Using Altia Design with Statemate MAGNUM

Connection Tutorial

1.0   Introduction

Altia Design simulation graphics and user interface software can be used in conjunction with I-Logix's Statemate MAGNUM. The Altia interface to Statemate allows the I-Logix user to create interactive graphical panels with the state-of-the-art Altia Design editor.

The Altia Design package includes an editor, runtime engine and numerous libraries of components for quickly creating a user interface to Statemate simulations. In addition to using the supplied component libraries to create graphical front ends, the Altia Design product allows users to make modified versions of the existing components or create custom components without programming. The benefits of such graphical front panels include involving the customer in the design process, increasing collaborative design and debugging models more efficiently.

This step-by-step tutorial will guide you through the process of loading a simple Statemate model, creating an Altia Design interface and then connecting them. If you are interested in learning how to use your Altia interface with Statemate generated code, please see the generated code application note included in the Altia/Statemate connection software directory `altia/stmm/docs`.

2.0   Installing the Altia Design Connection Package

Make sure you have Statemate MAGNUM 2.0.1 or newer and Altia Design 4.0 or newer already installed.

UNIX users:

Install the connection package from the Altia Design CD-ROM following the system-specific installation instructions provided on the CD-ROM in the `<platform>/connect` directory. To download the connection package from the internet, please contact Altia, Inc. in the U.S. at **(719) 598-4299** for instructions.

The package is a compressed tar archive with a name like `<platform>_altiastmm.tar.Z` (for example, `sol_altiastmm.tar.Z`). To unpack it, change to your Altia Design product directory (e.g., `/usr/altia`) and execute:

```
zcat /PACKAGEDIR/<platform>_altiastmm.tar.Z | tar xvf -
```

where `/PACKAGEDIR` is the directory containing the `tar.Z` file. When `zcat` completes successfully, execute: `INSTALLALTIASTMM`.

PC Users:

On the Altia Design CD-ROM, open the `connect` folder in a file browser window and double-click on `altSTMzip.exe`. A dialog will appear that allows you to select a destination directory for the extracted files. You should choose the directory containing the Design product software (e.g., `c:\usr\altia`).

To download the connection package from the Web, visit www.altia.com, select **Support**, then **Downloads** and choose to download the Altia/Statemate Connection for Altia Design (4.0 or newer). After the download completes, execute the downloaded file (`altSTMzip.exe`). A dialog will appear that allows you to select a destination directory for the extracted files. You should choose the directory containing the Altia Design product software (e.g., `c:\usr\altia`).

3.0   Tutorial Overview

The goal of this tutorial is to show the basic link between Statemate and an Altia Graphical User Interface (GUI). In this tutorial, we will discuss every step necessary to develop a simple system that exercises this connection.

Before you begin this 30-minute tutorial, make sure you have Statemate 2.0.1 or newer and Altia Design 4.0 or newer already installed on your machine. Also, please make sure that you have an STM_ROOT system environment variable that is set to the correct Statemate root directory (e.g., c:\stmm201).

For more information on setting system environment variables, please see your operating system manuals. If you need a new copy of Altia Design, please call Altia in the U.S. at **(719) 598-4299** or visit our web site at www.altia.com.

- The first section, labeled *Load the Sample Statemate Simulation*, will describe how to load the included sample model that consists of a simple statechart which mimics a gain block.

- In the next section (*Use Altia Design to Create a Simple GUI*), we will step through the few procedures required to build a GUI that has a knob, a meter and a slider.

- The process of connecting our model to our GUI will be addressed in the next section, *Connect Your Altia GUI to Your Statemate Model*. We will connect the two such that the slider will be the gain input, the meter will display the gain result and the knob will set the actual gain amount.

- Finally, the *Test Your Altia GUI/Statemate Model Interaction* section will show you how to verify that your GUI and your model are connected correctly.

