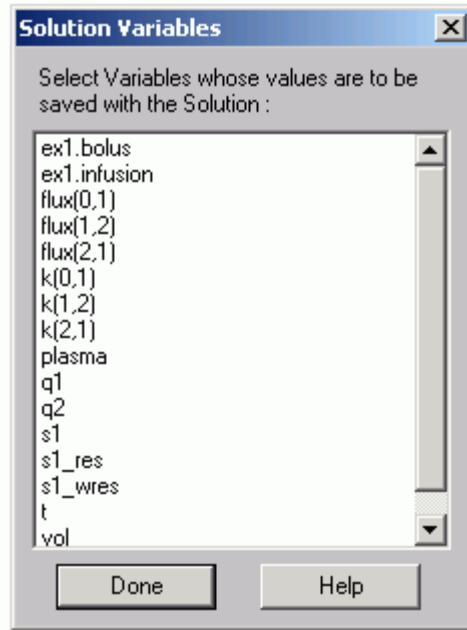
The **Solutions** pane listing the names of the saved solutions.

The **Solution Variables** pane with the names of the saved solutions variables for a given solution. Clicking on the name of a solution in the **Solutions** pane will produce a list of the variables saved in the **Solution Variables** pane.

The **Current Solution** pane providing you the option to **Add** a solution, or to **Restore Selected**, a selected solution.



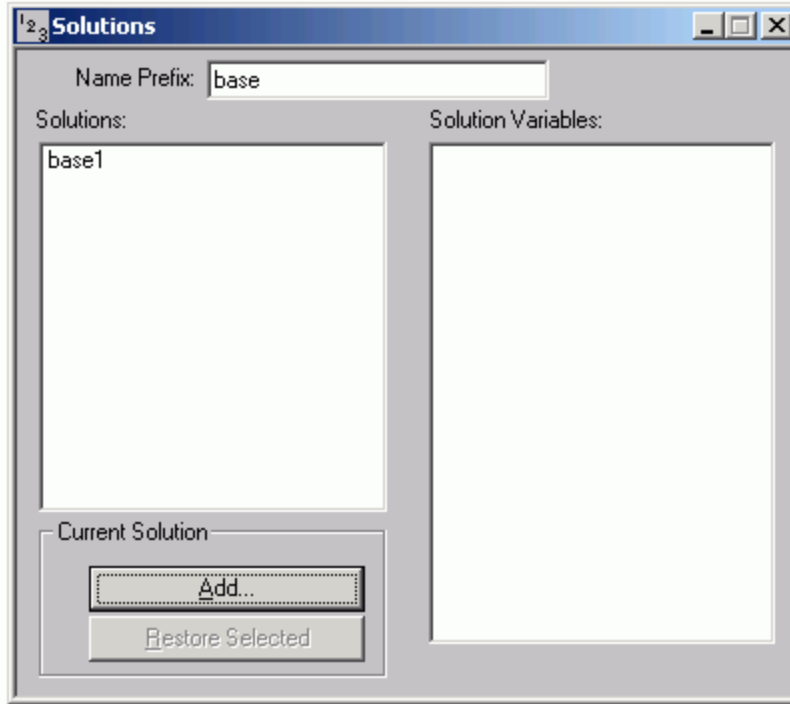
- b. Type “base” in the **Name Prefix** box.
- c. Click **Add** in the **Current Solution** pane. The **Solution Variables** dialog box will open as follows:



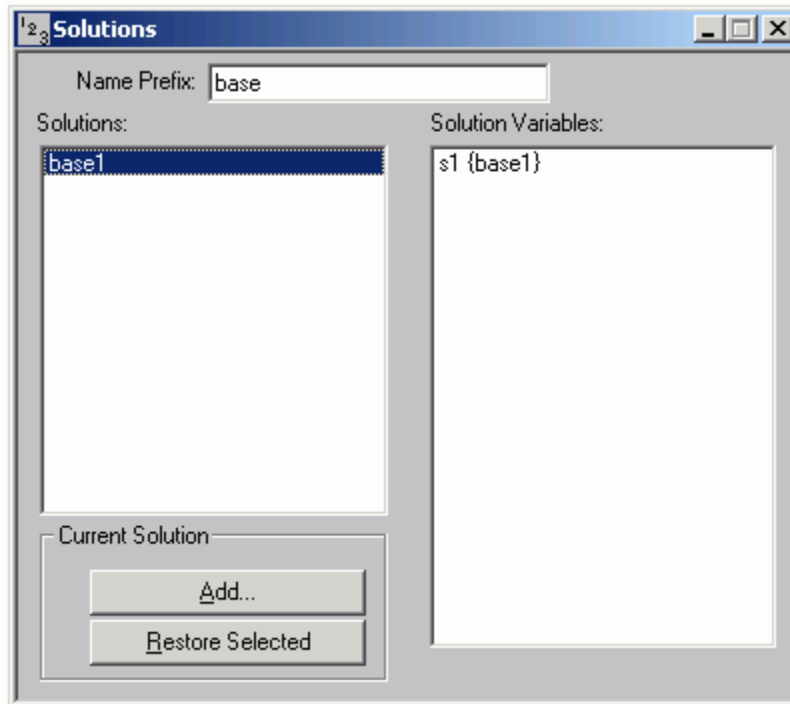
The **Solution Variables** dialog box. The **Solution Variables** dialog box contains the names of the model variables or parameters you may save with the solution. These saved variables can be accessed for plotting or tabular purposes. They will be saved with a suffix added to them. In this case, because the name of the saved solution is “base” hence saved as “base1”, the variables will be saved with the name {base1} associated with them. For example, if you save **s1**, the name **s1{base1}** will appear in the **Plot and Table Variables** dialog box.



- d. In the **Solution Variables** dialog box, click **s1** and then click **Done**. The **Solutions** dialog box will appear as follows:




- e. In the **Solutions** pane, click “base1”. The **Solutions** dialog box will appear as follows:

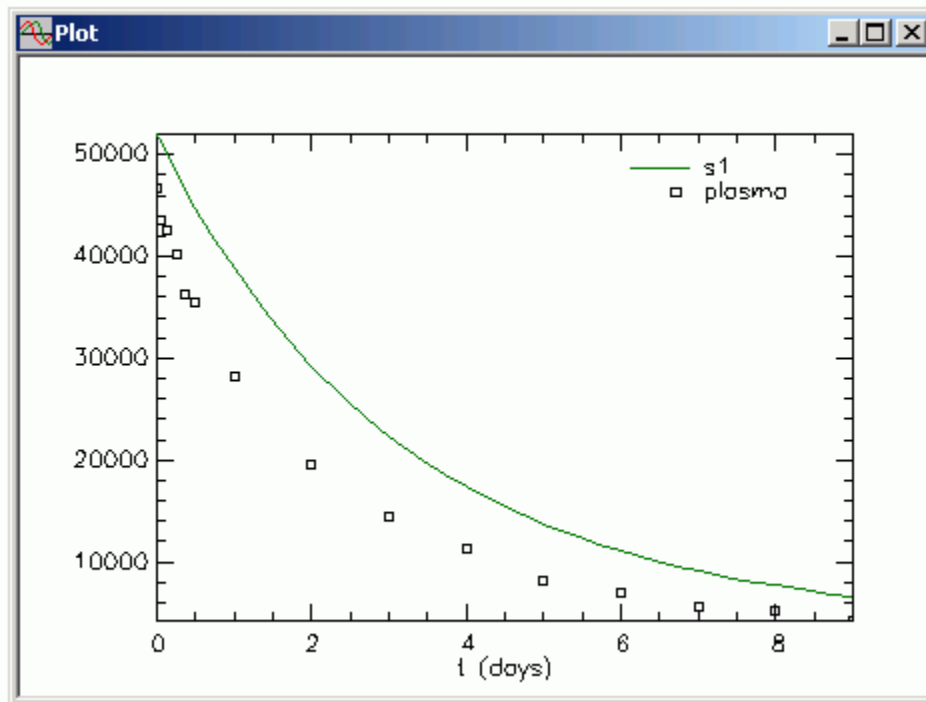




The **Solution** dialog box. When you click the name of a solution in the **Solution** dialog box, the variables and parameters saved with that solution will appear in the **Solution Variables** pane.

