Writing a Simple Program to Draw a Line

In this chapter, you will learn how to use the following VBA functions to World Class standards:

- Beginning a New Visual Basic Application
- Opening the Visual Basic Editor in AutoCAD
- Laying Out a User Input Form in Visual Basic
- Insert a Label into a Form
- Insert a Textbox into a Form
- Insert Command Buttons into a Form
- Adding a Copyright Statement to a Form
- Adding Comments in Visual Basic to Communicate the Copyright
- Declaring Variables in a Program with the Dimension Statement
- Setting Variables in a Program
- Assigning Values to the Variables
- Inputting the Code to Draw in Visual Basic
- Resetting the Data with the cmdClear Command Button
- Exiting the Program with the cmdExit Command Button
- Exiting the Program with the cmdExit Command Button
- Executing a Subroutine with the cmdDrawLine Command Button
- Inserting a Module into a Visual Basic Application
- Running the Program

Beginning a New Visual Basic Application

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In this chapter, we will learn how to use the Visual Basic Application (VBA) program to first create a form and then to draw an AutoCAD entity automatically. We reiterate many elements of the previous lesson, but now we add the capability to add a line in AutoCAD Model Space. Eventually in following chapters, we will add circle, arcs, text and dimensions, placing entities on specific layers, having multiple views and soon we will be completing entire drawings in seconds.

At the beginning of every chapter, we will start a new Visual Basic Application project, use a sketch to determine the extent of what the program will do, create the form and then write the code. Once the code is finished, we will run the program and an orthographic drawing will appear on the graphical display.

Remember, that all programming projects begin with one or more sketches, with one portraying the part, detail, or assembly and the other being the user input form. In this Visual Basic Project, Input Line, we will be running a user form inside the AutoCAD application, so we need to sketch the structure of this special dialogue box. We will name the Input form, **Input Line**. We will place six textboxes on the right side of the form to input the starting point and the ending point. On the left side of the form, we will place labels identifying the starting point and ending point. We will have three command buttons, **Draw Line**, **Clear** and **Exit**. On the bottom of the form, we will write the copyright statement using another label. On this presentation, we can help ourselves by being as accurate as possible, by displaying sizes, fonts, colors and any other specific details which will enable us to quickly create the form. From the beginning of inserting the form into the project, we need to refer to our sketch. The sketch of the form is shown in Figure 3.1.
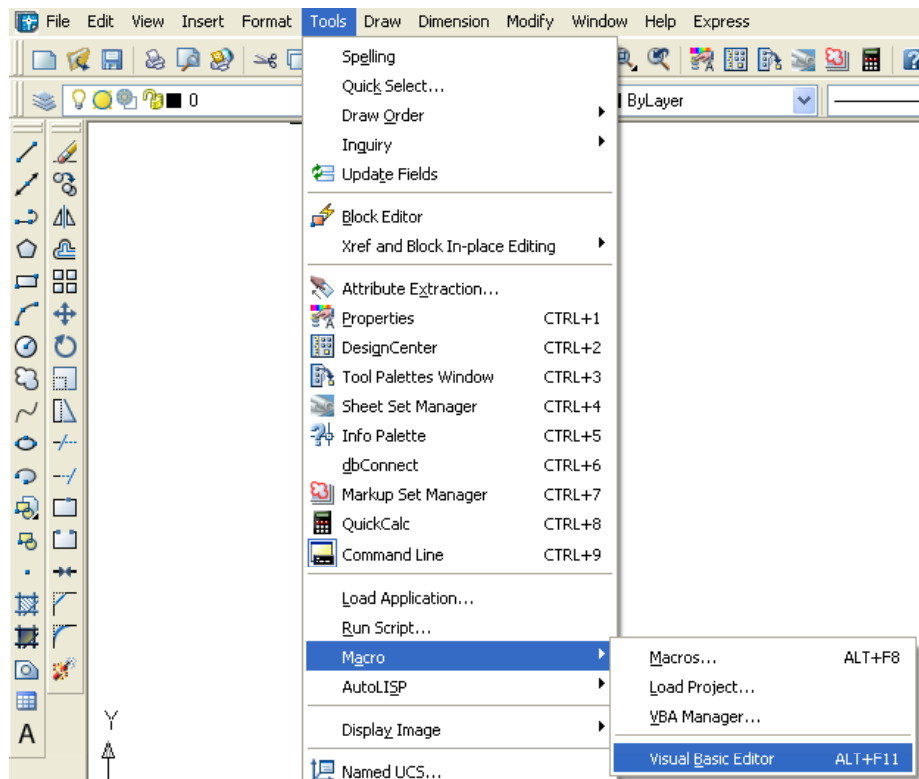
Remember, we should train new programmers initially in the art of form building. When using the editor, we insert and size the form, and selecting the Controls Toolbox, we will place all the various input tools and properly label them. Whenever we place an input tool, the properties window will display a list of every attribute associated with the tool, and we will take every effort to arrange the tool by performing such actions as naming, labeling and sizing the visual input device.

Figure 3.1 – Rough Sketch of the Input Line Form

Opening the Visual Basic Editor in AutoCAD

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Opening the Visual Basic Editor in AutoCAD is essential to creating the program to automate the drawing process. In this version of the World Class CAD – Visual Basic Applications for AutoCAD, we are using AutoCAD 2008, but we just finished using all the programs in this text with a group programming in AutoCAD 2002. Their drawings were automatically made just as efficiently as if they were using the most recent version of the Autodesk software.

Figure 3.2 – Launching the Visual Basic Editor

Select Tools on the Menu bar; pick Macro and then choose the Visual Basic Editor. Look to the right of the phrase, Visual Basic Editor and the shortcut keys Alt – F11 is noted. For quick launching of the editor, press Alt – F11

The Visual Basic Editor will appear on the computer desktop as a new program application. Looking down on the computer's Taskbar, we can see the AutoCAD and Microsoft Visual Basic Editor program tabs. Just single click either program tab to switch between any applications. However, if we close the AutoCAD drawing, unlike a stand alone version of Visual Basic, the Visual Basic Editor will also close.