4.0   Load the Sample Statemate Simulation

1. The first thing to do is start Statemate (PC users, be sure your X server and license servers are started first).

2. When Statemate opens, click on **File** and choose **New Project...**.

3. In the **Name:** field, type **TUTORIAL** and for **Manager:**, type in your Statemate user name. For **Databank:**, type in the location of the sample databank that was included with the Statemate connection (usually located in `$ALTIAHOME/stmm/demos/tutorial` where `$ALTIAHOME` is replaced by the actual Altia product directory name) and then click **OK** (see <u>Figure 4-1</u>).
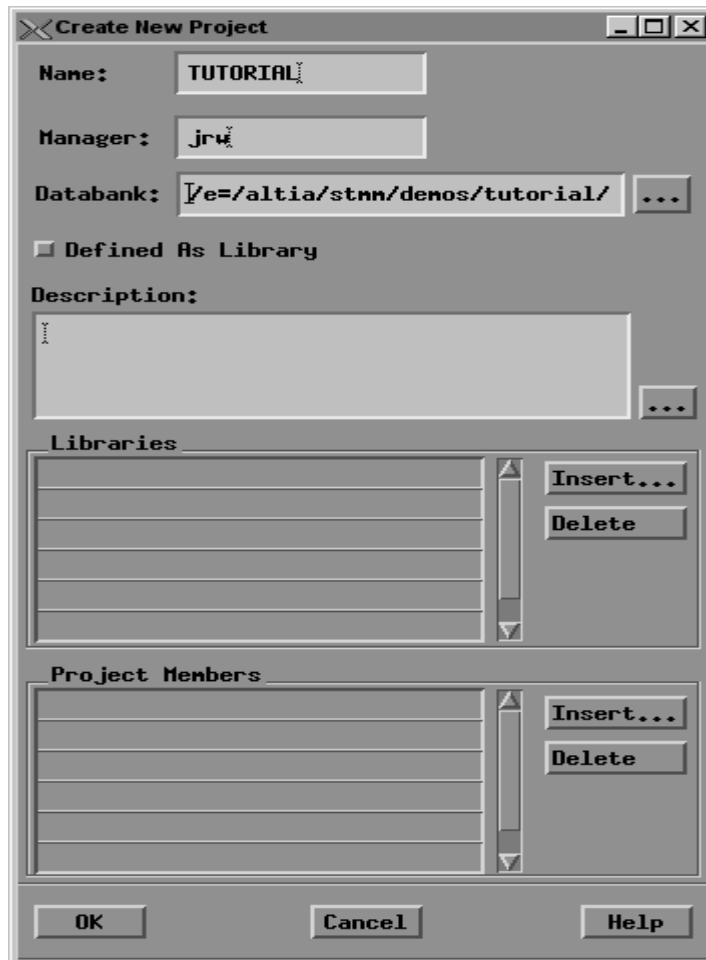
FIGURE 4-1   Statemate Create New Project

4. An **Open Project** dialog will open with our newly created TUTORIAL project se-
   lected. Notice that there is currently no work area (in the right pane) for this
   project (see).

5. **Type in a location for a work area in the text input area at the bottom of the dialog (e.g., `e:/tmp/work`) and click the OK button. Statemate will automatically create this new work area and associate it with our project.**
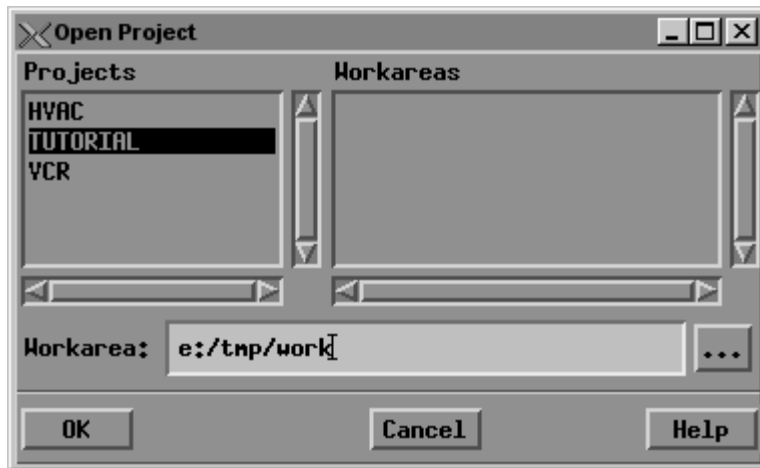

