Adobe Flash CS4
Part 4: Interactivity

Fall 2010, Version 1.0

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Introduction

Adobe Flash CS4 is the industry standard software for creating rich, interactive content ranging from simple animations to full-featured web applications. Flash includes many features that make it powerful but easy to use. In addition, Flash includes a scripting language that can be used to add interactivity and complex functionality to Flash projects. This handout covers how to create realistic motion in animations with the use of bones and joints, as well as how to develop Flash websites and add ActionScript.

Downloading the Data Files

This handout includes sample data files that can be used for hands-on practice. The data files are stored in a self-extracting archive. The archive must be downloaded and executed in order to extract the data files.
- The data files used with this handout are available for download at http://www.calstatela.edu/its/training/datafiles/flashcs4p4.exe.
- Instructions on how to download and extract the data files are available at http://www.calstatela.edu/its/docs/download.php.

Articulated Motion

One of the easiest ways to create animation with Flash CS4 is through the use of motion tweens. However, fluid movement, such as the movement of legs when walking, is difficult to achieve through tweening alone. The use of articulated joints and inverse kinematics in Flash CS4 allows for such animations to be created with ease.

<u>Defining Bones</u>

The first step in creating articulated motion is to define the bones of an object. Defining bones allows for the formation of moveable joints. Collectively, a set of connected bones and their joints is called an *armature*.

To create a crane:
1. Click the **Start** button, point to **All Programs**, point to **Adobe Design Premium CS4**, and select **Adobe Flash CS4 Professional**. The program opens and the **Welcome Screen** displays.
2. Click the **File** menu and select **Open**. The **Open** dialog box opens.
3. Navigate to the data files folder, select the **SScrane.fla** file, and then click the **Open** button.
4. Select the **crane_base** layer in the **Timeline**.
5. Drag the **Main Crane** movie clip symbol from the **Library** panel to the lower-left corner of the **Stage**.
6. Drag the **Crane Arm** movie clip symbol from the **Library** panel to the **Stage** and place it so that the left side of the **Crane Arm** symbol connects to the top of the **Main Crane** symbol.
7. Drag another instance of the **Crane Arm** movie clip symbol from the **Library** panel to the **Stage** and place it so that the left side of the second **Crane Arm** symbol connects to the right side of the first **Crane Arm** symbol.

8. Drag the **Winch** movie clip symbol from the **Library** panel to the **Stage** and place it so that the top of the **Winch** symbol connects to the right side of the second **Crane Arm** symbol.

9. Rearrange the symbols on the **Stage** so that the **Winch** movie clip symbol makes contact with the **Rocket** graphic symbol (see Figure 1).

Figure 1 – Setting Up the Crane

To define the bones:

1. Select the **Bone** tool in the **Tools** panel.

2. Drag to draw a bone starting from the bottom base of the **Main Crane** symbol to where it makes contact with the adjacent **Crane Arm** symbol. The **Crane Arm** symbol is automatically selected (see Figure 2).

   NOTE: When defining bones, ensure that the mouse pointer hovers over the end of the last drawn bone. The pointer changes into a bone with a plus sign when it is possible to draw a bone; the pointer changes into a circle with a slash next to the bone when it is not possible to draw a bone. This might have to do with the symbol itself or the positioning between symbols.
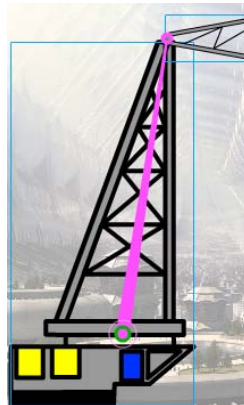

Figure 2 – Defining a Bone

3. Continuing from the last bone, drag to draw another bone across the adjacent **Crane Arm** symbol.

4. Repeat step 3 for the second **Crane Arm** symbol and the **Winch** symbol. The bones connect to each other and to the **Rocket** symbol (see Figure 3).

   NOTE: An *armature* layer is created when using the **Bone** tool, and the keyframes of the **crane_base** and **rocket** layers disappear. Additionally, drawing connecting bones between objects may slightly reposition the affected symbols in order to create a realistic looking joint (with minimal air space in between).
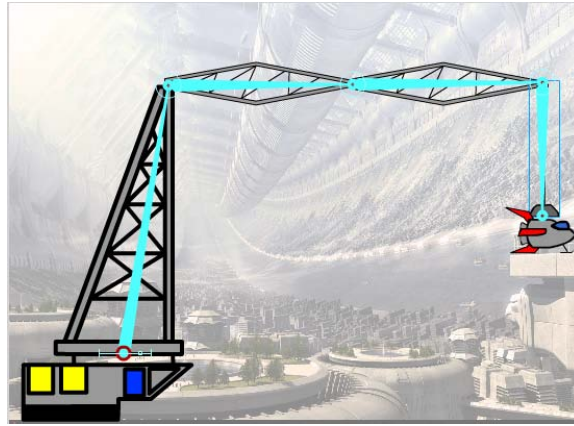
Figure 3 – Bones and Joints

Positioning Bones

Once bones and joints have been created, inverse kinematics comes into play. When one bone moves, the other connected bones move in relation to the bone that initiated the movement. Flash approximates the movement as best as it can to create fluid motion of the connected symbols.

To reposition all the bones of an armature:

1. In the **Timeline**, double-click the newly created armature layer and rename it to **Crane_Armature**.

   NOTE: Armature layer names cannot have spaces.

2. Select the **Selection** tool ![selection tool] in the **Tools** panel.
3. Select the **Crane_Armature** layer in the **Timeline**. The bones reappear over the crane movie clip symbols.
4. Drag the **Winch** symbol to reposition it on the **Stage**. The entire armature repositions according to the movement of the **Winch** symbol.
5. Press **Ctrl+Z** to undo the changes and revert back to the original image.

To reposition individual bones:

1. If necessary, select the **Selection** tool ![selection tool], and then select the **Crane_Armature** layer in the **Timeline** to display the bones.
2. Hold down the **Shift** key and drag the **Winch** symbol to a new position on the **Stage**. Notice that only the bone over the **Winch** symbol moves, leaving the others intact.

Constraining Joints and Translation

By default, joints have no constraints, which means they can rotate 360 degrees. This may not be desired in all situations, so constraining the movement of joints can help with creating a realistic joint structure and movement. Constraining the translation of a joint involves the movement of the joint on the X-axis and Y-axis, thereby limiting horizontal and vertical movement.

To constrain joints:

1. If necessary, select the **Selection** tool ![selection tool], and then select the **Crane_Armature** layer in the **Timeline** to display the bones.
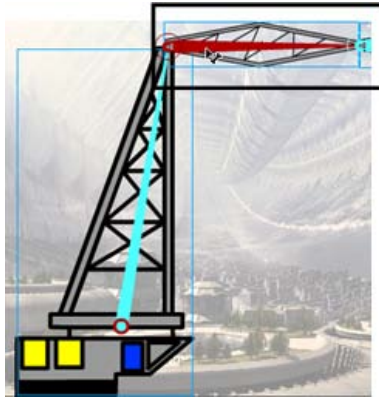2. Select the bone over the first **Crane Arm** symbol (see Figure 4).