For those individuals with previous Visual Basic experience, the Visual Basic Editor in AutoCAD has the same layout as in other VB programs. The Menu Bar contains tools for our use as well as the four toolbars shown in Figure 3.4, which are Standard, Debug, Edit and Userform. Presently, only the Standard toolbar is showing. On the left side of the workspace is the Project menu, which shows the files pertaining to this project. Below the Project menu is the Properties pane. If we remember the Properties tool in AutoCAD, using this device will be simple.
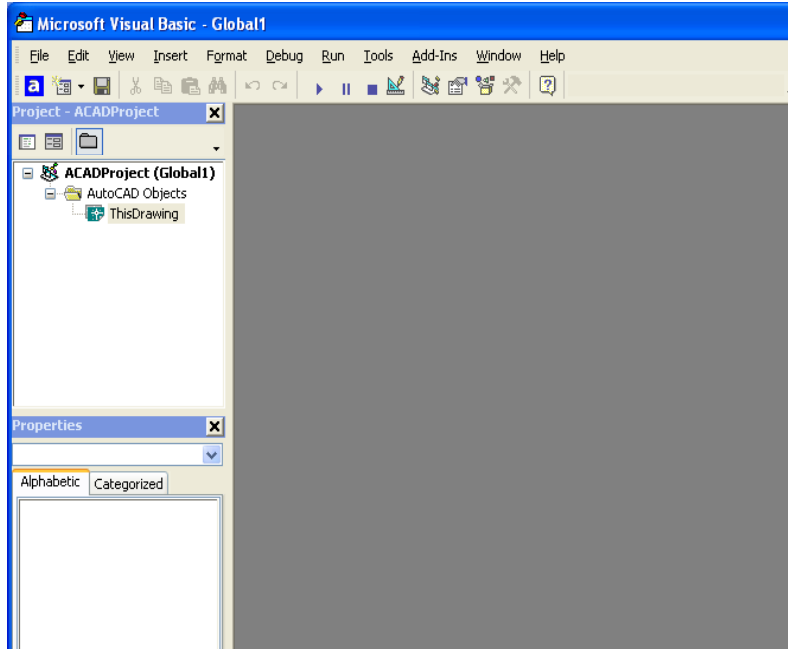
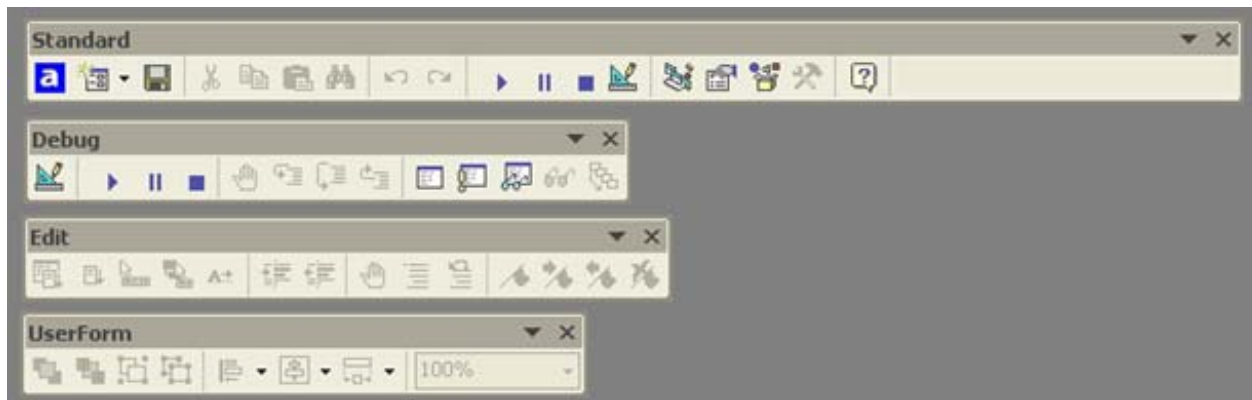**Figure 3.3 – The Visual Basic Editor**

Figure 3.4 – Toolbars in the Visual Basic Editor

With the Visual Basic Editor open, select **File** on the Menu Bar and select **Save Project**. Remember, we have a folder on either the desktop or in the My Documents folder called "VBA Programs". Save the project with the filename "Input Line". The file has an extension called *dvb* which means DCL and Visual Basic programs as shown in Figure 3.5.
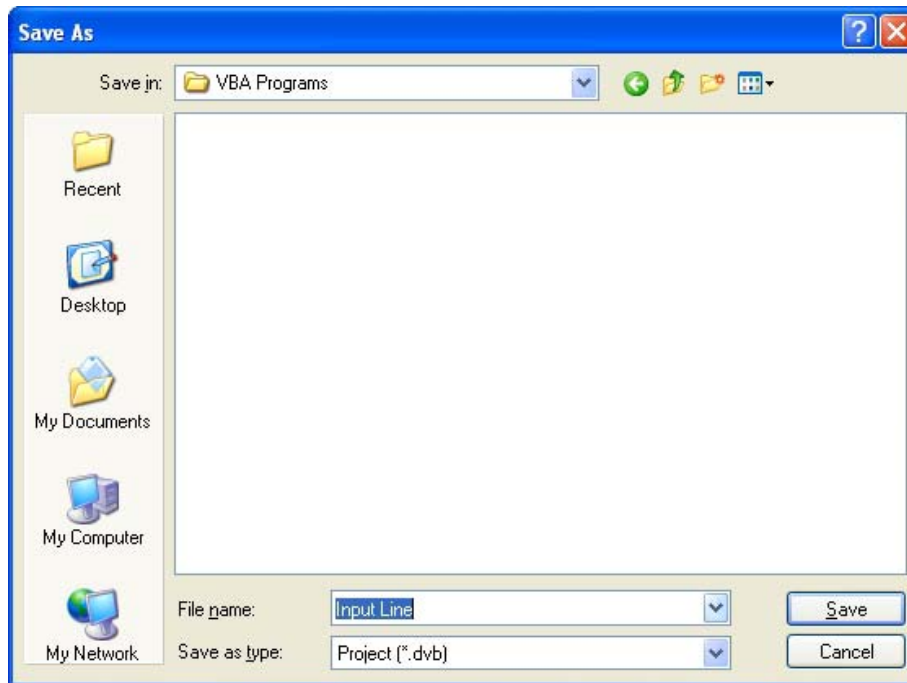
Figure 3.5 – Saving the Input Line Program