**FIGURE 4-2   Statemate Open Project
Dialog**

6. After the work area is created, the main Statemate window will open the TUTORIAL project and display a number of icons.
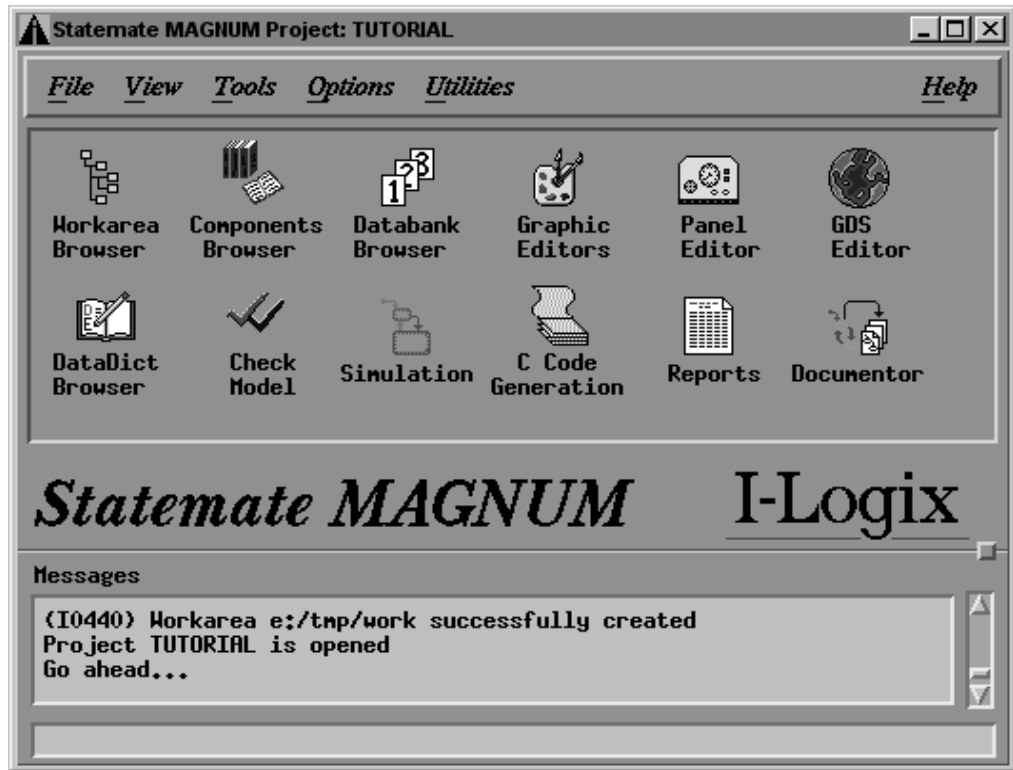

FIGURE 4-3   Main Statemate Window

7. Click on the **Databank Browser** icon to open the Databank Browser. In the **Show Files** dialog that opens, choose **All Files** and click **OK**

8. From the **Edit** menu of the Databank Browser, choose **Select > Select All**. Then from the **Configuration** menu, choose **Check Out > Without Lock**.

9. Close the Databank Browser by clicking on its **File** menu and choosing **Exit**.

10. Back in the main Statemate window, click on the **Simulation** icon. From the
    Simulation dialog's **File** menu, choose **Open Profile...**.

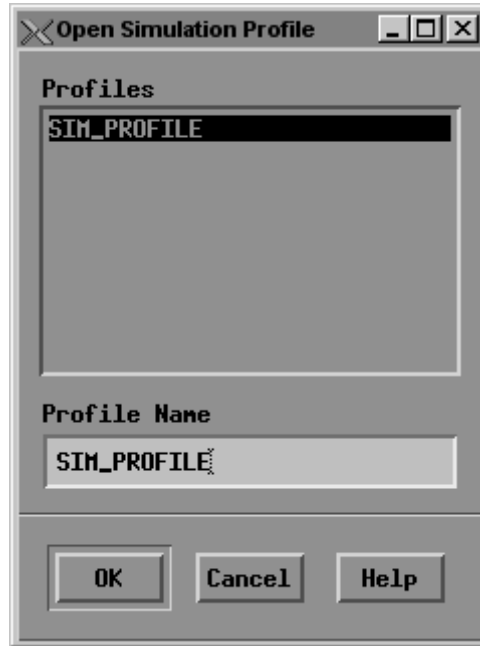11. Choose the profile named **SIM_PROFILE** and click **OK**.

**FIGURE 4-4   Open Simulation Profile
                Dialog**

12. From the **Execute** menu, choose **Execute Simulation** which will open two dialogs
    titled **Simulation Execution** and **Simulation Monitor**.

13. In the Simulation Execution dialog, choose **Autorun** from the **Go** menu.

The simulation is now running and waiting for some input. The next section dis-
cusses the process of building an Altia GUI which can drive this simple model.