Figure 4 – Selecting a Bone

3. In the **Property inspector**, under **Joint: Rotation**, select the **Constrain** check box (see Figure 5).
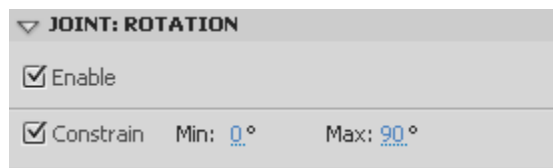

Figure 5 – Constraining Joint: Rotation

4. Set the **Min** value to **0** and the **Max** value to **90**. The joint is constrained to move a maximum of **90** degrees (see Figure 6).

Figure 6 – Angle Constraints

NOTE: When deciding the minimum and maximum joint angles, it helps to envision the joint angle right-side up, with negative values deviating to the left of a 90-degree angle and positive values deviating to the right.

To constrain translations:

1. If necessary, select the **Selection** tool , and then select the **Crane_Armature** layer in the **Timeline** to display the bones.
2. Select the bone over the **Main Crane** symbol.
3. In the **Property inspector**, under **Joint: Rotation**, deselect the **Enable** check box to disable joint rotation.
4. Under **Joint: X Translation**, select the **Enable** check box to enable horizontal translation.
5. Select the **Constrain** check box (see Figure 7).

Figure 7 – Constraining Joint: X Translation

6. Set the **Min** value to **-25** and the **Max** value to **25**. The bone is constrained to move 25 pixels to the left and 25 pixels to the right (see Figure 8).

Figure 8 – X Translation Movement Range

Setting Poses

Setting poses is the equivalent of keyframes, indicating a change when working with an armature. Flash interpolates the movement from one armature pose to the next in a fluid motion.

To set poses:
1. In the **Timeline**, select frame **24** of the **Crane_Armature** layer, and then press the **F6** key to insert a new keyframe.
2. Drag the **Winch** symbol upward, lifting up the **Rocket** symbol (see Figure 9).

Figure 9 – Pose at Frame 24

3. In the **Timeline**, select frame **48** of the **Crane_Armature** layer, and then press the **F6** key to insert a new keyframe.
4. Drag the first **Crane Arm** symbol, constrained earlier, downward (see Figure 10).
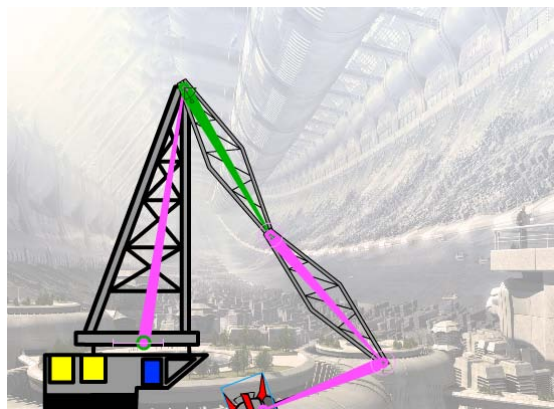

Figure 10 – Pose at Frame 48 (Downward Crane Arm)

5. While on the same frame, drag the second **Crane Arm** symbol upward (see Figure 11).
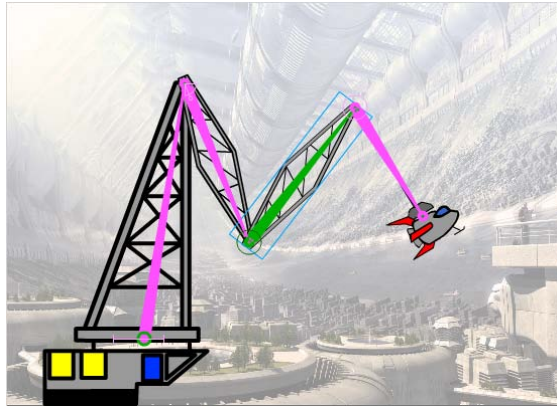
Figure 11 – Pose at Frame 48 (Upward Crane Arm)

6. In the **Timeline**, select frame **72** of the **Crane_Armature** layer, and then press the **F6** key to insert a new keyframe.
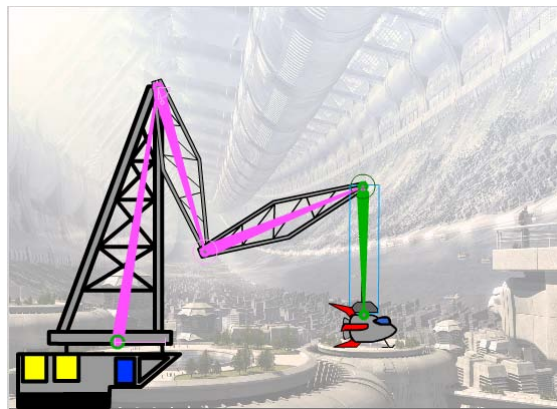7. Drag the **Winch** symbol towards the landing pad (see Figure 12).

Figure 12 – Pose at Frame 72

8. Press **Ctrl**+**Enter** to preview the animation in a **Flash Player** window.

Creating Web Pages with Flash

Flash CS4 can be used to create web pages. Each frame in the Timeline can be thought of as an entire page of a website.

Creating New Pages

Pages in Flash can be created by inserting frames and keyframes. The advantage of using Flash is that the layout and contents of the previous frame will be carried over to the next frame, making it easy to create consistent pages.

To add a basic layout:
1. Click the **File** menu and select **Open**. The **Open** dialog box opens.
2. Locate and select the **site_station.fla** file, and then click the **Open** button.
3. In the **Timeline**, hold down the **Ctrl** key and select frame **4** of the **title**, **spaceship**, **banner**, **site**, and **background** layers.
4. Right-click on any of the selected frames and select **Insert Frame** to insert new frames. Or, press the **F5** key.

To add buttons to the new page:
1. In the **Timeline**, select frame **4** of the **home** layer.

   NOTE: To display the full layer names, drag the bar separating the layer names and the frames portions of the **Timeline** (see Figure 13).
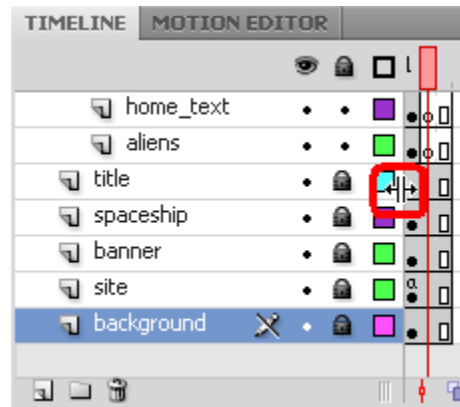

Figure 13 – Adjusting the Width of the Layer Names

2. Hold down the **Ctrl** key and select frame **4** of the **about**, **video**, and **explore** layers.
3. Right-click on any of the selected frames and select **Insert Frame**. The buttons appear in frame **4** of the selected layers.

Writing ActionScript

ActionScript is the scripting language included in Flash CS4. It lets users add complex interactivity, playback control, and data display to their application. For example, ActionScript can be used to attach behaviors to buttons or to stop an animation. Users can add ActionScript in the authoring environment by using the *Actions* panel, *Script* window, or an external editor.