Laying Out a User Input Form in Visual Basic

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Now that we have an idea of what the dialogue box in our program will look like, select the **Insert UserForm** button on the Standard toolbar to insert a new form as shown in Figure 3.6. Instantaneously, the once grey work area is changed to contain our UserForm1. A Form folder with Userform1 is now in the Project menu and the Properties pane contains the attributes associated with UserForm1. (See Figure 3.7)
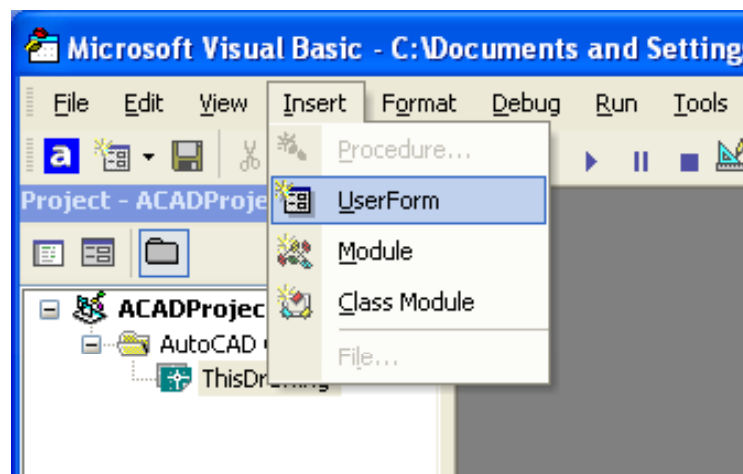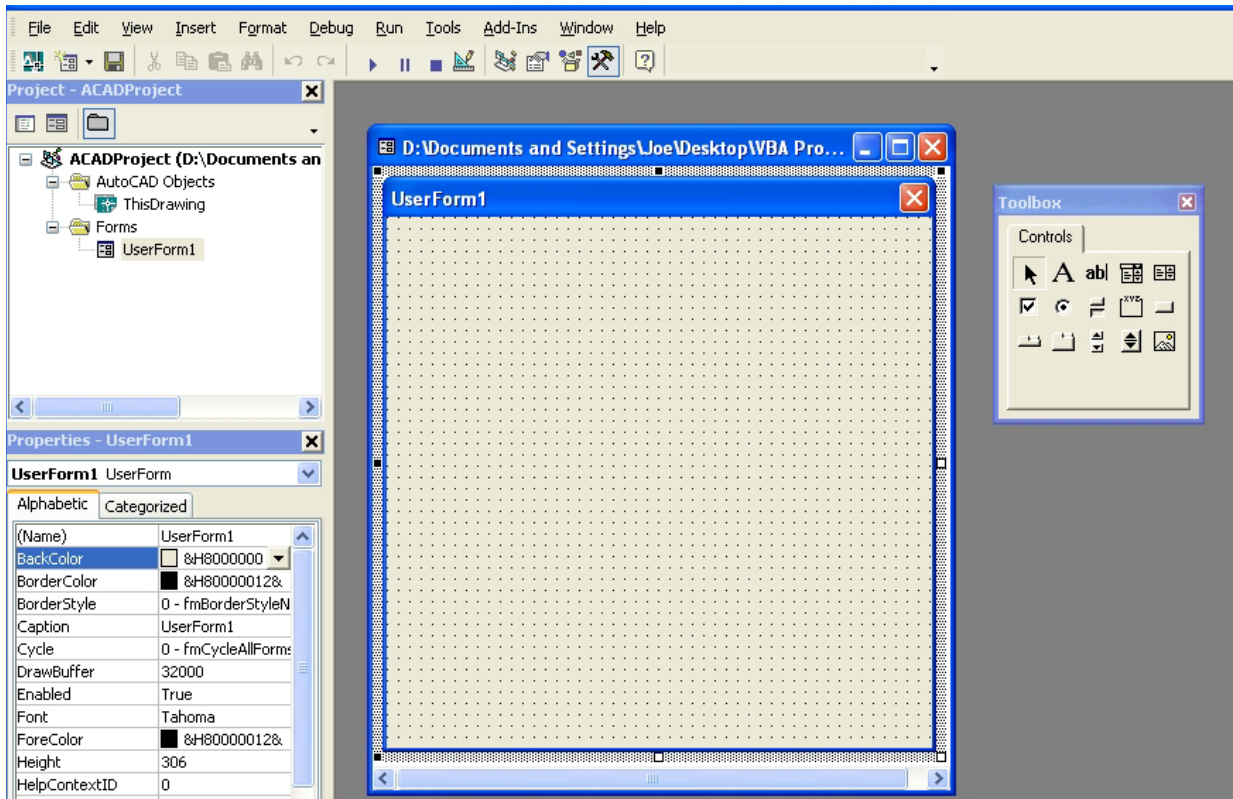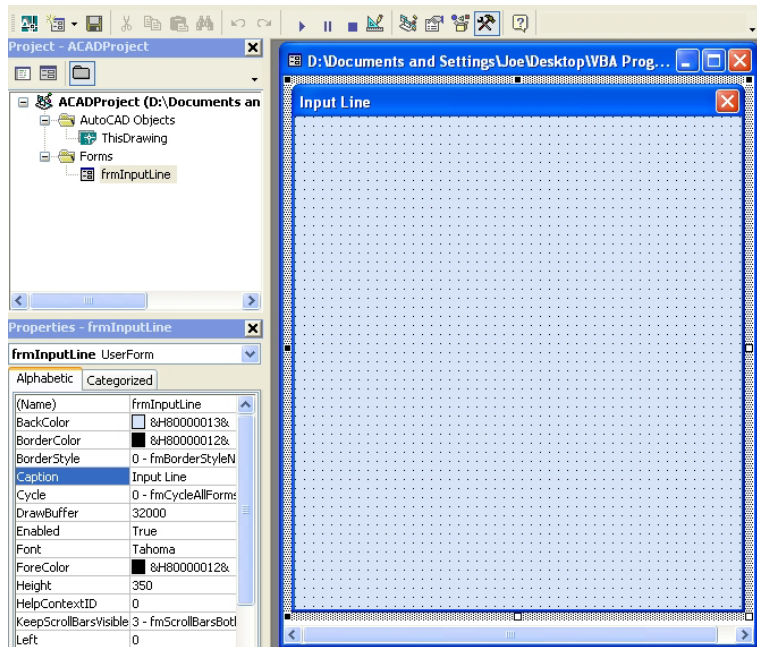

Figure 3.6 – Inserting a User Form

Change the name of the user form to frmInputLine. We use the frm prefix in front of all of the form names in Visual Basic. Change the background of the form to light blue by setting the BackColor in the Properties Pane on the left side of the Visual Basic Application window to "&H80000013&".

Figure 3.7 – Designing the Input Line Form in Visual Basic

Next, we will change the **Caption** in the Properties pane to **Input Line** to agree with the sketch in Figure 3.8. Go ahead and change the form in two other aspects, Height and Width.

Alphabetic	
(Name)	frmInputLine
BackColor	&H80000013&
Caption	Input Line
Height	350
Width	300

Figure 3.8 – Setting the Caption and other Properties

The form will change in size to the height and width measurement. The background color will change to a light blue. There are many more attributes in the Properties pane that we will use on future projects.

3-6

Inserting a Label into a Form

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A good form is easy to figure out by the user, so when we are attempting to provide information on the window that will run in AutoCAD; we add labels to textboxes to explain our intent. Press the Label (A) button on the Control Toolbar to add a label. To size the label area, click on the upper left area of the form and hold down on the left mouse button, draw the dotted label box as shown in the sketch.

We will name the Label using a common Visual Basic naming convention where the programming object is a three letter prefix followed by the name or phrase of the tool. For our first label on this form, the name is **lblStartingPoint.**

Alphabetic	
(Name)	lblStartingPoint
BackColor	&H80000013&
Caption	Type your name:
Font	Arial

On the sketch, the label's caption is "Enter the X, Y, and Z coordinates for the start of the line" We will make the font on the 14 point, Arial. When highlighting the row for Font, a small command button with three small dots appears to the right of the default font name of Tahoma. Click on the three dotted button to open the Visual Basic Font window.
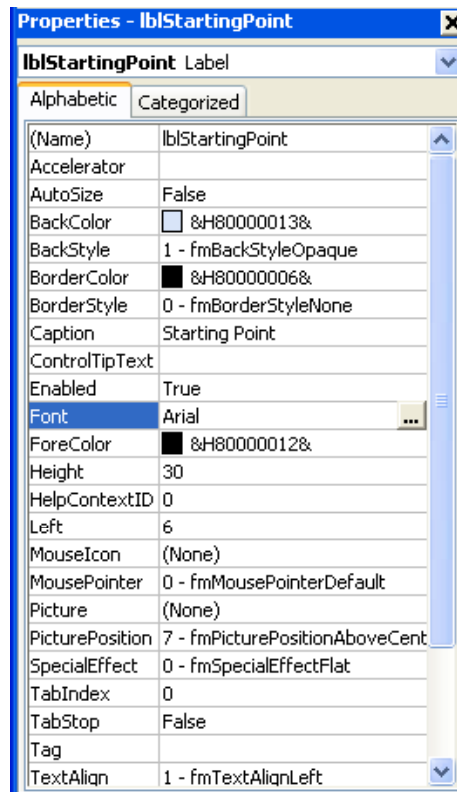

Figure 3.9 – Changing the Font to Arial

We will select the Arial font, Regular font style and 12 size for this project to agree with the initial sketch if the user input form. When we adjust the attributes for the label, these changes do not alter globally for the other objects on the form. If we wish to underline the text or phrase in the label, add a check to the Underline checkbox in the Effects section of the Font window. When we finish making changes to the font property, select the OK command button to return to the work area.
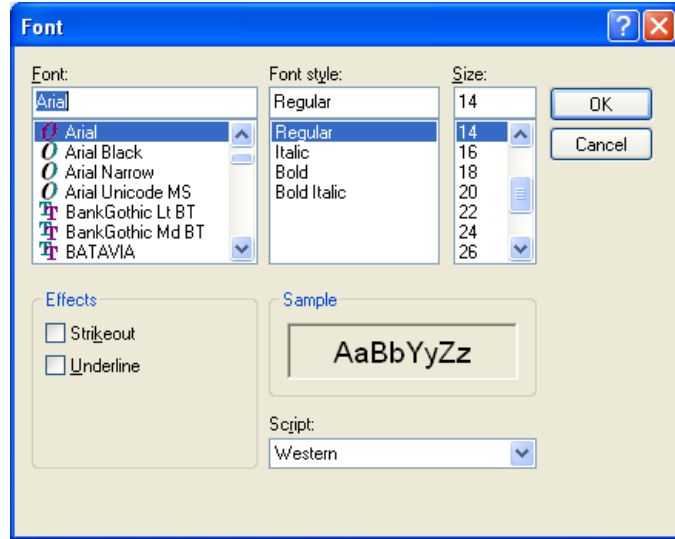