5.0   Use Altia Design to Create a Simple GUI

1. **Open the Altia Design editor by choosing its icon from the Altia Design program group (UNIX users can run** `$ALTIAHOME/bin/altia` **from the command line where** `$ALTIAHOME` **is replaced by the actual Altia product directory name).**

2. **In this initial design we will only have a knob, an analog meter and a slider. To create our GUI, we will use objects from Altia's included component libraries.**

3. **To create the knob, start by clicking on the Libraries button right above the Main Altia View.**
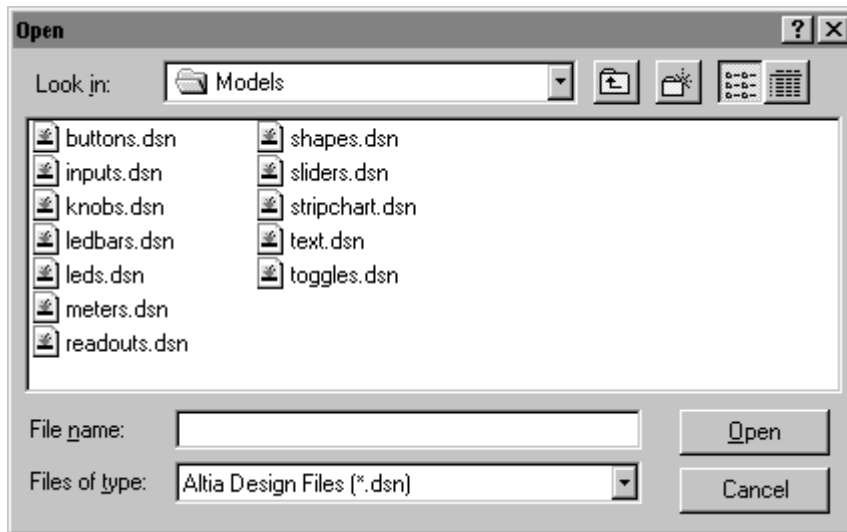

FIGURE 5-5   Open Libraries Dialog

4. **Choose the knobs.dsn library and then click Open to view a collection of pre-built knobs. UNIX users must first double click on the** `$ALTIAHOME/models/` **entry in the Standard Models Directories list to go to the directory that contains the** `knobs.dsn` **file.**

5. **Pull the knob of your choice into your design by left-clicking on it and dragging it into the Design window. Close the Libraries view.**
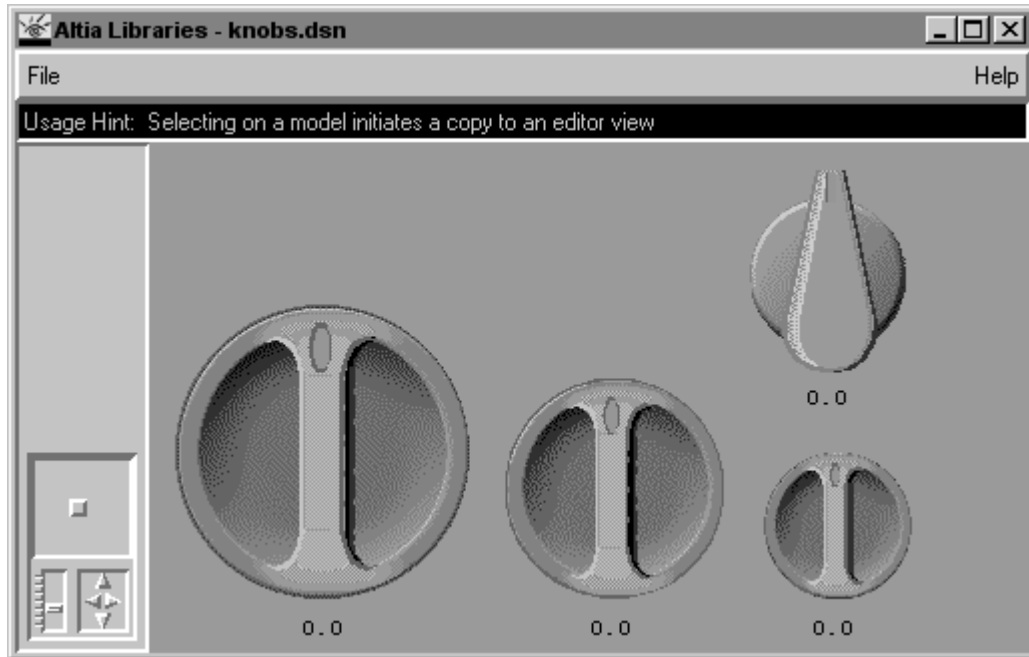