Linking Buttons

To navigate to different pages of a Flash website, ActionScript can be used to control buttons. Clicking a button will jump to a different frame in the Timeline, with each frame representing a page of a website. Before adding any code, users need to give each button a unique instance name. The instance name enables users to target the button with ActionScript code.

To link the Home button:
1. Deselect all objects by clicking in the gray area surrounding the **Stage**.
2. Select the **Home** button on the **Stage**. The **home** layer is automatically selected in the **Timeline**.
3. In the **Property inspector**, type **home** in the **Instance Name** box to give an instance name to the button (see Figure 14).
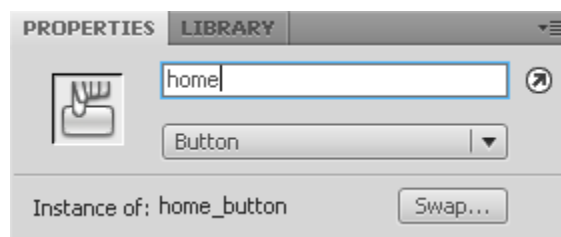

Figure 14 – Assigning an Instance Name in the Property Inspector

NOTE: An instance name cannot have spaces or special characters, but can contain underscores. Also, instance names are case-sensitive.

4. Minimize the **Flash CS4** application window.
5. Locate and open the **Link.txt** file.
6. In the **Link.txt** file, select the first four lines of the script, and then click the **Edit** menu and select **Copy** to copy the selection (see Figure 15).
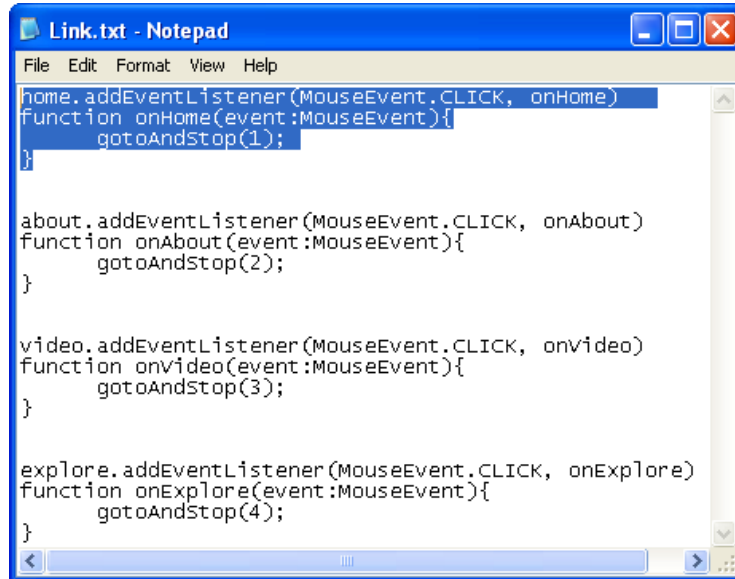

Figure 15 – Link.txt File

7. Maximize the **Flash CS4** application window.
8. In the **Timeline**, select frame **1** of the **home** layer.
9. Click the **Window** menu and select **Actions** (see Figure 16). Or, press the **F9** key. The **Actions** panel opens.
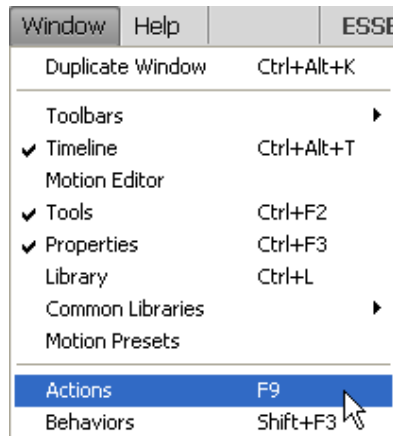

Figure 16 – Window Menu When Selecting Actions

10. Right-click in the **Script** pane of the **Actions** panel and select **Paste**. Or, type the following code in the **Script** pane (see Figure 17).

```
home.addEventListener(MouseEvent.CLICK, onHome)
function onHome(event:MouseEvent){
        gotoAndStop(1);
}
```
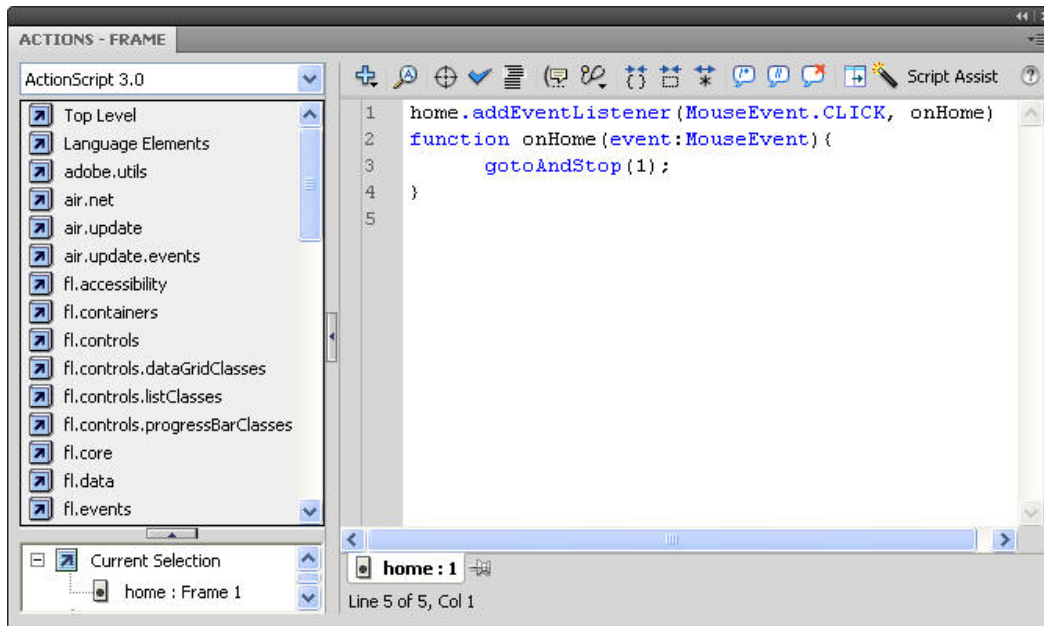
11. Close the **Actions** panel.