Figure 3.10 – The Font Window in Visual Basic

When the first label is done, the background color of the label matches the background color of the form. In many cases that effect is visually pleasing to the eye, versus introducing another color. Both color and shape will direct the user in completing the form along with the explanation we place on the window to guide the designer in using the automated programs. Use colors and shape strategically to communicate well.
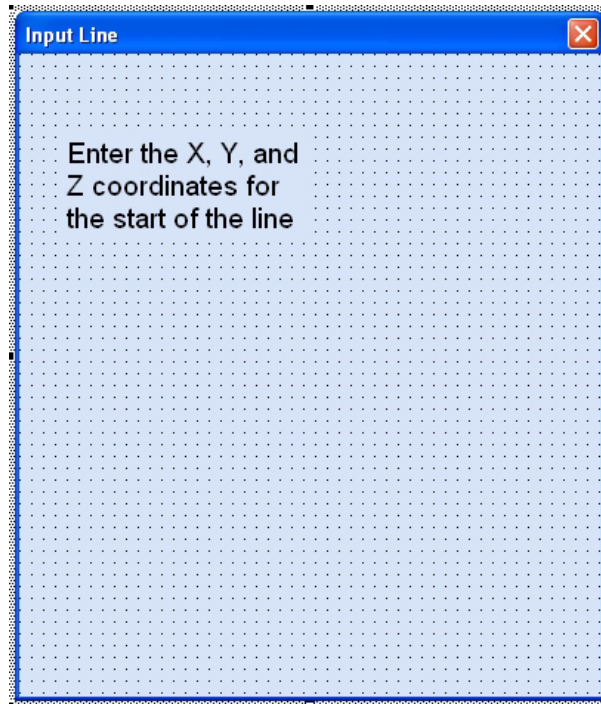

Figure 3.11 – The Finished Label on the Form

Inserting a Textbox into a Form

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A textbox is used so that a user of the computer program can input data in the form of words, numbers or a mixture of both. Press the TextBox (ab) button on the Control Toolbar to add a textbox. To size the textbox area, click on the upper left area of the form and hold down on the left mouse button, draw the dotted textbox as shown in Figure 3.12.
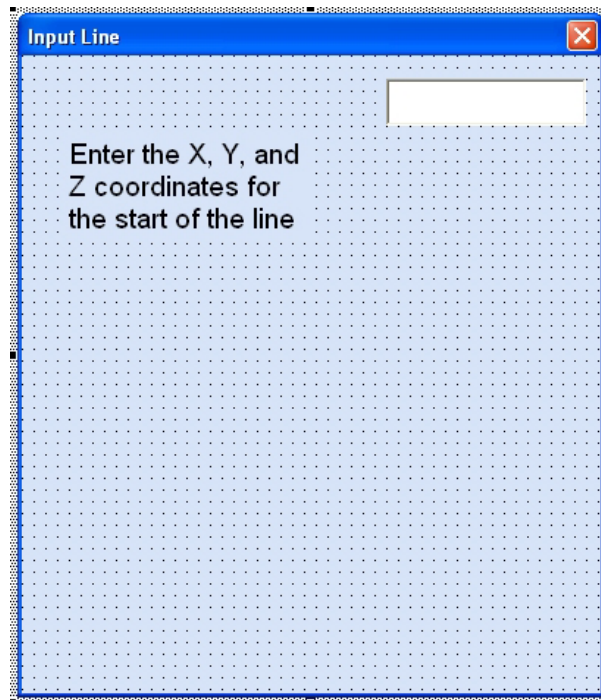

Figure 3.12 – Placing a TextBox on the Form

We will name the TextBox using the three letter prefix followed by the name or phrase of the tool. For our first textbox, the name is **txtStartpointX.**

Alphabetic	
(Name)	txtStartpointX
Height	24
Width	102

The font on the sketch is 14 point, Arial. When highlighting the row for Font, a small command button with three small dots appears to the right of the default font name of Tahoma. Click on the three dotted button to open the Visual Basic Font window. Make the changes like we did on the Label and press OK to save the property.
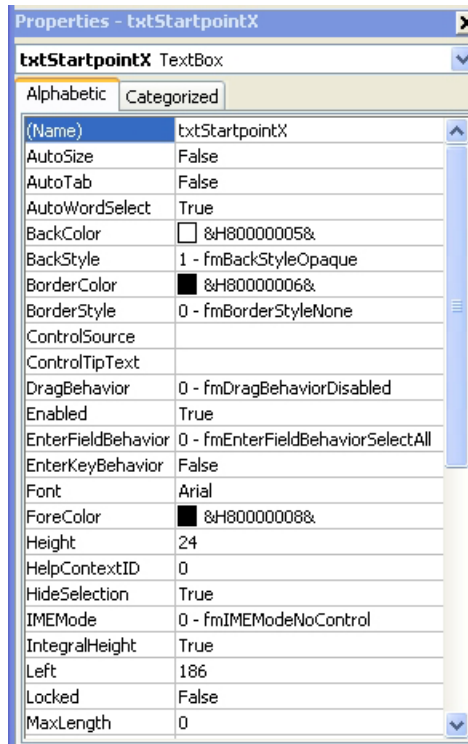

Figure 3.13 – Changing the (Name) to txtName

We place a Label using a common Visual Basic naming convention **lblSpX** just to the left of the Textbox. The Caption for the Label will be **X.** On all of the labels that are just to the left of the Textboxes, we will align the text to the right by setting the **TextAlign** property to right align.

We will add another TextBox named **txtStartpointY** under the first one and the Label to the left of the textbox is called **lblSpY.** The Caption for the Label will be **Y.**

We will add yet another TextBox named **txtStartpointZ** under the first one and the Label to the left of the textbox is called **lblSpZ.** The Caption for the Label will be **Z.**
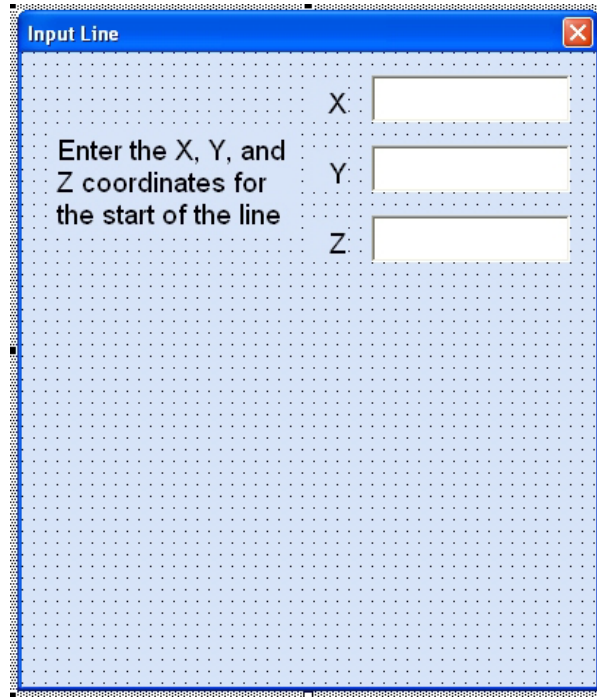