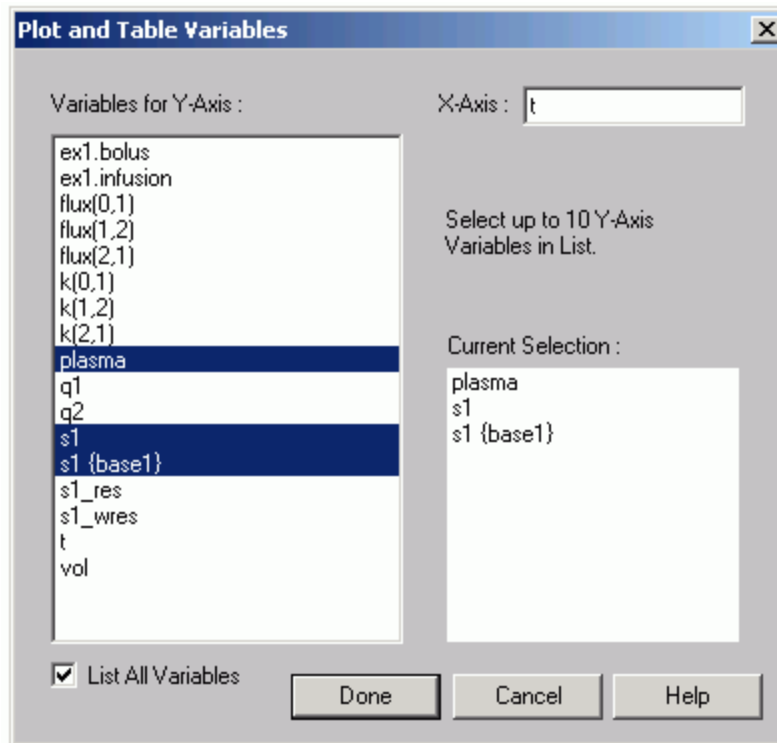


- f. Close the **Solutions** dialog box.
5. Change the value of  $k(0,1)$  and compare solutions.
    - a. In the **Show** menu, click **Parameters**, or alternatively, on the **SAAM II Toolbar**, click **Parameters** . The **Parameters** dialog box will open.
    - b. Change the value of  $k(0,1)$  from “0.1” to “0.2”.
    - c. Close the **Parameters** dialog box.
    - d. Solve the model. The plot will be updated as follows:



- e. Compare this solution with the original base solution.
  - (1) In the **Set** menu, click **Plot/Table Variables**. The **Plot and Table Variables** dialog box will open. Be sure the **List All Variables** check box is selected.

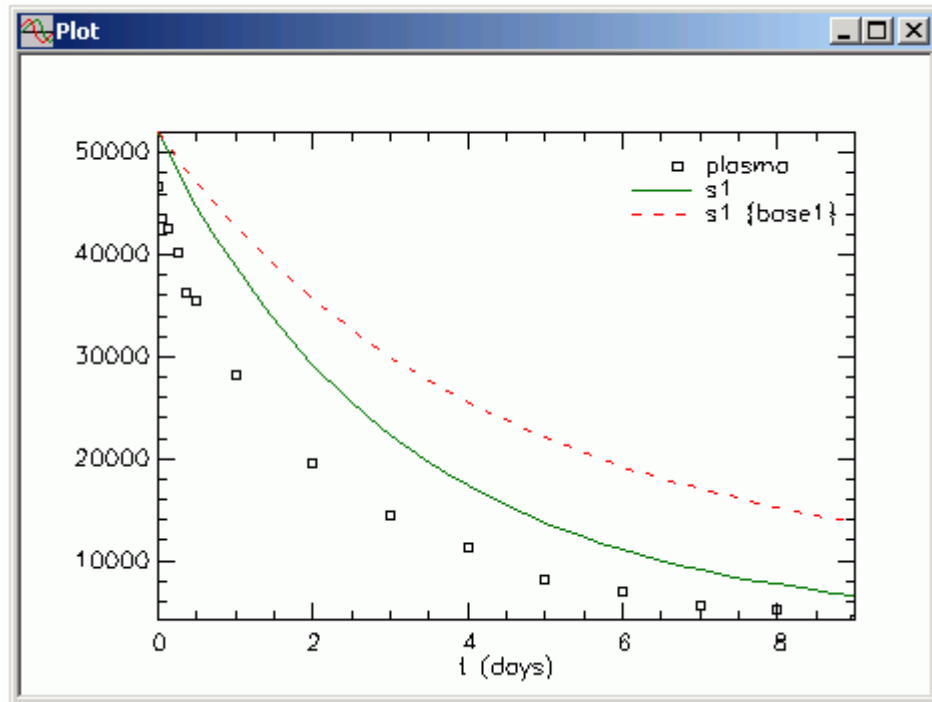
- (2) Press the **CTRL** key, and click **plasma**, **s1** and **s1{base}**. The **Plot and Table Variables** dialog box will appear as follows:



*Saved variables and parameters.* Notice in the **Variable for Y-Axis** pane the saved original solution **s1{base1}** appears. This is the only saved variable. If you had saved other variables or parameters, these would appear in this list followed by **{base1}**.

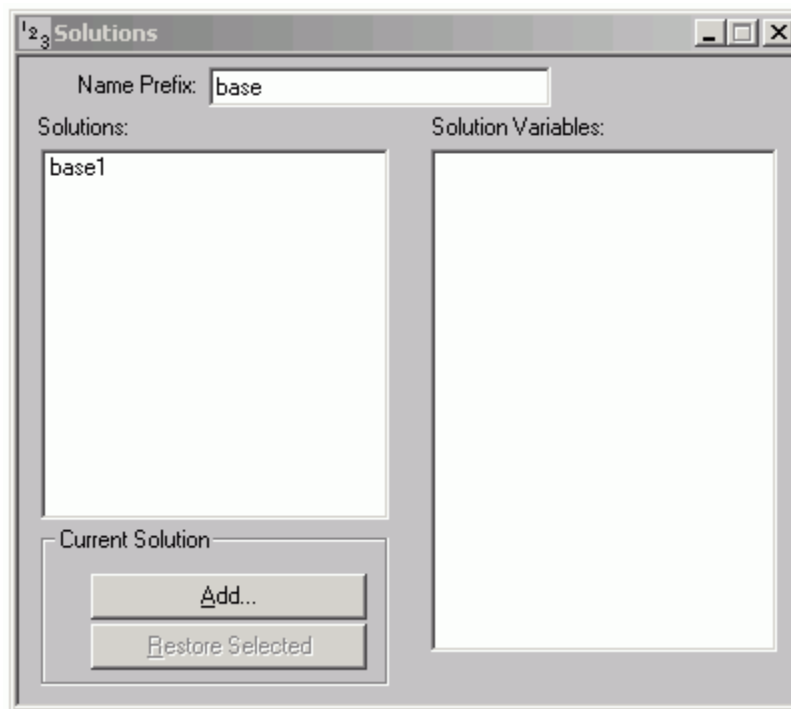


- (3) Click **Done**. The plot will appear as follows:



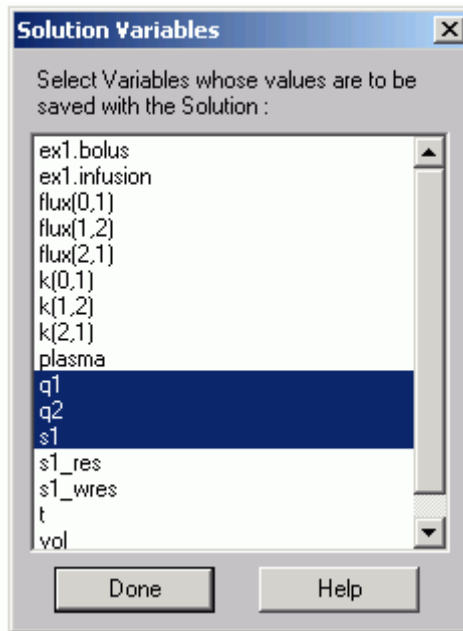
6. Save the solution.

- a. In the **Compute** menu, click **Solutions**. The **Solutions** dialog box will open as follows:

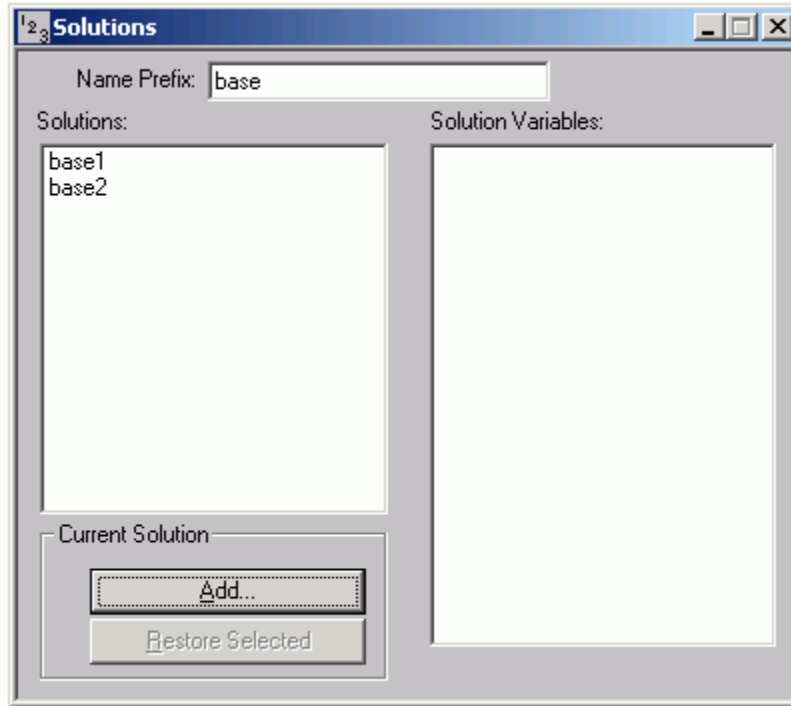


Notice “base” appears in the **Name Prefix** box, and “base1” is the original saved solution. Leave the **Name Prefix** as “base”.

- b. Click **Add**. The **Solution Variables** dialog box will open. Clear the selected variables, press the **CTRL** key, and click **q1**, **q2** and **s1**. The **Solution Variables** dialog box will appear as follows:

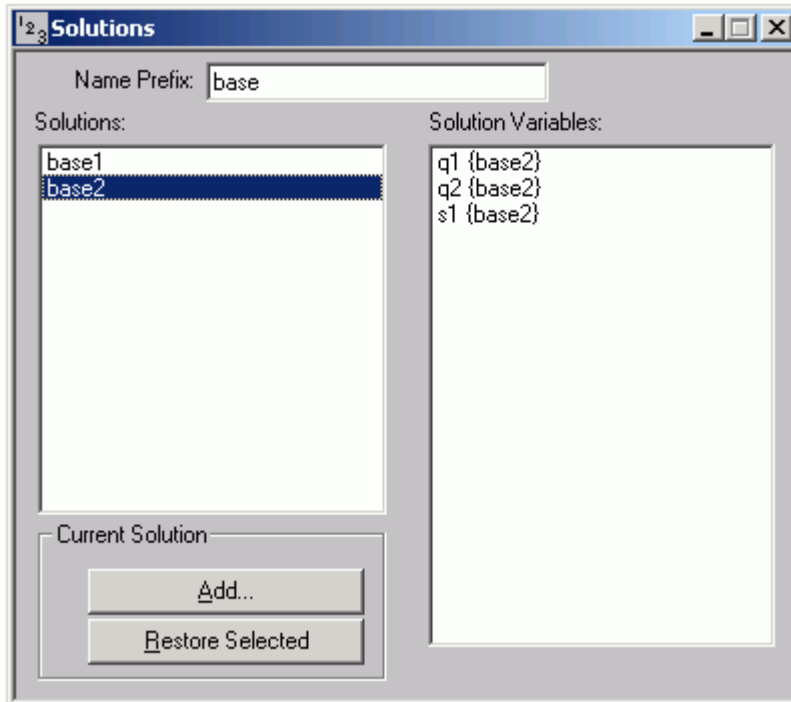


- c. Click **Done**. The **Solutions** dialog box will appear as follows:




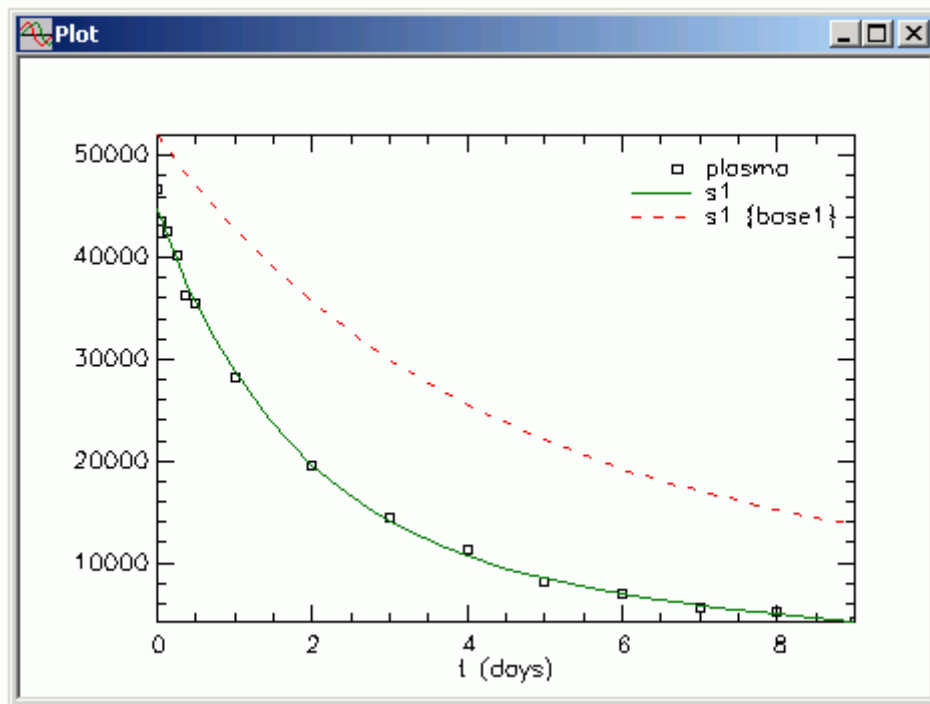
Notice the **Name Prefix** “base” remains, but the number “2” is added. Thus “base2” is the second “base” saved solution.