Figure 17 – Actions Panel (Home)

To link the About button:
1. Select the **About** button on the **Stage**. The **about** layer is automatically selected in the **Timeline**.
2. In the **Property inspector**, type **about** in the **Instance Name** box.
3. Switch to the **Link.txt** file, copy the second four lines of the script, and then switch back to the **Flash CS4** application window.
4. In the **Timeline**, select frame **1** of the **about** layer.
5. Press the **F9** key to open the **Actions** panel.
6. Right-click in the **Script** pane of the **Actions** panel and select **Paste**. Or, type the following code in the **Script** pane (see Figure 18).

```
about.addEventListener(MouseEvent.CLICK, onAbout)
function onAbout(event:MouseEvent){
        gotoAndStop(2);
}
```
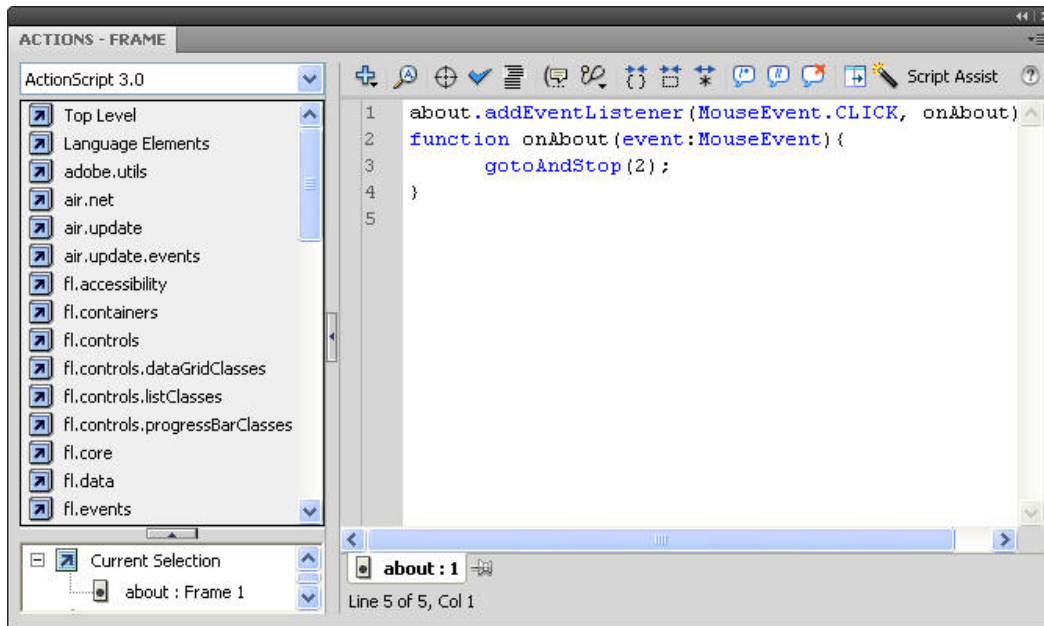
7. Close the **Actions** panel.

Figure 18 – Actions Panel (About)

To link the Video button:

1. Select the **Video** button on the **Stage**. The **video** layer is automatically selected in the **Timeline**.
2. In the **Property inspector**, type **video** in the **Instance Name** box.
3. Switch to the **Link.txt** file, copy the third four lines of the script, and then switch back to the **Flash CS4** application window.
4. In the **Timeline**, select frame **1** of the **video** layer.
5. Press the **F9** key to open the **Actions** panel.
6. Right-click in the **Script** pane of the **Actions** panel and select **Paste**. Or, type the following code in the **Script** pane (see Figure 19).

```
video.addEventListener(MouseEvent.CLICK, onVideo)
function onVideo(event:MouseEvent){
    gotoAndStop(3);
}
```
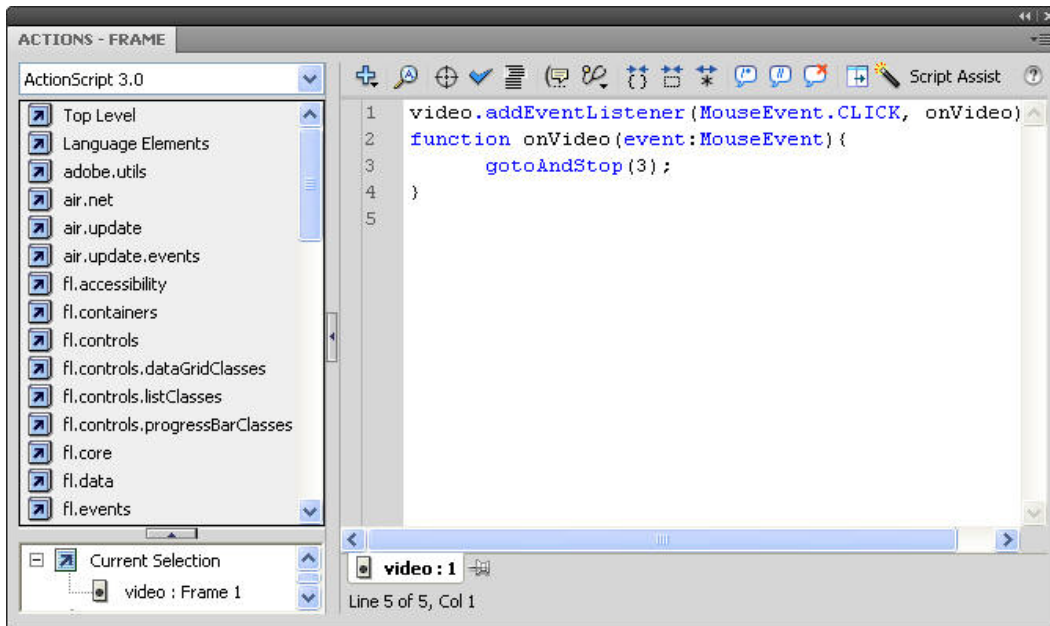
7. Close the **Actions** panel.

Figure 19 – Actions Panel (Video)

To link the Explore button:
1. Select the **Explore** button on the **Stage**. The **explore** layer is automatically selected in the **Timeline**.
2. In the **Property inspector**, type **explore** in the **Instance Name** box.
3. Switch to the **Link.txt** file, copy the last four lines of the script, and then switch back to the **Flash CS4** application window.
4. In the **Timeline**, select frame **1** of the **explore** layer.
5. Press the **F9** key to open the **Actions** panel.
6. Right-click in the **Script** pane of the **Actions** panel and select **Paste**. Or, type the following code in the **Script** pane (see Figure 20).

    ```
    explore.addEventListener(MouseEvent.CLICK, onExplore)
    function onExplore(event:MouseEvent){
         gotoAndStop(4);
    }
    ```
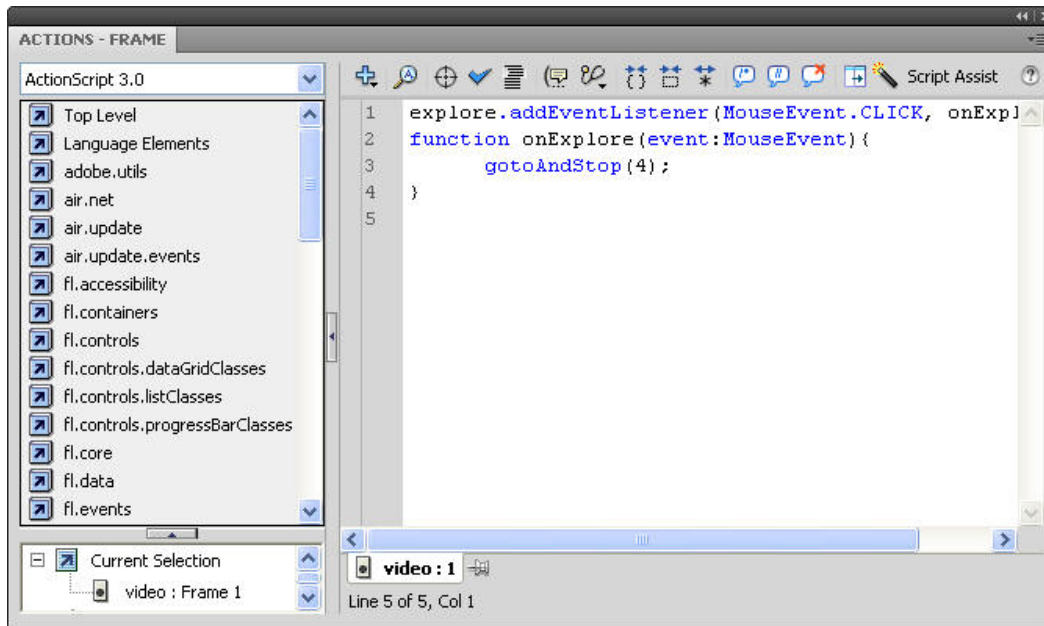
7. Close the **Actions** panel.