Figure 3.14 – Adding the Y and Z Textboxes

We will add three more textboxes to the form and they are named **txtEndpointX, txtEndpointY,** and **txtEndpointZ.** We will make the captions for the labels identifying the textboxes; X, Y and Z as shown in Figure 3.15. The labels are designated called **lblEpX**, **lblEpY**, and **lblEpZ**.
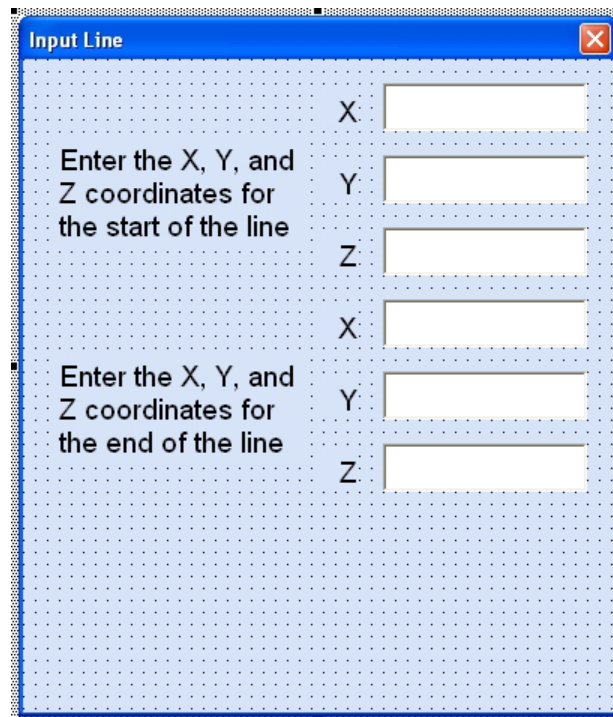

Figure 3.15 – Adding Four More Textboxes

Inserting a Command Buttons into a Form

A command button is used so that a user will execute the application. Press the Command button on the Control Toolbar to add a command button. To size the label area, click on the upper left area of the form and hold down on the left mouse button, draw the command button as shown in Figure 3.16.
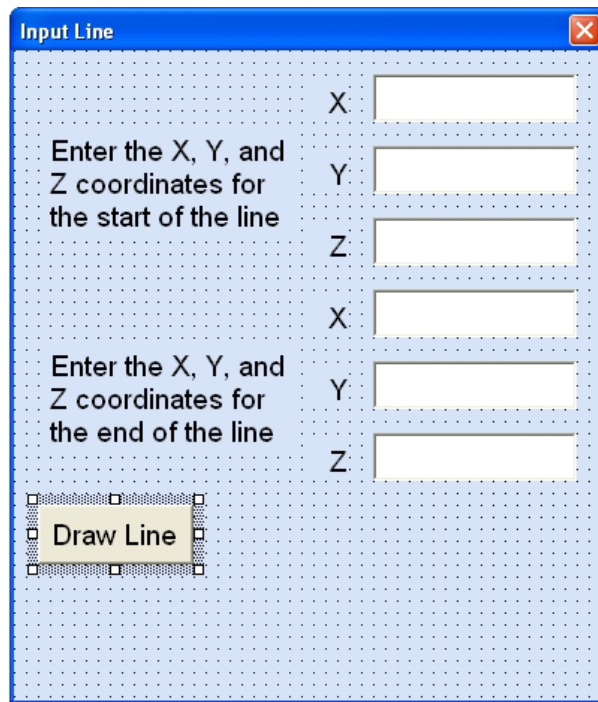

Figure 3.16 – Insert a Command Button onto a Form

We will name the command button using the name is **cmdHello.**

Alphabetic	
(Name)	cmdDrawLine
Caption	Draw
Font	Arial
Height	24
Width	66

The font on the sketch is 14 point, Arial. When highlighting the row for Font, a small command button with three small dots appears to the right of the default font name of Tahoma. Click on the three dotted button to open the Visual Basic Font window. Make the changes as we did before and press OK to save the property.
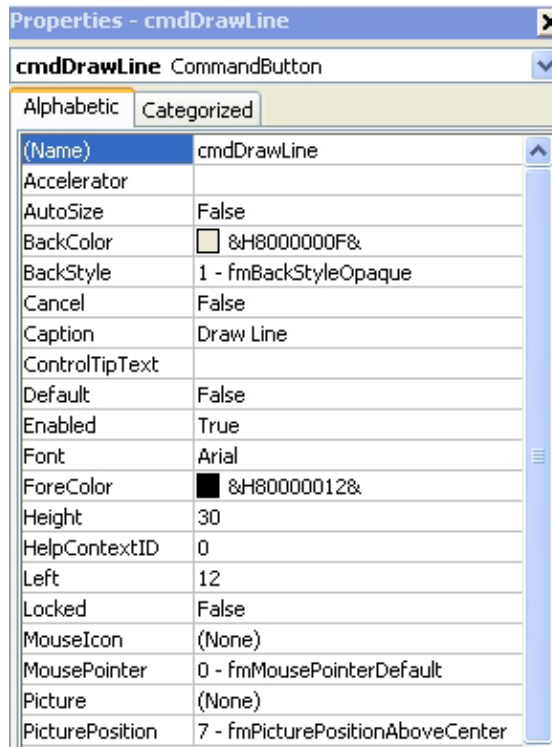

Figure 3.17 – Changing the (Name) to cmdDrawLine

3-11

Add a second Command button; named cmdClear is for clearing the StartPoint X, Y and Z and the EndPoint X, Y and Z textboxes. The third command button is to exit the program. When the user presses the Exit command button, the application closes and full control of the manual AutoCAD program returns to the user. Notice the equal spacing between the command buttons gives a visually friendly appearance.

Figure 3.19 – Insert Two More Command Buttons

Adding a Copyright Statement to a Form

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At the beginning of a new program, we will expect to see an explanation or any special instructions in the form of comments such as copyright, permissions or other legal notices to inform programmers what are the rules dealing with running the code. Comments at the opening of the code could help an individual determine whether the program is right for their application or is legal to use. The message box is a great tool when properly utilized to inform someone if they are breaking a copyright law when running the code.

Finish the form with the following copyright information.

'Input Line - copyright (c) 2006 by charles robbins

If there are special rules or instructions that the user needs to know, place that information on the bottom of the form.

Figure 3.20 – Adding a Copyright Statement

Now that the form is complete, we will begin to write the code that actually interfaces the content of the form using logic and computations to draw the stamping in the AutoCAD graphical display. We will begin the program with comments and place addition phrases throughout the program to assist ourselves or others in the future when modifying the code.

Adding Comments in Visual Basic to Communicate the Copyright

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The comments we placed in the first three lines of the program will inform the individual opening and reading the code, but those user that may run the application without checking, the label on the bottom of the form with the copyright information is a great tool to alert the client to the rules of the program and what will the application do.

To begin the actual coding of the program, double click on the Draw command button to enter the programming list. At the top of the program and before the line of code with **Sub CreateLine ()**, place the following comments with the single quote (') character. Remember, the single quote character (') will precede a comment and when the code is compiled, comments are ignored.