FIGURE 5-6   Library of Knobs

6. Double-click on the knob to open its properties dialog. Change the **Name** to **Gain,** the **Initial Value** to **1,** the **Start Value** property to **1** and its **End Value** to **10**.
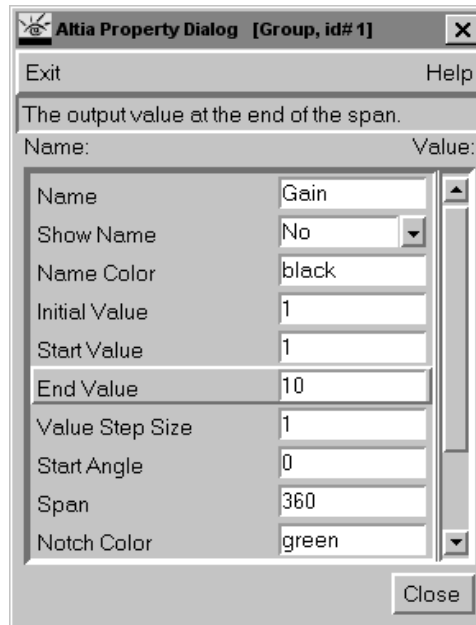

FIGURE 5-7   Knob Properties

There are several other properties associated with this knob. We don't need to alter any other properties for this tutorial, but feel free to experiment with them. Properties make changing the behavior and appearance of components extremely easy.

7. Several analog meters are located in the **meters.dsn** model library. Open this component library by clicking the **Libraries** button. Select **meters.dsn** and click the **Open** button.
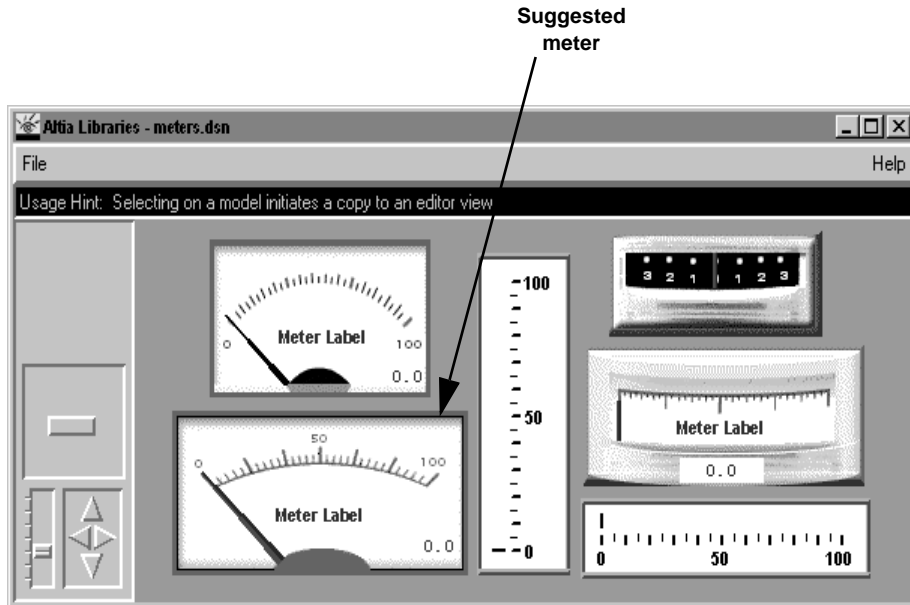

FIGURE 5-8   Library of Meters

8. Choose an analog meter and drag it into the Altia Design main window just below the button. Close the Libraries view.

9. Double-click on the meter to open its properties dialog. Change the **Text Label** to **Gain Meter,** the **Name** property to **Gain Result** and its **Maximum Value** to **1000**.