- d. In the **Solutions** pane, click “base2”. The **Solutions** dialog box will appear as follows:



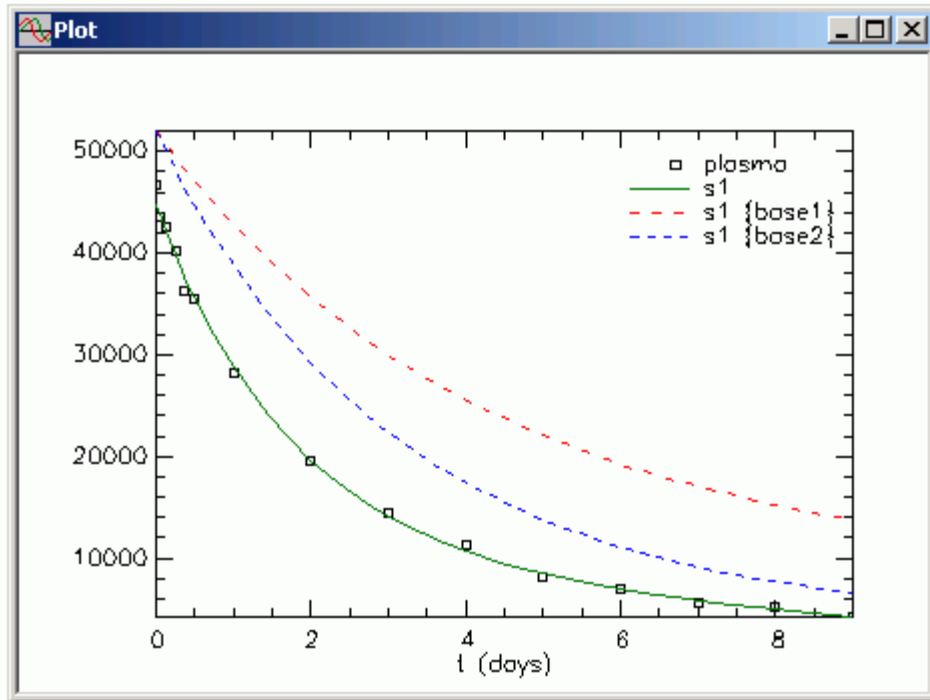
The variables in the **Solution Variables** pane are those that you saved; they will appear as variables in the **Plot and Table Variables** dialog box.


- e. Close the **Solutions** dialog box.
7. Fit the model to your data. In the **Compute** menu, click **Fit**, or alternatively, on the **SAAM II Toolbar** click **Fit** . Since the **Plot** window was open during the “Fit”, the **Plot** window will be updated as shown below:



Remember your previous plot had **s1{base1}** as a variable in the **Current Selection** pane; thus this plot compares the best fit of the model to the data with the original solution.


8. Compare all three solutions.
  - a. In the **Set** menu, click **Plot/Table Variables**. The **Plot and Table Variables** dialog box will open. Be sure the **List All Variables** check box is selected.
  - b. Clear the selected variables, press the **CTRL** key, and click **plasma**, **s1**, **s1{base1}** and **s1{base2}** to move these variable to the **Current Selection** pane.
  - c. Click **Done**. The plot will appear as follows:



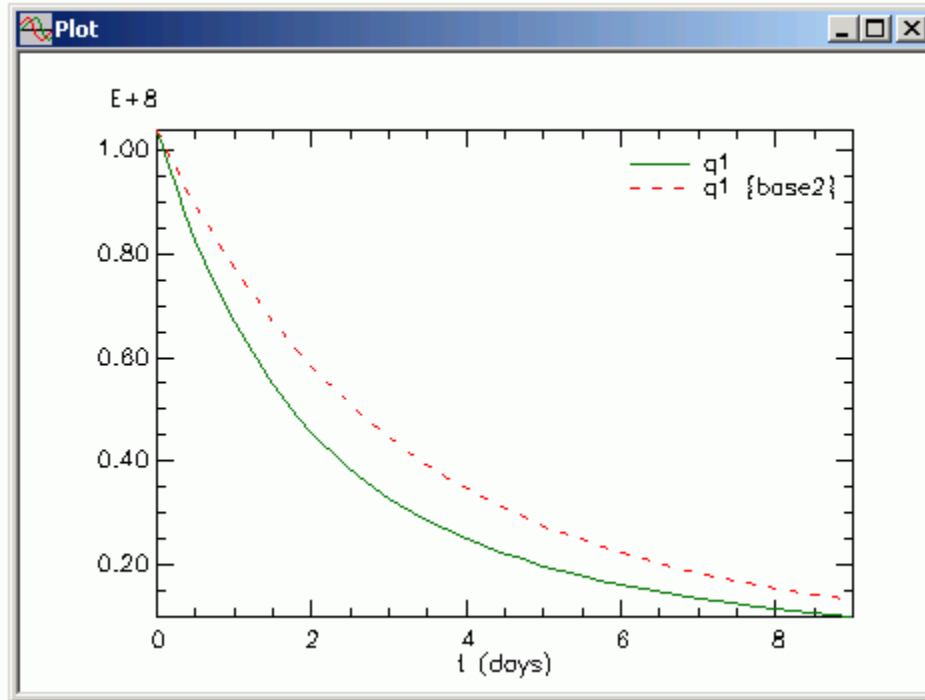
- d. Close the **Plot** window.
- e. In the **Show** menu, click **Table**, or alternatively, on the **SAAM II Toolbar** click **Table** . The following table will open.

t	plasma	s1	s1 {base1}	s1 {base2}
0.000	-	44755.102	52000.000	52000.000
7.00000e-003	46780.000	44609.149	51927.264	51890.927
4.20000e-002	43522.000	43888.092	51565.485	51349.365
0.125	42535.000	42234.734	50720.094	50090.056
0.250	40125.000	39887.777	49479.518	48257.992
0.375	36221.000	37701.608	48277.014	46500.570
0.500	35562.000	35664.538	47111.365	44814.685
0.750	-	31995.176	44885.961	41645.749
1.000	28194.000	28802.293	42794.330	38728.842
1.450	-	24049.853	39340.009	34049.108
1.725	-	21664.290	37409.749	31512.801
2.000	19573.000	19600.851	35605.189	29195.561
2.450	-	16795.738	32901.059	25825.977
2.725	-	15368.731	31388.008	23997.303
3.000	14403.000	14120.793	29971.990	22324.748
3.450	-	12397.815	27846.960	19888.845
3.725	-	11506.125	26656.046	18564.604
4.000	11278.000	10715.574	25540.090	17351.718
4.450	-	9603.404	23862.412	15581.766
4.725	-	9016.148	22920.423	14617.450
5.000	8081.000	8487.371	22036.391	13732.649
5.450	-	7728.045	20704.602	12438.224
5.725	-	7318.557	19955.152	11731.041
6.000	6999.000	6944.012	19250.565	11080.723
6.450	-	6395.272	18186.512	10126.355
6.725	-	6093.436	17586.168	9603.172
7.000	5653.000	5813.407	17020.600	9120.734
7.450	-	5395.873	16164.076	8410.019
7.725	-	5162.344	15679.375	8018.784
8.000	5139.000	4943.155	15221.676	7656.819
8.450	-	4611.747	14526.287	7121.125
8.725	-	4423.988	14131.441	6824.776
9.000	-	4246.214	13757.604	6549.523
9.000	4210.000	4246.214	13757.604	6549.523