Figure 20 – Actions Panel (Explore)

To preview the animation:
1. Press **Ctrl+Enter**. The SWF file displays in a **Flash Player** window.
2. Click the buttons to see how they work.

Creating a Flash-based Pannable Window

With ActionScript, Flash has the ability to pan an image based on mouse movements. As the mouse pointer is moved around the screen, the image scrolls based on the direction of the mouse movement. The scrolling stops once the image's boundary is reached.

To create a customizable pan window:
1. Click the **File** menu and select **Open**. The **Open** dialog box opens.
2. Locate and select the **site_station_imagepanning.fla** file, and then click the **Open** button.
3. In the **Timeline**, select frame **4** of the **universe** layer located within the **Explore** folder.
4. On the **Edit** bar, click the **Zoom control** arrow and select **50%** to adjust the magnification of the **Stage** (see Figure 21).

Figure 21 – Zoom Control on the Edit Bar

5. Drag the **universe.jpg** image from the **Library** panel to the **Stage** and position it below the title (see Figure 22).

Figure 22 – Placing the Universe Image on the Stage

6. Right-click the universe image on the **Stage** and select **Convert to Symbol**. The **Convert to Symbol** dialog box opens.
7. Type **bigPic** in the **Name** box.
8. Click the **Type** arrow and select **Movie Clip** from the list.
9. Click the **OK** button.
10. In the **Property inspector**, type **bigPic** in the **Instance Name** box (see Figure 23).
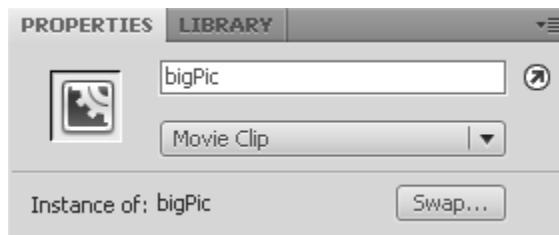
    NOTE: Instance names are case-sensitive.

Figure 23 – Assigning Instance Name of bigPic

11. Right-click the image again and select **Convert to Symbol**. The **Convert to Symbol** dialog box opens.
12. Type **wholeMagicWindow** in the **Name** box.
13. Click the **Type** arrow and select **Movie Clip** from the list.
14. Click the **OK** button.
15. In the **Property inspector**, type **wholeMagicWindow** in the **Instance Name** box (see Figure 24).

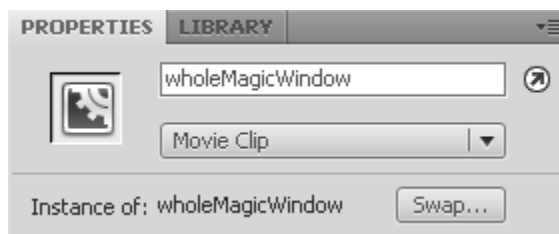   NOTE: Instance names are case-sensitive.

Figure 24 – Assigning Instance Name of wholeMagicWindow

To create an activator for the image pan window:

1. Double-click the universe image on the **Stage** to edit the **wholeMagicWindow** movie clip symbol.

   NOTE: You can also enter edit mode by clicking the **Edit Symbols** button 🔶 on the **Edit** bar and selecting the symbol that needs to be edited.

2. In the **wholeMagicWindow** movie clip's **Timeline**, create a new layer and rename it to **activator**.
3. Select frame **1** of the **activator** layer.
4. Select the **Rectangle Primitive** tool 🔲 in the **Tools** panel.

   NOTE: If the **Rectangle Primitive** tool is not displayed, click and hold the mouse button on the **Rectangle** tool 🔲, and then select the **Rectangle Primitive** tool from the pop-up menu (see Figure 25).
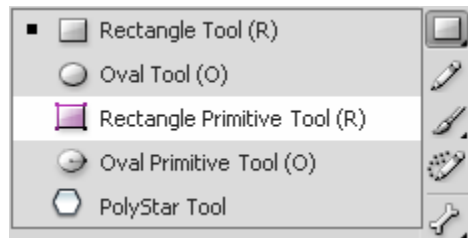

Figure 25 – Selecting the Rectangle Primitive Tool

5. On the **Stage**, drag the mouse pointer to draw a rectangle.
6. In the **Property inspector**, under **Fill and Stroke**, click the **Fill Color** control and set the **Alpha** value to **30%**. This makes the rectangle almost transparent.
7. Under **Position and Size**, change the **W** (width) value to **550** and the **H** (height) value to **375** (see Figure 26).
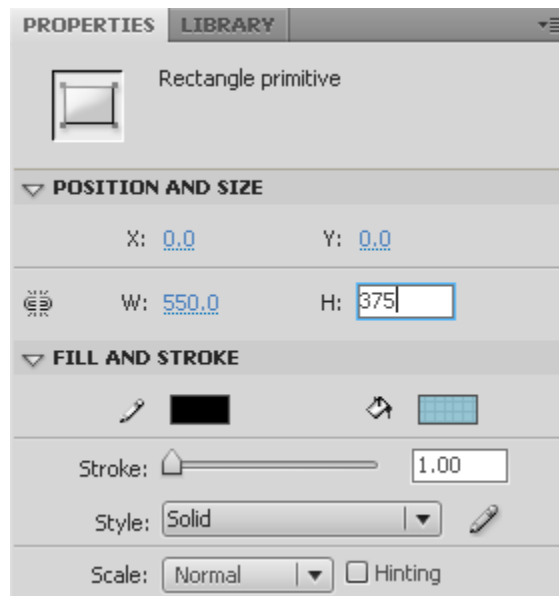

Figure 26 – Property Inspector (Rectangle Primitive Tool)

8. Select the **Selection** tool ▲ in the **Tools** panel.
9. Right-click the rectangle on the **Stage** and select **Convert to Symbol**. The **Convert to Symbol** dialog box opens.

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10. Type **activator** in the **Name** box.
11. Click the **Type** arrow and select **Movie Clip** from the list.
12. Click the **OK** button.
13. In the **Property inspector**, type **activator** in the **Instance Name** box (see Figure 27).