10. **To put a slider into our design, open the sliders.dsn model library. Drag in the slider object of your choice. After placing it in your Design window, close the Altia Models View window by choosing Close from its File menu.**
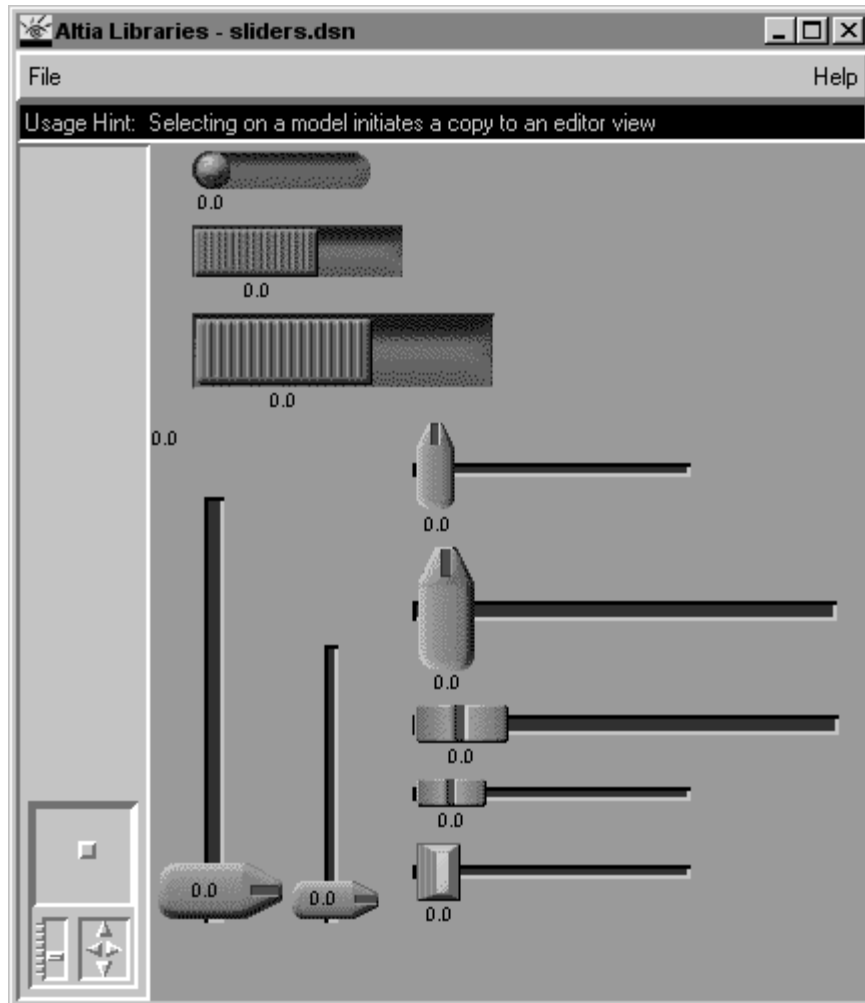

FIGURE 5-9   Library of Sliders

11. **Change the slider's Name property to Gain Feed.**

12. Now, let's save our GUI to a design file. In the Design editor, choose **Save** from the **File** menu. Save your design as **tutor.dsn.** On the PC, the default directory is Altia's `work` directory, which is fine. On UNIX, the default directory is the present working directory. You should change directories if this is not an appropriate work directory.

Although the graphics look neat, right now they don't do much because we have yet to connect them to anything. This is our next task.

6.0   Connect Your Altia GUI to Your Statemate Model

We must now connect the input/output labels of our Statemate model to the Altia GUI objects' labels so that the two programs may communicate. This is easily done with Altia.

1. To get the signal information from Statemate, choose **Get Connection Info** from Altia Design's **Statemate** menu.

2. The dialog that opens will allow you to type in your project name and work area. In the **Project Name** box, type in **TUTORIAL** and in the **Work Area** box, type the path to your work area (e.g., **e:\tmp\work**) then click the **OK** button.
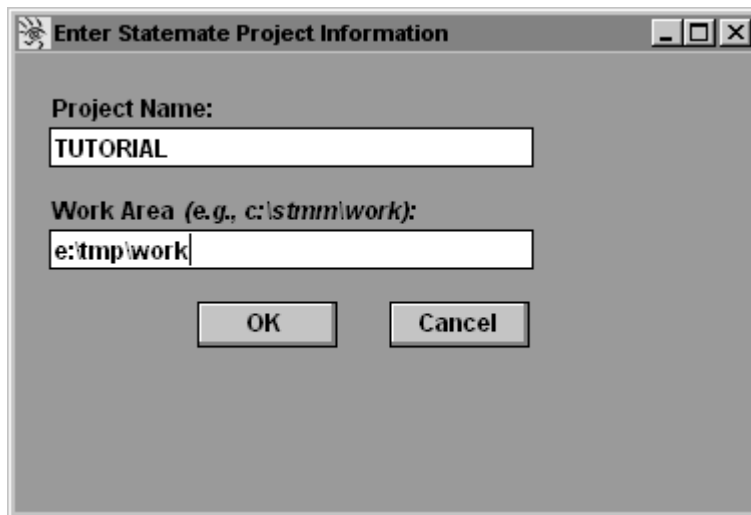
**FIGURE 6-10 Enter Statemate
Information**