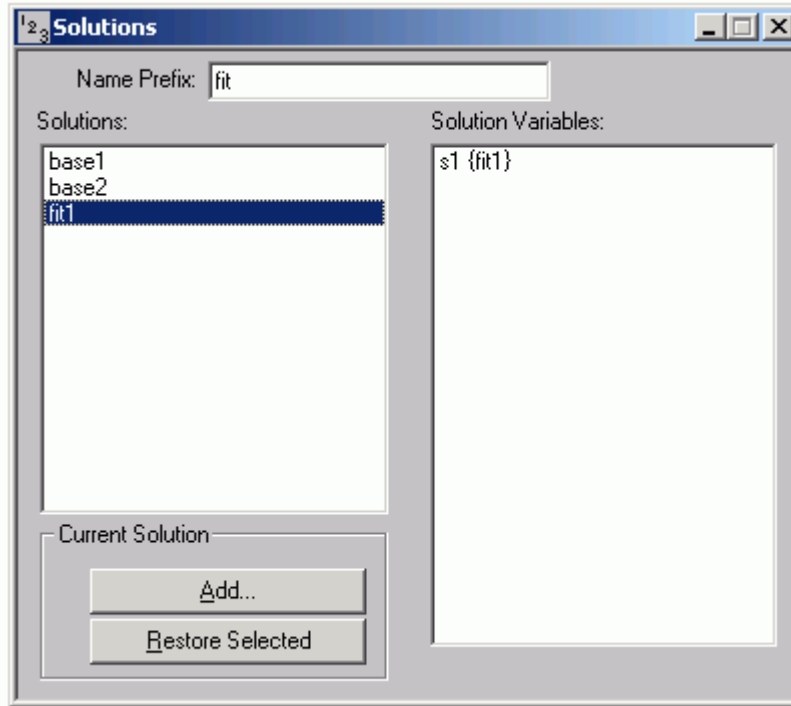
Because the previous plot had the Plot and Table Variables **plasma**, **s1**, **s1{base1}** and **s1{base2}** selected, these the variables will appear in the table. To change the variable, simply open the **Plot and Table Variables** dialog box, and select those variables you would like to view in tabular form.

- f. Close the **Table** window.
9. Compare **q1{base2}** with **q1** from the best fit.
  - a. In the **Show** menu, click **Plot**, or alternatively, on the **SAAM II Toolbar**, click **Plot** . The previous plot will open.
  - b. In the **Set** menu, click **Plot/Table Variables**. The **Plot and Table Variables** dialog box will open. Be sure the **List All Variables** check box is selected.

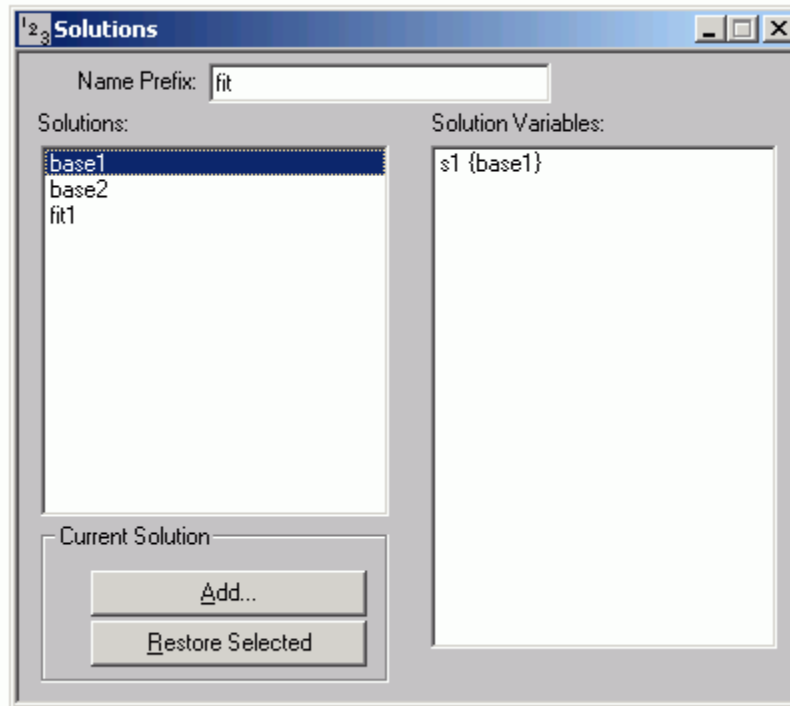
- c. Press the **CTRL** key, and click **q1** and **q1{base2}** to move these variables to the **Current Selection** pane. Notice there is no **q1{base1}**; this is because you did not save **q1** as a variable for base1. Click **Done**. The plot will appear as follows:



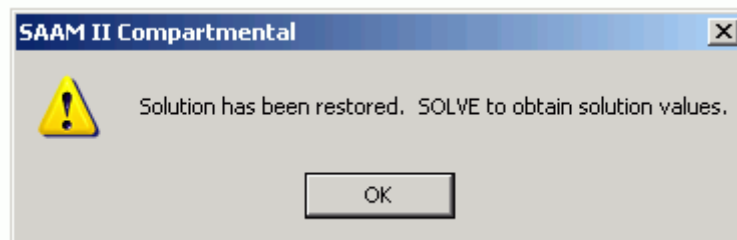
- d. Close the **Plot** window.
10. Save the solution from the best fit.
- a. In the **Compute** menu, click **Solutions**. The **Solutions** dialog box will open.
  - b. Type "fit" in the **Name Prefix** box.
  - c. Click **Add**. The **Solutions Variables** dialog box will open.
  - d. Click **s1** and **Done**.
  - e. In the **Solutions** dialog box, click "fit1". The **Solutions** dialog box will appear as follows:



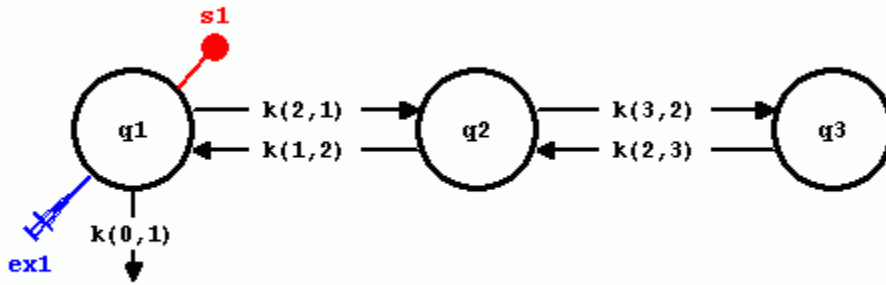
- f. Close the Solutions dialog box.
11. Restore the original solution {base1}.
    - a. In the **Compute** menu, click **Solutions**. The **Solutions** dialog box will open.
    - b. Click “base1”. The saved variables for “base1” will appear in **the Solution Variables** pane as shown below. Notice also in the **Current Solution** pane, **Restore Selected** is active. You now have the option to restore this solution.