Type the following line of code:

Sub CreateLine ()

'Input Line.dvb copyright (c) 2006 by Charles W. Robbins
'This program will open a dialogue box in AutoCAD and allow the user
'to enter a starting point (x, y, z) and an ending point (x, y, z).
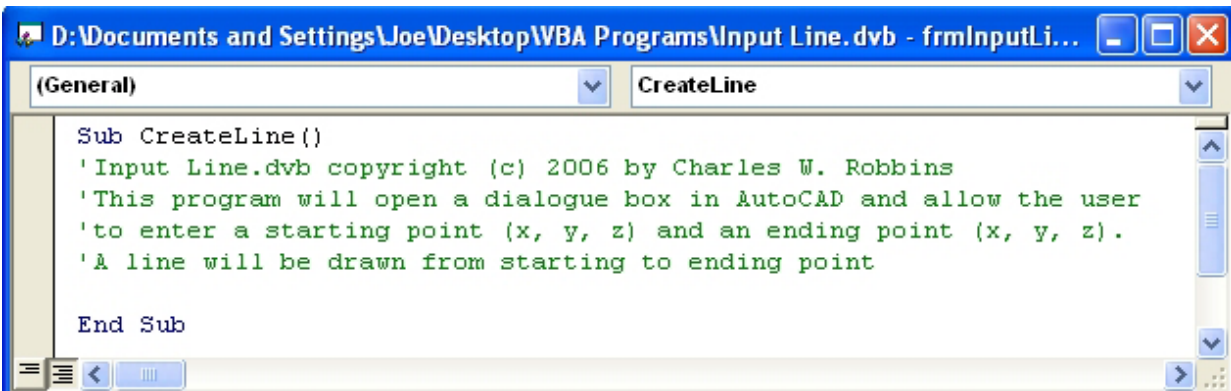**'A line will be drawn from starting to ending point**

Figure 3.21 – Adding Comments into the Code

Declaring Variables in a Program with the Dimension Statement

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When we are going to use a number, text string or object that may change throughout the life of the code, we create a variable to hold the value of that changing entity. In Visual Basic, the dimension or dim statement is one of the ways to declare a variable at the script of procedure level. The other two ways are the Private and Public statements, which we will use in later chapters.
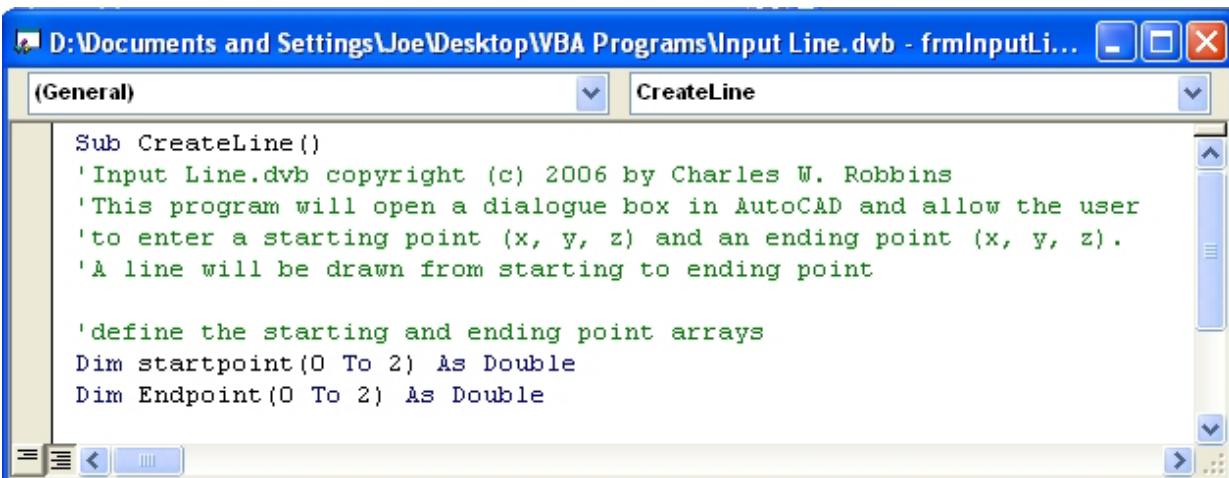
Type the following lines of code after the comment.

'define the starting and centerpoint arrays, width, height and radius

```
Dim Startpoint (0 To 2) As Double
Dim Endpoint (0 To 2) As Double
```

In our program, we will declare a variable to enable us to draw a line by making a variable for each vertex.

The vertices are declared as double integers (As Double) with an array of zero to two (0 to 2). The vertex Startpoint(0) represents the X coordinate, the StartingPoint(1) represents the Y coordinate and StartingPoint(2) represents the Z coordinate. Some may think that it is a waste of time to involve the Z-axis in a two dimension drawing, but we will incorporate the Z coordinate for designers that work in all three dimensions. For everyone else, we will just enter zero (0) in the Z coordinate textbox.

Figure 3.22 – Declaring Variables with Dim Statements

When selecting variable names, they should be a word or a phrase without spaces that represents the value that the variable contains. If we want to hold a value of one's date of birth, we can call the variable, DateofBirth. The keywords Date and Birth are in sentence case with the first letter capitalized. There are no spaces in the name. Some programmers use the underscore character (_) to separate words in phrases. This is acceptable, but a double underscore (__) can cause errors if we do not detect the repeated character.

Assigning Values to the Variables

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After we declare the variables and before we start drawing, we will assign the variables from the input the user types in the textboxes on the launched user form and then assign values to each of the vertices in the set of construction points.
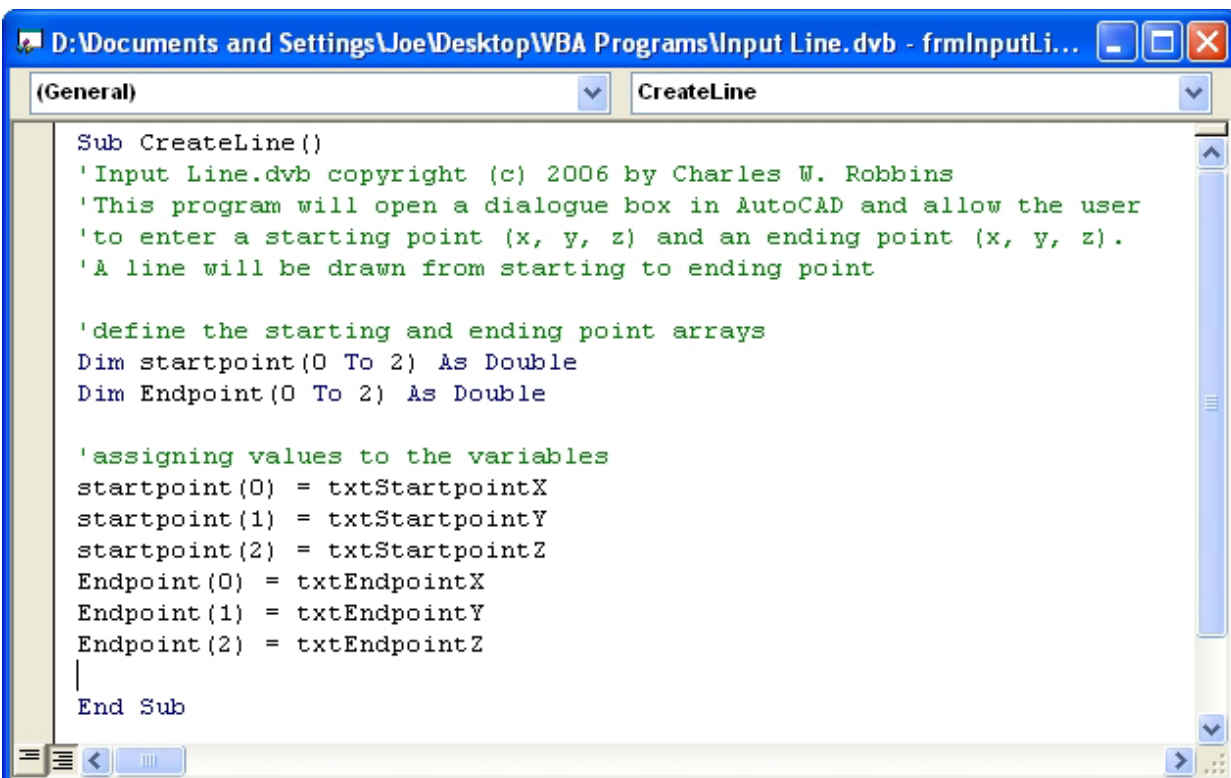
Type the following code right below the declared variables.