3. **The dialog will display some informational text messages that should end with: "Available connections successfully sent to Altia." Press OK to dismiss the dialog.**

4. **From the Altia Design editor's Connections menu, choose All Objects....** A window containing the available connections of our three Altia objects will open.
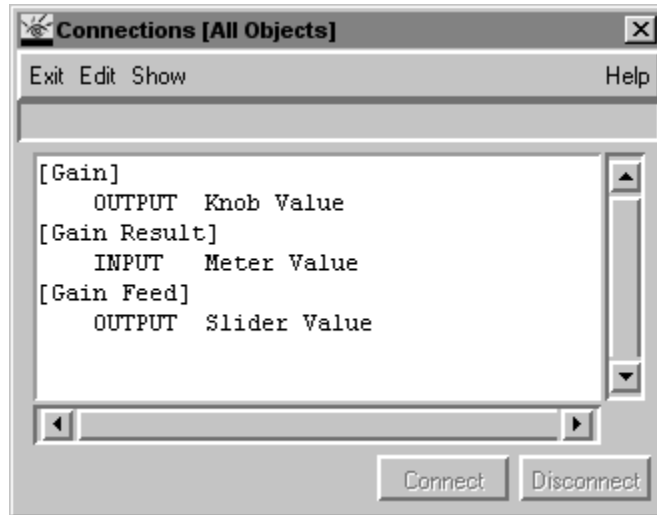

FIGURE 6-11 Connectors of All Objects

5. Next, from the **Connections** menu, choose **External Signals...** to open the dialog which will allow us to connect to the available Statemate signals (see Figure 6-12). This window also contains a useful graphic at the bottom to show which directions the input and output signals flow relative to Altia and Statemate.
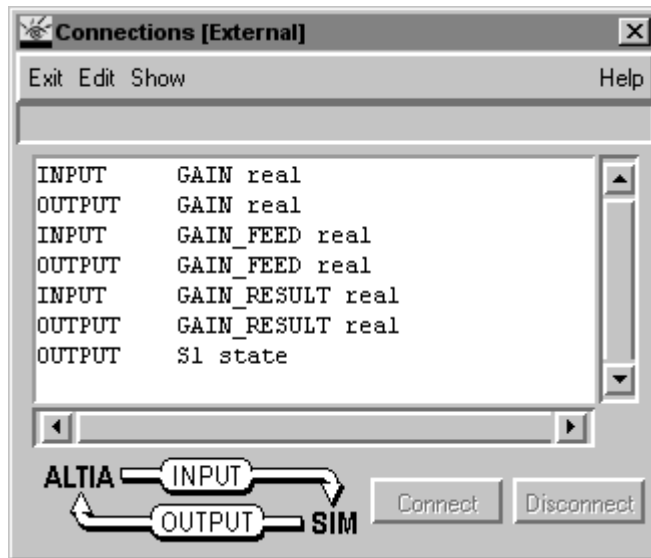

FIGURE 6-12 Connectors of External Signals

Now that we can see the connections of our Statemate signals and those of our Altia objects, let's connect them.

6. In the connection dialog that shows all of the objects, click on the signal labeled **OUTPUT Slider Value**, then click on the signal in the external connection dialog labeled **INPUT GAIN_FEED real**. When this is done the **Connect** button will become available. Press it to connect the slider to the Statemate variable **GAIN_FEED**. The connections dialogs should reflect the fact that the two objects are now connected (see Figure 6-13).

7. To connect the result of the Statemate gain statechart to the analog meter, click on the signal labeled **OUTPUT GAIN_RESULT real** in the external connections dialog, then click on the signal labeled **INPUT Meter Value**. Press the **Connect** button to connect the output of the model to the meter.