- c. Click **Restore Selected**. The following message will appear:



- d. Click **OK**.
- e. Solve the model and view the solution. You will see it is the original solution. You can confirm this by examining the parameter values. Close all open windows and dialog boxes.
11. Add a compartment to the model.
- a. Add a third compartment to your model. The new model should appear as follows:



b. Add parameter values to your model.

(1) In the **Show** menu, click **Parameters**, or alternatively, on the **SAAM II Toolbar**, click **Parameters** . The **Parameters** dialog box will open. Notice the values for  $k(2,1)$ ,  $k(1,2)$ ,  $k(0,1)$  and  $vol$  are those for **study\_0**.

(2) Double-click  $k(3,2)$  to make it active. Type “0.01” in the **Value** box, and click **Save**. Repeat the process for  $k(2,3)$ . The **Parameters** dialog box will appear as follows:



Name	Type	Current	Low Limit	High Limit
k(0,1)	Adj	0.1000	0.0100	1.0000
k(1,2)	Adj	0.1000	0.0100	1.0000
k(2,1)	Adj	0.1000	0.0100	1.0000
k(2,3)	Adj	0.0100	0.0010	0.1000
k(3,2)	Adj	0.0100	0.0010	0.1000
vol	Adj	2000.0000	200.0000	20000.0000

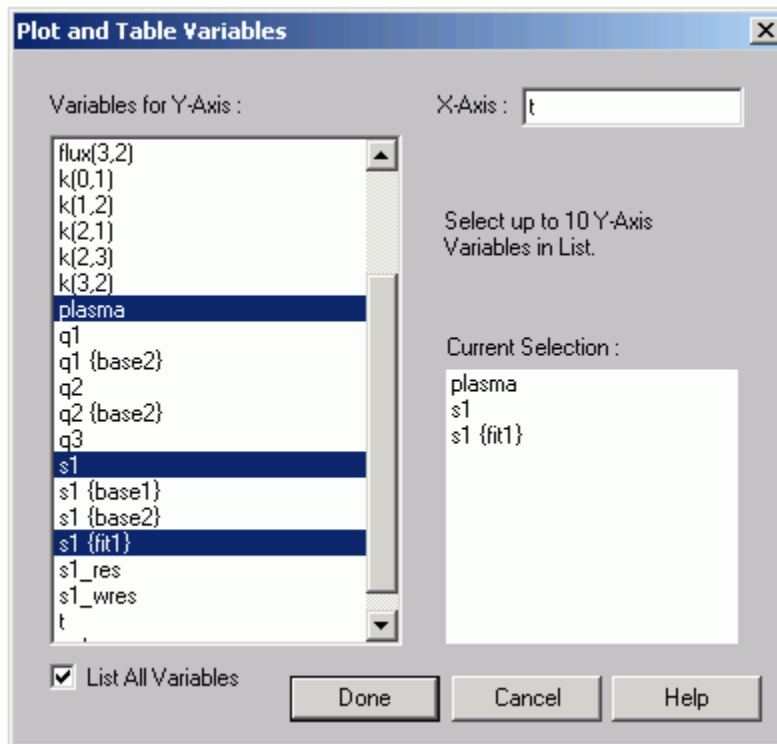
Name: k(2,3)      Value: .01

Type:  Fixed      Low Limit: 0.00100000

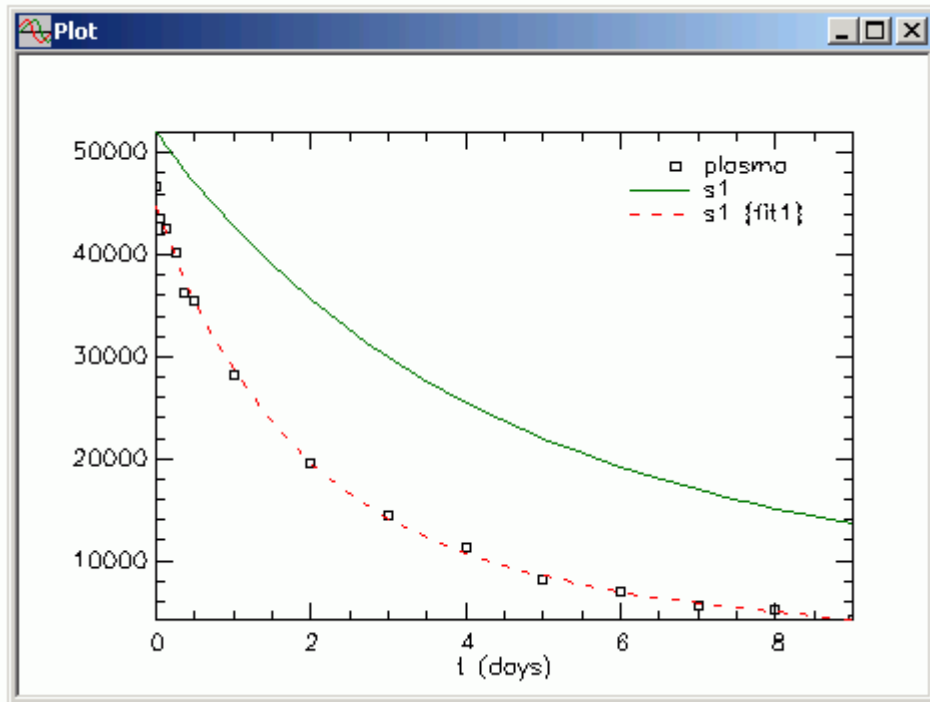
Adjustable      High Limit: 0.10000000

Buttons: Edit, Save, Done, Cancel, Help

- (3) Click **Done**.
- c. Solve the model, and compare the solution with the best fit to a two-compartment model solution.
- (1) In the **Compute** menu, click **Solve**, or alternatively, on the **SAAM II Toolbar**, click **Solve** .
- (2) In the **Show** menu, click **Plot**, or alternatively, on the **SAAM II Toolbar**, click **Plot** . A plot of the current solution s1 and the plasma data may appear. If a plot opens, in the **Set** menu, click **Plot/Table Variables**. The **Plot and Table Variables** dialog box will open. If a plot does not open, the **Plot and Table Variables** dialog box will open. Be sure the **List All Variables** check box is selected.
- (3) Press the **CTRL** key, and click **plasma**, **s1** and **s1{fit1}**. The **Plot and Table Variables** dialog box will appear as follows:




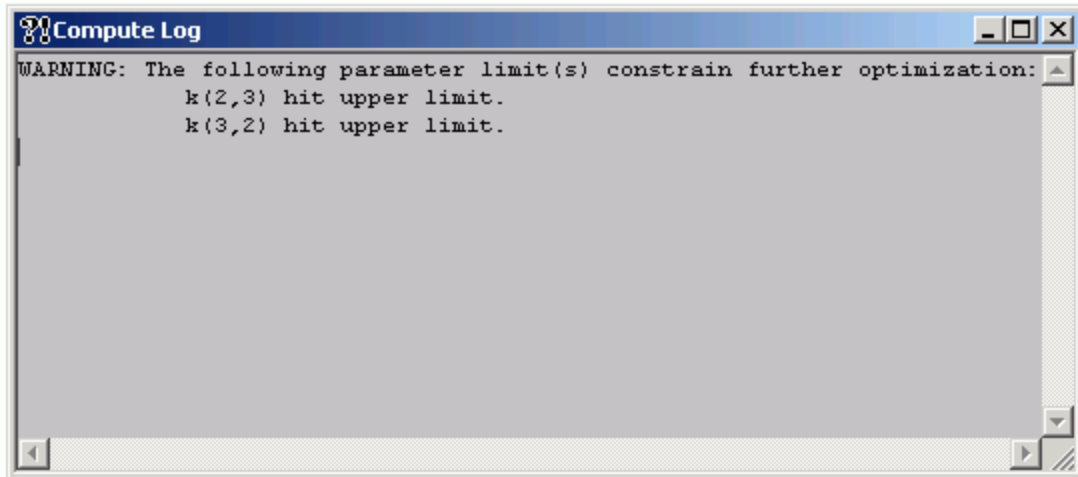
- (4) Click **Done**. The Plot window will appear as follows:



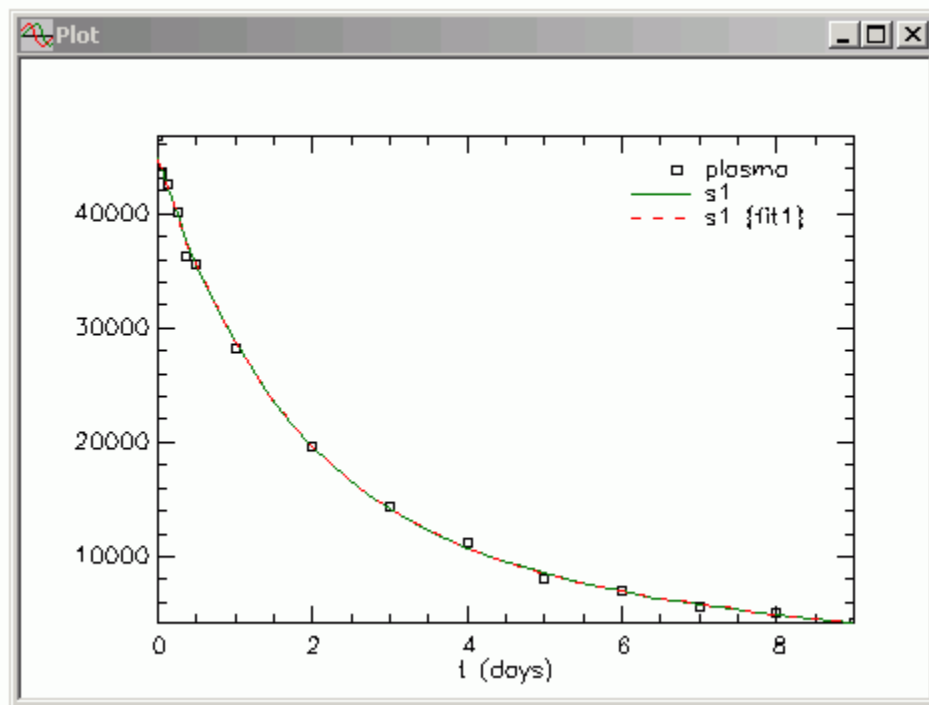
*Saved solutions.* It is important to know that, even though you changed the model structure by adding a third compartment, the solutions saved for the two-compartment model remain, and can be compared with your work on the third compartment.



- d. Fit the model to the data. In the **Compute** menu, click **Fit**, or alternatively, on the **SAAM II Toolbar** click **Fit** . The following warning message will appear:



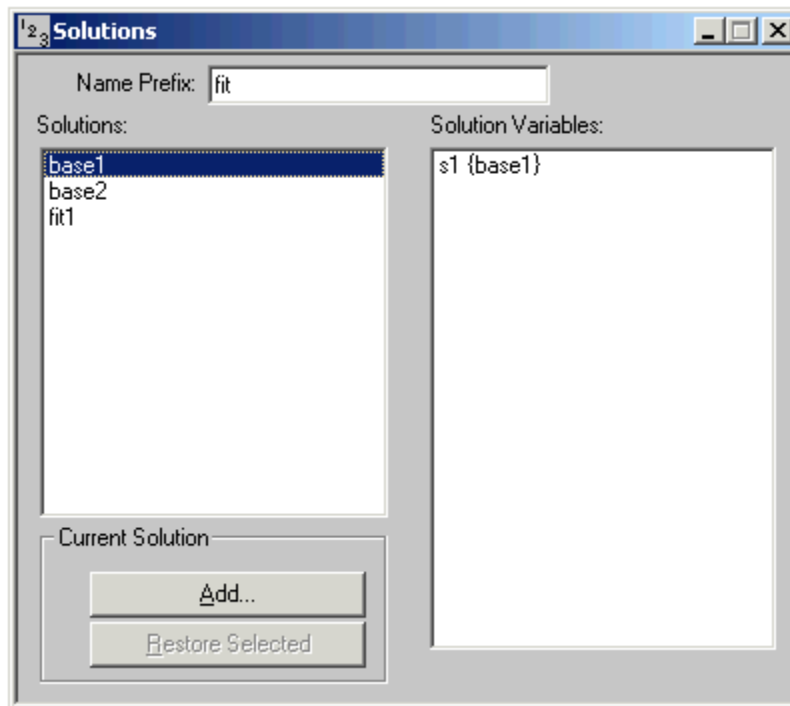
The **Plot** window will be updated as follows:



The combination of the warning message and the identical fit of the model to the data indicate a third compartment is not supported by the data.

- e. Close the **Compute Log** window and the **Plot** window.
12. Restore the original two-compartment model
- a. In the **Compute** menu, click **Solutions**. The **Solutions** dialog box will open.

- b. In the **Solutions** pane, click “base1”. The **Solutions** dialog box will appear as follows:



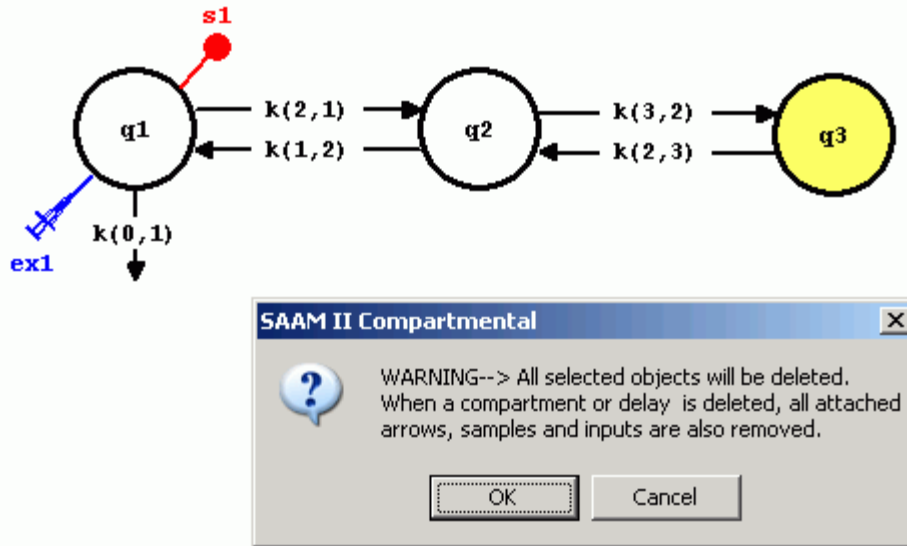
Although “base1” is active, the **Restore Selected** option in the **Current Solution** pane is dimmed.