'assigning values to the variables

> **Startpoint(0) = txtStartPointX**
> **Startpoint(1) = txtStartPointY**
> **Startpoint(2) = txtStartPointZ**
> **Endpoint(0) = txtEndPointX**
> **Endpoint(1) = txtEndPointY**
> **Endpoint(2) = txtEndPointZ**

As we can see below, the first seven equal the values form the textbox. After that, we assign each point's X, Y and Z coordinate a number either from the variable or from a mathematical calculation that we arrive from the sketch in Figure 3.23. We use the variables Width, Height and Offset to measure the distance from one point to another.

```
Sub CreateLine()
'Input Line.dvb copyright (c) 2006 by Charles W. Robbins
'This program will open a dialogue box in AutoCAD and allow the user
'to enter a starting point (x, y, z) and an ending point (x, y, z).
'A line will be drawn from starting to ending point

'define the starting and ending point arrays
Dim startpoint(0 To 2) As Double
Dim Endpoint(0 To 2) As Double

'assigning values to the variables
startpoint(0) = txtStartpointX
startpoint(1) = txtStartpointY
startpoint(2) = txtStartpointZ
Endpoint(0) = txtEndpointX
Endpoint(1) = txtEndpointY
Endpoint(2) = txtEndpointZ

End Sub
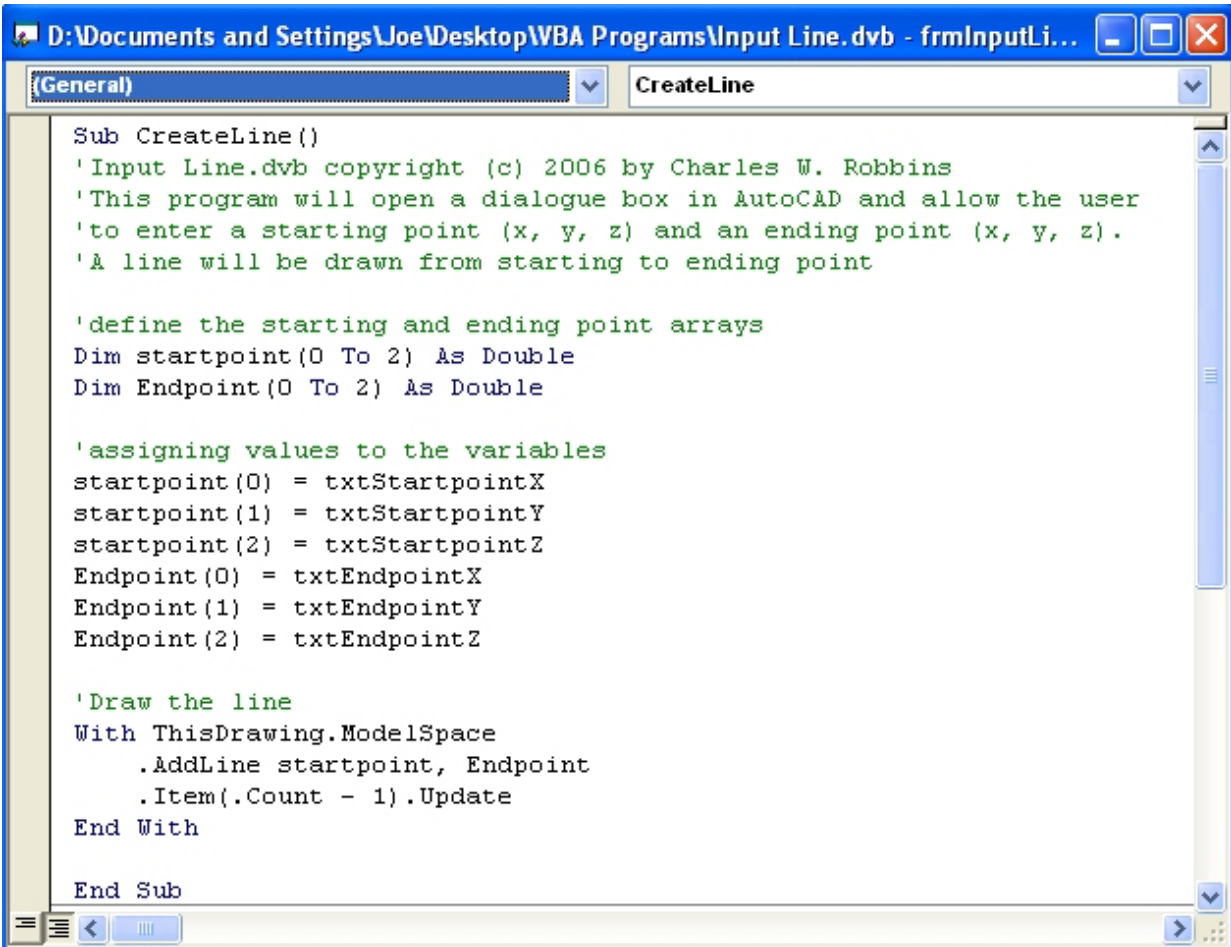```

**Figure 3.23 – Setting the Variables in the Code**

## Inputting the Code to Draw in Visual Basic

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Now we want to enter the code that will actually draw the line in the AutoCAD Model Space. We use the With expression to draw a line by typing **With ThisDrawing.ModelSpace** and the **.AddLine** function then we tell the computer that it will draw in Modelspace by adding a line from the startpoint to endpoint, which already have X, Y and Z coordinates. Type **.Item(.Count - 1).Update** and then **End With** to finish the expression as shown below.

Go ahead and type the following comments and drawing code:

```
'Draw the line
  With ThisDrawing.ModelSpace
  .AddLine startpoint, Endpoint
  .Item(.Count - 1).Update
  End With
```

```
Sub CreateLine()
'Input Line.dvb copyright (c) 2006 by Charles W. Robbins
'This program will open a dialogue box in AutoCAD and allow the user
'to enter a starting point (x, y, z) and an ending point (x, y, z).
'A line will be drawn from starting to ending point

'define the starting and ending point arrays
Dim startpoint(0 To 2) As Double
Dim Endpoint(0 To 2) As Double

'assigning values to the variables
startpoint(0) = txtStartpointX
startpoint(1) = txtStartpointY
startpoint(2) = txtStartpointZ
Endpoint(0) = txtEndpointX
Endpoint(1) = txtEndpointY
Endpoint(2) = txtEndpointZ

'Draw the line
With ThisDrawing.ModelSpace
    .AddLine startpoint, Endpoint
    .Item(.Count - 1).Update
End With

End Sub
```

Figure 3.24 – Adding Code to Draw a Line

To end this Visual Basic subroutine, we will type a comment saying so. In the future, this will be more elaborate, but for now we will just get used to announcing the natural divisions of the script.

Type the following code:

End Sub

Resetting the Data with the cmdClear Command Button

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To clear the textboxes containing the user input, we will first set the textbox for txtXcoord, txtXcoord.text property to a "0.00" entry by using the equal sign "=".This makes the property equal zero as a default. We do this also for the Y and Z coordinates. We will set the textboxes for txtWidth, txtWidth.text property to a black entry by using the equal sign "=" and the null string "", and this will make that property blank. Notice that after the control object name the dot (.) separates the suffix which is the name of the property for that object.

Key the following code as a new subroutine **Private Sub cmdClear_Click().**

