

Chapter 2

Our First Equation

In this chapter, we will introduce some of the more basic features of EquationBuilder by constructing the simple equation,

paste_0.eps ↪

and then modifying it to read

paste_1.eps ↪

At the same time, we'll present some of the terminology and tools that will be used throughout the rest of this manual.

Starting EquationBuilder

Like most NeXTSTEP applications, you begin each session by either double-clicking on the EquationBuilder.app icon in the Workspace Manager (usually located in either your system's /LocalApps directory or your own ~/Apps directory), or by double-clicking on an EquationBuilder file you have previously created and saved. EquationBuilder files have the extension .eqn.

Building an equation

When you construct an equation, you build it out of what we call elements. An element is anything that can be typeset on the page. An element can usually be thought of as a single character, such as the variable a^0 . An $=^0$ sign is also an element. Elements can also combine to form more complex structures, each structure being an element in its own right. Things like fractions and matrices are really just structures that maintain defined relationships between their component elements; but we like to think of them as elements, too. You'll see more of this later on when we begin to build complex equations. For now, keep the definition of an element in mind: it is a term we will use again and again throughout this manual.

For the most part, building an equation involves using the keyboard and the **Element Creator**

panel. The Element Creator panel is really a **palette** of various building-block elements that you can use to construct equations. We sometimes refer to this panel, then, as just the ^apalette.^o

Occasionally, when it is necessary to override the default behavior of a particular element, you may also make use of the **Inspector** panel. EquationBuilder's inspectors allow you to do interesting things like negate a relation or change the position of the limits on an integral sign. We'll introduce the use of the inspector gradually, as they are needed.

In fact, all of the menu items, palettes, and inspectors used by EquationBuilder are detailed in the reference part of this manual (Chapters 11±17). Instead of repeating the same information here, we will simply introduce panels and features as we need them over the next several chapters.

First equation

Every equation begins with an equation window:

Window.tiff ⇐

In the middle of the window is a blinking cursor indicating where the next element will appear. Don't worry about the controls in the lower right-hand corner of the window: we'll discuss those later on.

We begin building our first equation by using EquationBuilder as a typewriter. Go ahead and type $E=mc^0$ on your keyboard.

Your window should look something like this:

Ex00.1.tiff ↵

Notice that EquationBuilder automatically placed extra spacing around the $E=$ sign as you typed. There was no need for you to manually put spaces in. This is a very simple example of how EqB tries to be smart about what it's typesetting for you. You'll see other, more powerful examples of EqB's intelligence in later examples.

To complete the equation, we need to learn how to make a superscript E^2 . There are two different ways to do this:

One possibility is to use the superscript button on right-hand side of the Element Creator panel:

SuperscriptButton.tiff ↵

Pressing this button will place the cursor in the superscript of the a^c^0 that you just typed.

Perhaps a more efficient way is to use the keyboard to accomplish the same thing. To create a superscript from the keyboard, type the $a^{\wedge}0$ character.

Now that the cursor is in the superscript position, type the number a^20 and press the **return** key. Pressing return tells EqB that you're done with the superscript and returns the cursor to the normal baseline. Congratulations, you are now done with your first equation!

Ex00.2.tiff ↵

- **Note**

The return key is a signal to EquationBuilder that you are finished with the current item. In this case, the return key signified that you were finished with the superscript on the a^c^0 . The return key is a very useful tool when building equations from the keyboard, and

we will see its use again and again throughout the rest of the manual.

Modifying an equation

Now let's modify our first equation to read

paste_3.eps ↵

In order to change the a^2 to a a^3 , you first need to select the a^2 . Assuming the cursor is still positioned after the superscripted a^c , there are two different ways to do this:

The first and more general way to select the a^2 is to simply drag over it with the mouse, just as you would text in any NeXTSTEP application. You can then type a^3 to replace what you've selected.

Another way to make your change is to again type the a^{\wedge} key. Since the a^c already has a^2 as its superscript, rather than placing the cursor in the superscript position, as in the previous example, EquationBuilder selects the superscript for you. You can then type a^3 to replace it.

Next, we need to change the $a^=$ to a a^{\neq} . Select the $a^=$ sign with the mouse and bring up the **Attributes** inspector from the pop-up list on EqB's inspector panel. An $a^=$ is a **Relation** element and so its Attributes inspector is called the **Relation Inspector**.

RelationInspector.tiff \rightarrow

- **Note**

In general, if you wish to change the default behavior of some element, just select it and bring up its Attributes inspector. Once you have selected the element, a quick way to bring up its Attributes inspector is to type **Command-3** from the keyboard.

The only parameter we can change for a Relation element like the $a=^o$ sign is whether it is negated or not. For this example, we want $a\neq^o$, so go ahead and press the button with the slash through it. This should negate your $a=^o$ sign, finishing the modifications.

- **Note**

Most of the functionality of EquationBuilder is accessed using inspectors. EqB has three levels of inspectors. Although we will explore all of them over the next several chapters, we will briefly introduce them here:

- (1) The first level is the **Equation Inspector**, which allows you to modify parameters that affect the equation as a whole, such as default fonts and font sizes.
- (2) The next level is the **Element Inspector**, which allows you to modify parameters that all individual elements share, such as whether to use a custom or

default font for the selected element.

(3) The third level is the **Attributes Inspector**, which changes depending on the type of element you've selected. In the above example, you selected a Relation, so the Relation Inspector became active. If you had selected the entire superscripted $^a c^o$ element (including the $^a 3^o$), a different Attributes inspector would have appeared (try it and see!).

Variations

If you press the **Composition Toggle** button in the lower right hand corner of the window (or equivalently, type **Command-C**), you will switch the equation to composition mode:

Ex00.3.tiff ↵

In composition mode, all of the individual elements are separated from each other and surrounded by boxes. In the above illustration, the entire equation is composed of four elements (the $^a E^o$, $^a \neq^o$, $^a m^o$, and the superscripted $^a c^o$). The superscripted $^a c^o$ is in turn made up of three elements (the $^a c^o$, the superscript $^a 3^o$, and an empty place-holder for where a subscript could go).

Often, it is helpful to work in composition mode, particularly when you first start out with EquationBuilder. In this mode, you can easily see what EquationBuilder is doing. By exploding out the elements and surrounding them with boxes, element selection and cursor positioning become much easier as well.

If you wish to return to regular mode, press the Composition Toggle button again.

We strongly recommend that you build your equations in composition mode, at least until you become more accustomed to working with EquationBuilder.