> NOTE: Instance names are case-sensitive.
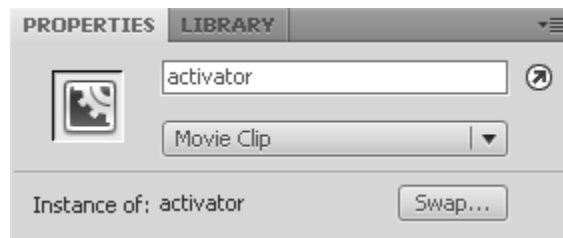
Figure 27 – Assigning Instance Name of activator

To insert a script into the activator layer of the customizable pan window:
1. In the **Timeline**, create a new layer and rename it to **actions**.
2. Minimize the **Flash CS4** application window.
3. Locate and open the **Image_Panning.txt** file.
4. In the **Image_Panning.txt** file, select all the content, and then click the **Edit** menu and select **Copy** (see Figure 28).

Figure 28 – Image_Panning.txt File

5. Maximize the **Flash CS4** application window.
6. In the **Timeline**, select frame **1** of the **actions** layer.
7. Press the **F9** key to open the **Actions** panel.
8. Right-click in the **Script** pane of the **Actions** panel and select **Paste**.
9. Close the **Actions** panel.
10. Press **Ctrl+Enter** to preview the animation in a **Flash Player** window.
11. Click the **Explore** button and move the mouse pointer over the universe image to see how the activator works.

To mask the image:
1. Select the **activator** layer in the **Timeline**, copy the rectangle, and then lock the **activator** layer.
2. Click **Scene 1** on the **Edit** bar to return to the main scene.
3. In the **Timeline**, create a new layer above the **universe** layer and rename it to **mask** (see Figure 29).
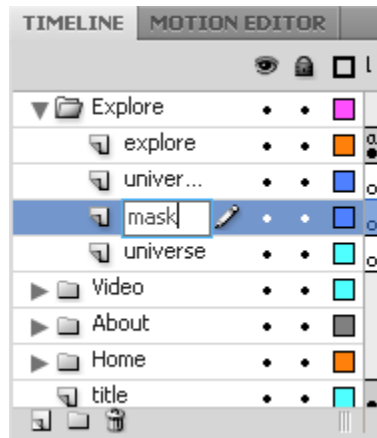

Figure 29 – Renaming a Mask Layer

4. Right-click frame **4** of the **mask** layer and select **Insert Keyframe**.
5. Paste the rectangle, and then adjust its position so that it overlaps the half-transparent rectangle on the **Stage**.
6. Right-click the **mask** layer and select **Mask**. The universe image is masked.

To make the activator transparent:
1. Unlock the **mask** layer.
2. Double-click the rectangle on the **mask** layer to edit the **activator** movie clip symbol.
3. In the **Color** panel, set the **Alpha** value to **0%**.
4. Click **Scene 1** on the **Edit** bar to return to the main scene.
5. Lock the **mask** layer. The activator becomes transparent and the universe image is clearly visible (see Figure 30).


Figure 30 – Explore Page

6. Press **Ctrl**+**Enter** to preview the animation in a **Flash Player** window.
7. Click the **Explore** button and move the mouse pointer over the universe image to view the image panning.

Creating a Preloader

Preloaders indicate that Flash content is being loaded and show the progress of the download.

To create a simple preloader scene:
1. Click the **File** menu and select **Open**. The **Open** dialog box opens.
2. Locate and select the **site_station_preloader.fla** file, and then click the **Open** button.
3. Click the **Window** menu, point to **Other Panels,** and select **Scene** (see Figure 30). Or, press **Shift**+**F2**. The **Scene** panel opens.
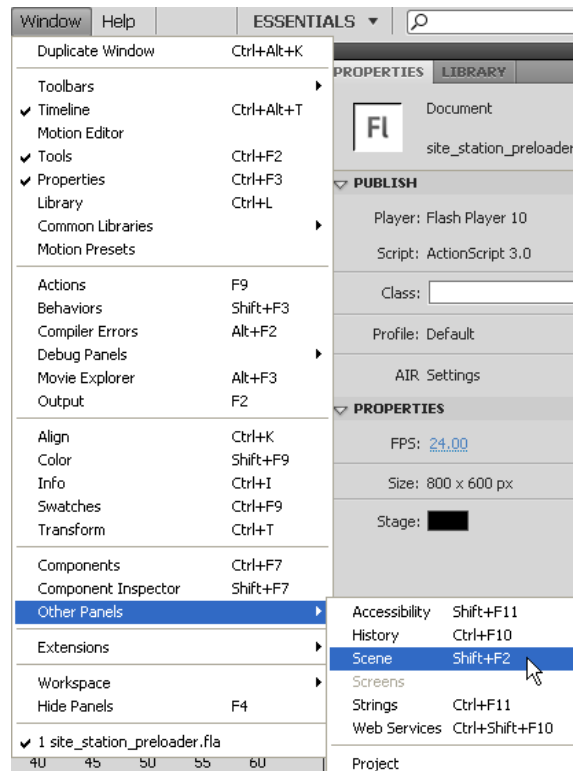
Figure 31 – Window Menu When Selecting Scene

4. In the **Scene** panel, double-click **Scene 1** and type **Main** to rename the scene.
5. Click the **Add Scene** button to create a new scene.
6. Double-click the new scene name and type **Preloader**.
7. Drag the **Preloader** scene and place it above the **Main** scene (see Figure 32).
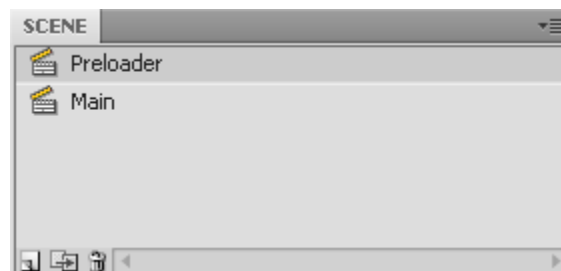
Figure 32 – Scene Panel

To create a preloader:
1. In the **Preloader** scene, rename **Layer 1** to **Spirals**.
2. Drag the **Spirals** movie clip symbol from the **Library** panel to the center of the **Stage**.
3. Select the **Free Transform** tool ⊠ in the **Tools** panel and resize the shape as desired.
4. In the **Timeline**, create a new layer and rename it to **Dynamic Text**.
5. Select the **Text** tool T in the **Tools** panel.
6. In the **Property inspector**, click the **Text type** arrow and select **Dynamic Text** from the list (see Figure 33).
7. Under **Character**, select the desired **Color**, **Size**, and **Type**, and change the **Alpha** value to **100%**.
8. Click on the **Stage** and type the text **Loading**.
9. In the **Property** inspector, type **loadingPercent** in the **Instance Name** box (see Figure 33).

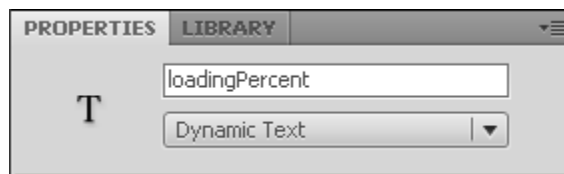   NOTE: Instance names are case-sensitive.