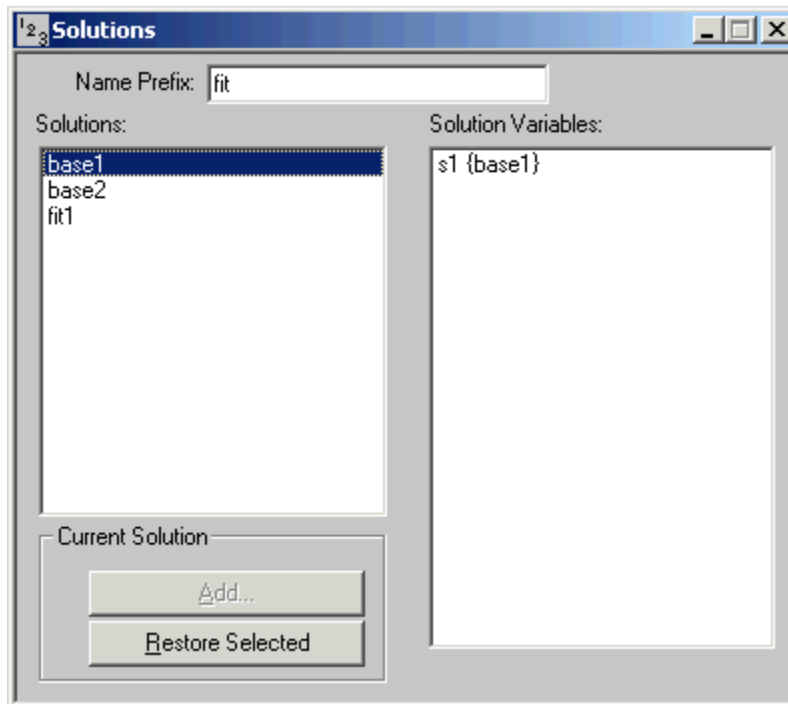
*Restoring solutions.* When you restore a solution, the model on the drawing canvas must be the same structural model as the saved solution. In the above case, the current model is a three-compartment model while the saved “base1” solution is a two-compartment model. Thus it cannot be restored.



- c. Close the **Solutions** dialog box.
- d. Delete Compartment **3** from the model.
- (1) Click Compartment **q3** to make it active.
  - (2) Press the **Delete** key. The model and a warning message will appear as follows:

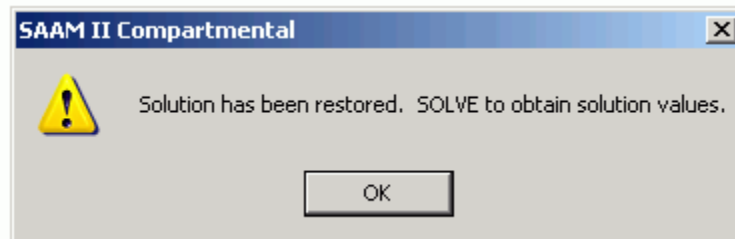


- (3) Click **OK**. The original two-compartment model will appear on the **Drawing Canvas**.
- e. In the **Compute** window, click **Solutions**. The **Solutions** dialog box will open.
- f. In the **Solutions** pane, click “base1”. The **Solutions** dialog box will appear as follows:

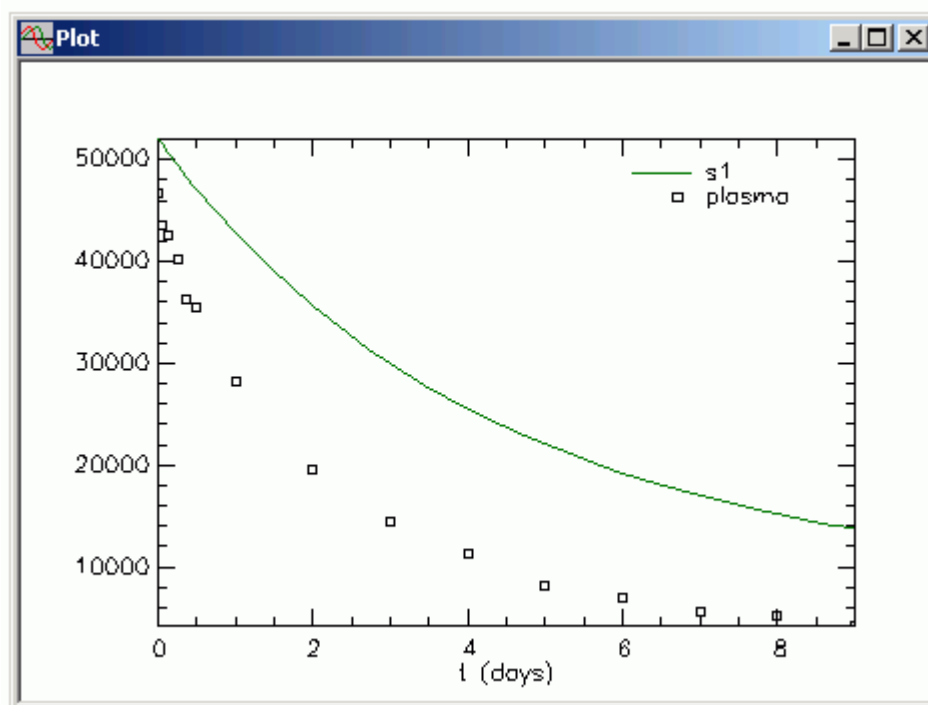


Now because the model on the **Drawing Canvas** is the same as the original saved model, the **Restored Selected** option is available in the **Current Solution** pane.

- g. Click **Restored Selected**. The following message will appear:



- h. Click **OK**, and close the **Solutions** dialog box.
- i. Solve the model, and view the solution. The original solution will appear as indicated by the following plot.

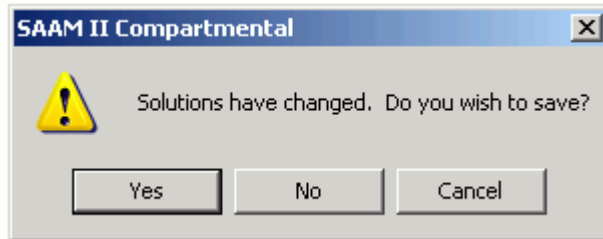


- j. Close all open windows and dialog boxes.

13. Save this study file and its solutions.

- a. In the **File** menu, click **Save As**. The **Save As** dialog box will open.

- b. Type “solutions” in the **File Name** box.
  - c. Click **Save**.
14. **Quit** the **SAAM II Compartmental** application. In the **File** menu, click **Exit**. The following message will appear:



If you click **Yes**, a file called **solutions.sol**, containing the solutions will be created. The “.sol” indicates a **SAAM II** solutions file. When you open **solutions.stu**, the solutions saved will be available in the **Solutions** dialog box. If you click **No**, the solutions will not be saved.

Click **Yes**. Now when you open **solutions.stu**, your solutions will be available.