8. Finally, to connect the gain value to our knob, click on the signal labeled **INPUT GAIN real** in the external connections dialog. Then, click on the signal labeled **OUTPUT Knob Value** in the other connection dialog and press the **Connect** button.
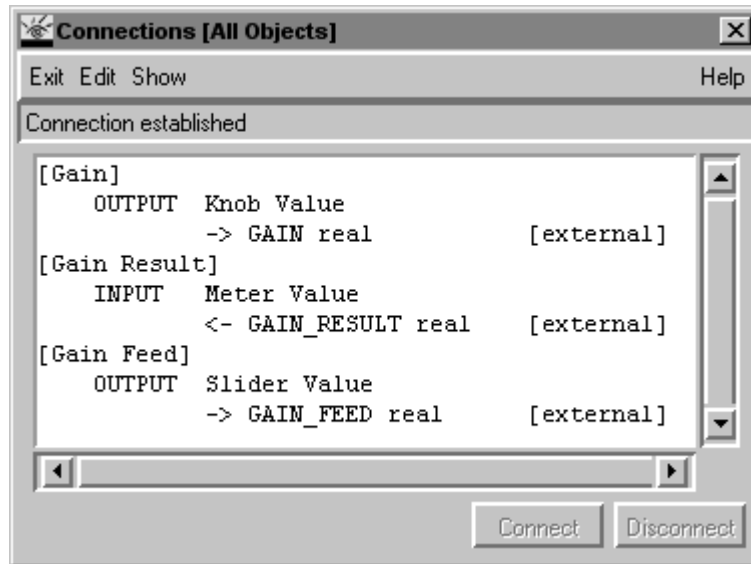

FIGURE 6-13 Connections of All Objects

9. The connections have now been established. Save the changes (the connections are really the only changes) to your Design GUI by choosing **Save** from the **File** menu.

    CAUTION: You must save whenever external connections are modified. Otherwise, the changes will *not* be recognized by the Altia/Statemate connection.

10. After saving, close all connections dialogs by choosing **Close All** from the **Exit** menu in one of the connections dialogs but leave the Altia Design editor open.

7.0   Test Your Altia GUI/Statemate Model Interaction

Your Altia Design editor window should still be displaying your GUI design from the previous section (*Connect Your Altia GUI to Your Statemate Model*). Change your focus to the Altia Design window.

1. In Altia Design, you are probably in Edit mode. Switch the Altia Design editor to Run mode by pressing the **Run** button in the upper left corner of the editor.

2. From Altia's **Statemate** menu, choose the **Run Sim Connection** option to connect to the running Statemate simulation. A command window with informational messages will open to alert you to the status of the connection attempt. A successful connection will yield the message **"CONNECTION INITIALIZATION DONE! ALTIA IS READY FOR USE."**

3. Click on the handle of the slider bar and drag the mouse from side to side. Also change the value of the knob. You will notice that the analog meter will change to reflect the status of the Statemate gain output (which is the value of the knob multiplied by the value of the slider bar).

8.0   Executing Your Altia GUI Using Altia Runtime

In the process of connecting your Altia GUI to the Statemate model, a script was automatically generated. This script makes it easy to run your GUI without using the Altia editor. With this feature, you can distribute an interactive copy of your Statemate/Altia projects to anyone who has Statemate MAGNUM installed.

1. Close the Altia editor if it is still open.

2. With the Statemate model still running, run the script file **tutor.bat** from a Windows Explorer window or from a command prompt (UNIX users will have a **tutor.sh** script).

3. Our GUI will open in an Altia Runtime window. Feel free to interact with the GUI again … it will behave just as it did in the editor.

To distribute your design to another Statemate MAGNUM user, you must include the following files:

• **tutor.dsn, tutor.rtm, tutor.mxc,** and **tutor.bat** (**tutor.sh** for UNIX users) from your current working directory

• **altiastm.exe** (**altiastm** on UNIX) from the Altia software stmm/bin directory

- **altiart.exe** (**altiart.out** on UNIX) and **fonts.ali** from the Altia software `bin` directory (PC users also need the **colors.ali** file)

To run the Altia GUI, the user would simply need to run the Statemate model and then execute the bat or shell script.

9.0   Tutorial Summary

In this tutorial, we began by loading a pre-existing Statemate MAGNUM model. We then created an Altia Design GUI from scratch and used the connection dialogs in Altia to connect the GUI to the model. In order to be sure that our connections were correct, we ran the Statemate model and generated input using our Altia interface. The necessary procedures for distributing the Altia interface to other Statemate users were given in the final section.

If you are interested in learning how to use your Altia interface with Statemate generated code, please see the generated code application note included in the Altia/Statemate connection software directory `altia/stmm/docs`.