Figure 33 – Assigning Instance Name of loadingPercent

To insert a script into the Preloader scene:
1. In the **Timeline**, create a new layer and rename it to **actions**.
2. Minimize the **Flash CS4** application window.
3. Locate and open the **Preloader.txt** file.
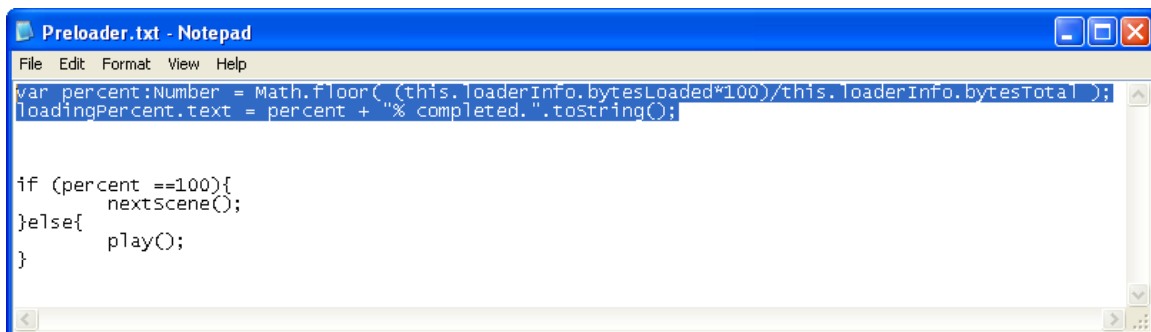4. In the **Preloader.txt** file, select the first two lines of the script (see Figure 34).

Figure 34 – Preloader.txt File

5. Click the **Edit** menu and select **Copy** to copy the first part of the script.
6. Maximize the **Flash CS4** application window.
7. In the **Timeline**, select frame **1** of the **actions** layer.
8. Press the **F9** key to open the **Actions** panel.
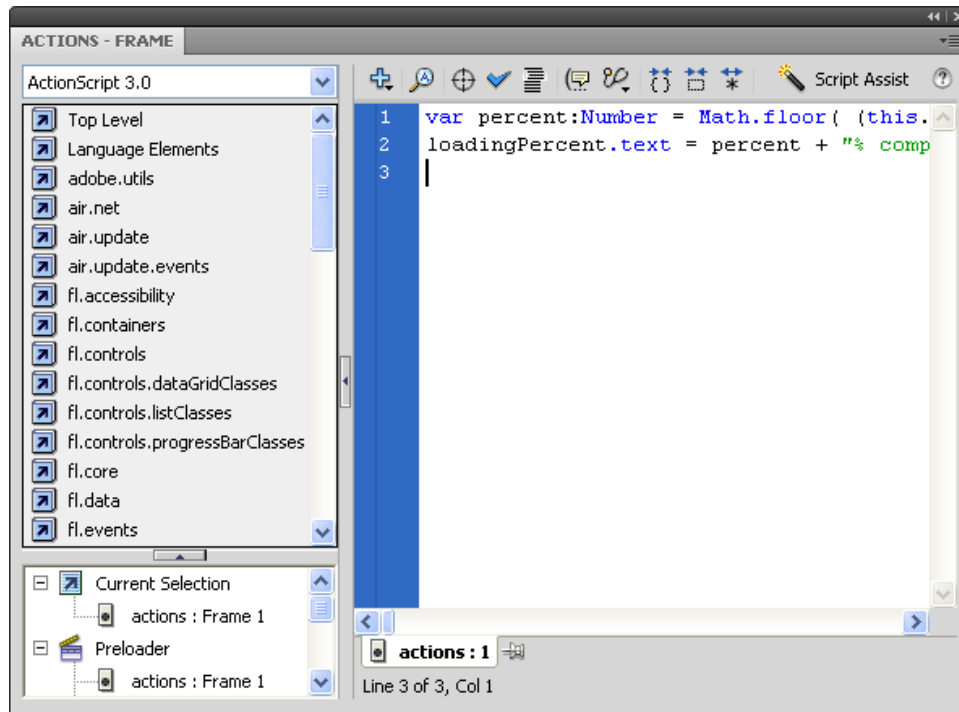9. Right-click in the **Script** pane of the **Actions** panel and select **Paste** (see Figure 35).

Figure 35 – Pasting Script into the Actions Panel (Frame 1)

10. Close the **Actions** panel.
11. In the **Timeline**, right-click frame **2** of the **actions** layer and select **Insert Blank Keyframe**.
12. Switch to the **Preloader.txt** file, copy the last five lines of the script, and then switch back to the **Flash CS4** application window.
13. In the **Timeline**, select frame **2** of the **actions** layer.
14. Press the **F9** key to open the **Actions** panel.
15. Right-click in the **Script** pane of the **Actions** panel and select **Paste** (see Figure 36).
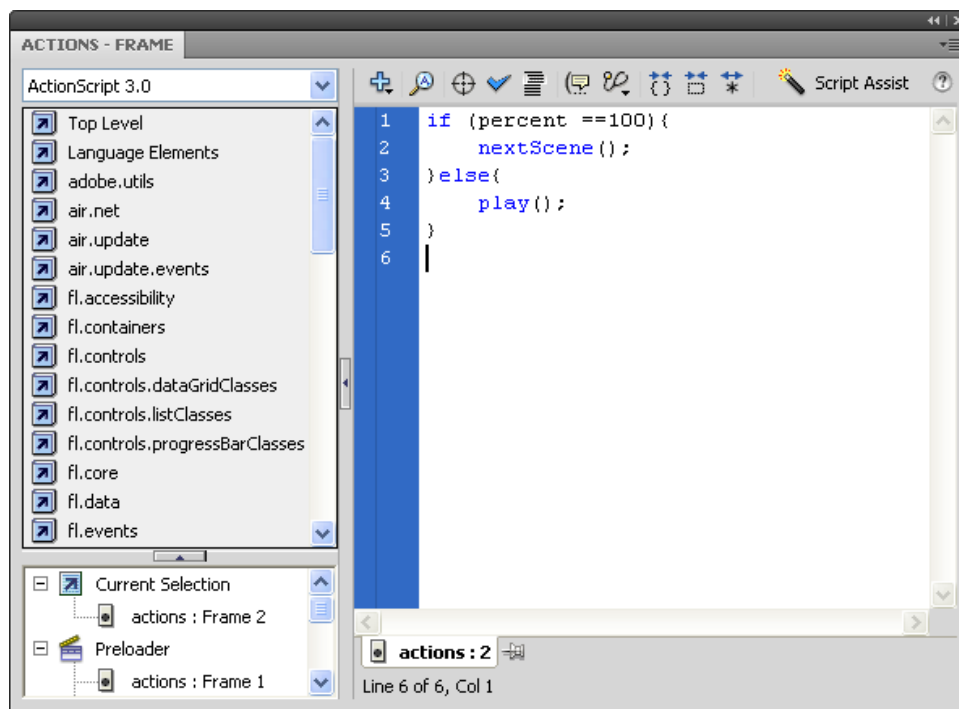

Figure 36 – Pasting Script into the Actions Panel (Frame 2)

16. Close the **Actions** panel.
17. In the **Timeline**, select frame **2** of the **Spirals** layer, hold down the **Ctrl** key, and select frame **2** of the **Dynamic Text** layer.
18. Right-click on any of the selected frames and select **Insert Frame** to insert new frames into the **Spirals** and **Dynamic Text** layers.

To preview the preloader:
1. In the **Scene** panel, click **Main** to go back to the **Main** scene.

    NOTE: You can also click the **Edit Scene** button on the **Edit** bar and select **Main** to go back to the **Main** scene.

2. Press **Ctrl+Enter** to preview the animation in a **Flash Player** window.
3. Press **Ctrl+Enter** again to view the preloader (see Figure 37).
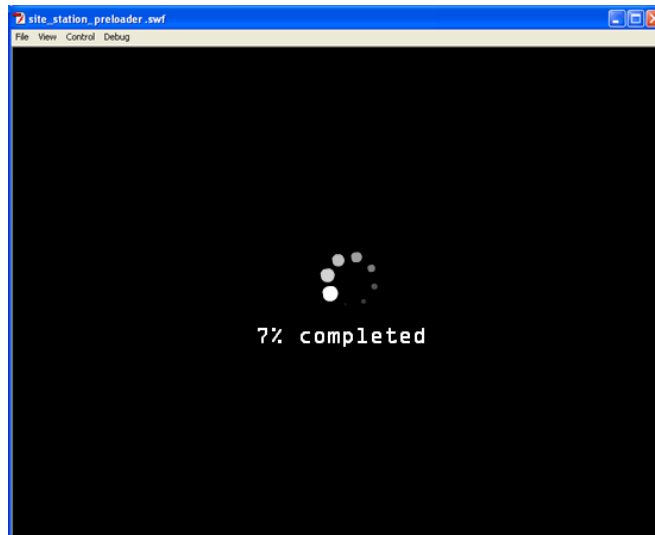

Figure 37 – Preloader

NOTE: To preview the animation at different download speeds, click the **View** menu, point to **Download Settings**, and select the desired speed (see Figure 38).
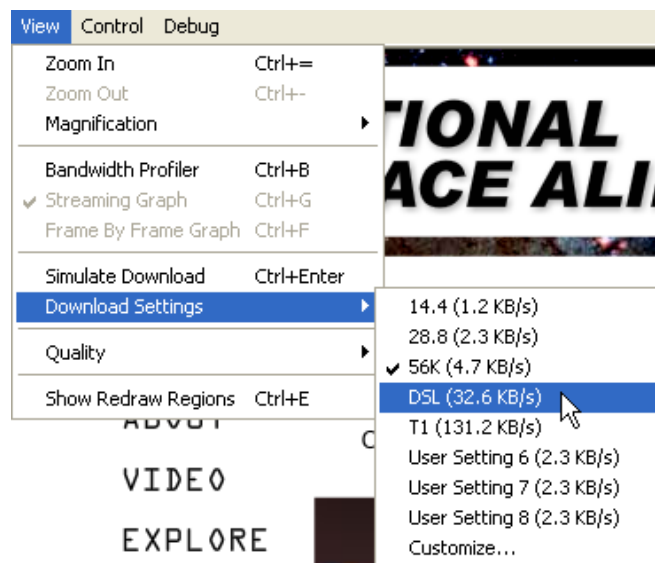

Figure 38 – View Menu When Adjusting the Download Speed

Publishing a Flash Website

When publishing a website in Flash, an HTML file will be generated referencing the SWF file that is outputted by Flash. The HTML and SWF files are the two files needed to display the Flash website in a web browser. To view the website, visitors must have the latest version of Adobe Flash Player installed on their computer. It is recommended to provide a link on the website so users can download the plug-in.

To publish the FLA file in HTML format:
1. Click the **File** menu and select **Publish Settings**. The **Publish Settings** dialog box opens (see Figure 39).
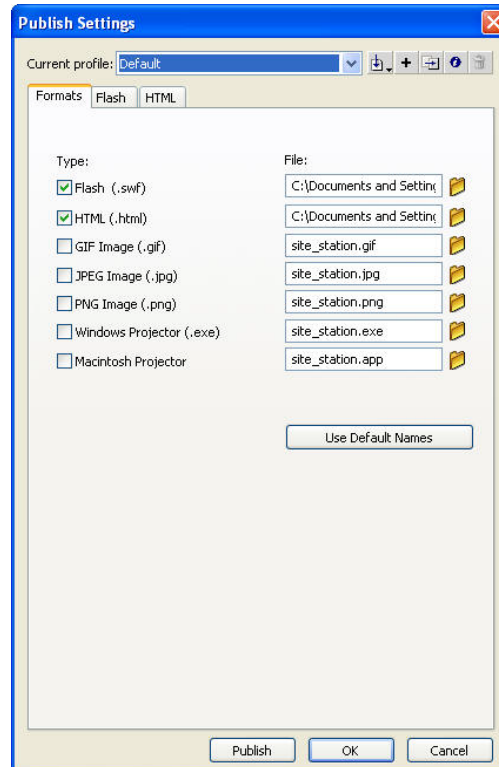

Figure 39 – Publish Settings Dialog Box

2. On the **Formats** tab, under **Type**, click the folder icon to the right of **HTML** (.**html**). The **Select Publish Destination** dialog box opens.
3. Select the **Desktop** as the location to save the published file, and then click the **Save** button.
4. Click the **Publish** button.
5. Click the **OK** button.

To preview the Flash website in a web browser:
1. Minimize all windows.
2. Locate the **site_station_preloader**.**html** file on the **Desktop**.
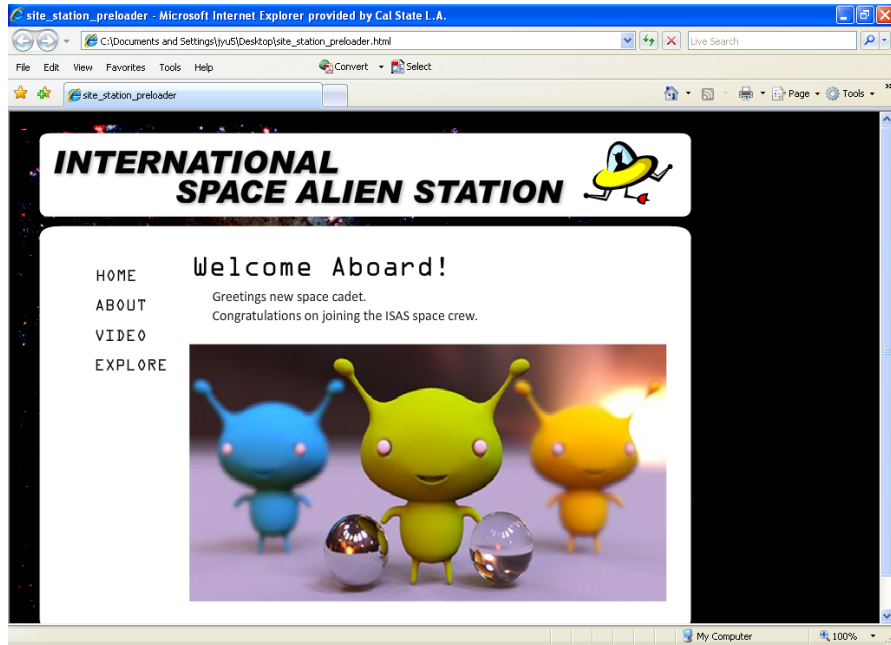3. Right-click the file, point to **Open With**, and select **Internet Explorer**. **Internet Explorer** opens, displaying the Flash site (see Figure 40).

Figure 40 – Flash Website in a Web Browser