```
Private Sub cmdClear_Click()
'clear the form
    txtStartpointX = ""
    txtStartpointY = ""
    txtStartpointZ = ""
    txtEndpointX = ""
    txtEndpointY = ""
    txtEndpointZ = ""
End Sub
```

```
cmdClear                              Click

    Private Sub cmdClear_Click()
    'clear the form
        txtStartpointX = ""
        txtStartpointY = ""
        txtStartpointZ = ""
        txtEndpointX = ""
        txtEndpointY = ""
        txtEndpointZ = ""
    End Sub
```
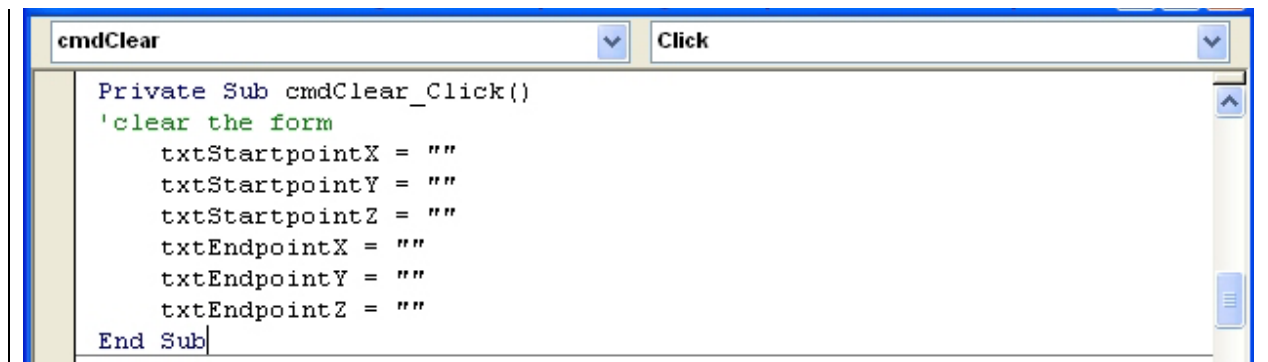
Figure 3.25 – Computing the Reset Button by Clearing Textboxes

Exiting the Program with the cmdExit Command Button

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To exit this program, we will unload the application and end the program.
Type the following code:

```
Private Sub cmdExit_Click()
'unload and end program
    Unload Me
    End
End Sub
```
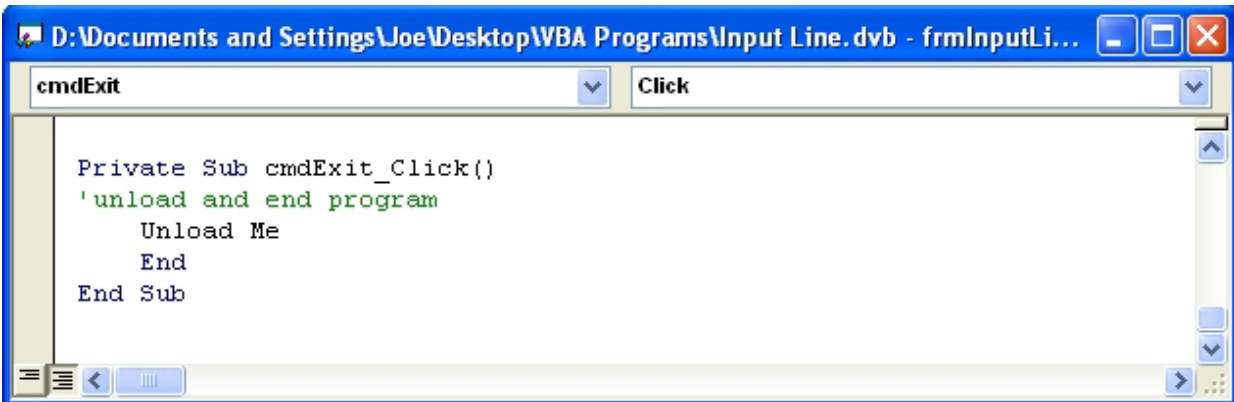
Figure 3.26 – Coding the Exit Button

Executing a Subroutine with the cmdDrawLine Command Button

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In this program, we use a subroutine which is executed by the DrawLine command button, so type the following code to execute the subroutine, **CreateLine**

Private Sub cmdDrawLine_Click()
'draw the line
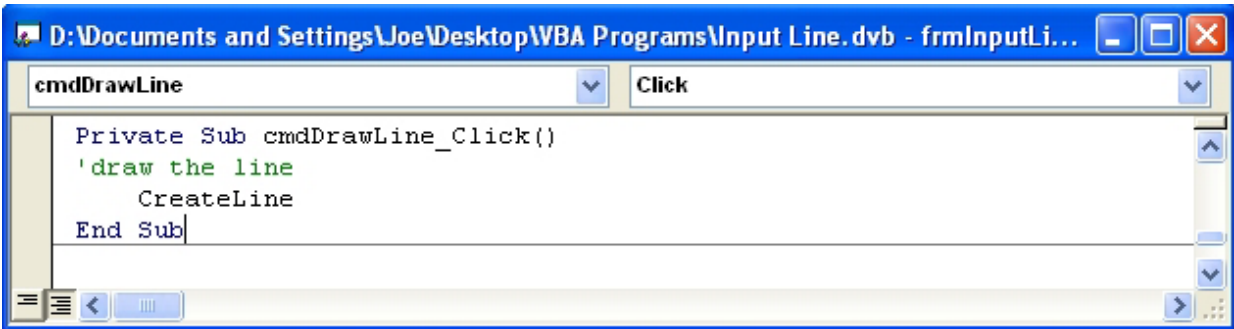   **CreateLine**
End Sub

Figure 3.27 – Coding the Draw Line Button

Written below is the entire program for creating the Line Input. Next, we will insert a module to launch the form.

Sub CreateLine ()

'Input Line.dvb copyright (c) 2006 by Charles W. Robbins
'This program will open a dialogue box in AutoCAD and allow the user
'to enter a starting point (x, y, z) and an ending point (x, y, z).
'A line will be drawn from starting to ending point

```vba
'define the starting and centerpoint arrays, width, height and radius

Dim Startpoint (0 To 2) As Double
Dim Endpoint (0 To 2) As Double

'assigning values to the variables

Startpoint(0) = txtStartPointX
Startpoint(1) = txtStartPointY
Startpoint(2) = txtStartPointZ
Endpoint(0) = txtEndPointX
Endpoint(1) = txtEndPointY
Endpoint(2) = txtEndPointZ

'Draw the line
With ThisDrawing.ModelSpace
   .AddLine startpoint, Endpoint
   .Item(.Count - 1).Update
End With

End Sub

Private Sub cmdClear_Click()
'clear the form
   txtStartpointX = ""
   txtStartpointY = ""
   txtStartpointZ = ""
   txtEndpointX = ""
   txtEndpointY = ""
   txtEndpointZ = ""
End Sub

Private Sub cmdDrawLine_Click()
'draw the line
 CreateLine
End Sub

Private Sub cmdExit_Click()
'unload and end program
   Unload Me
   End
End Sub
```

Inserting a Module into a Visual Basic Application

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Insert a Module by selecting Insert on the Menu Bar and select Module as shown in Figure 3.28. In the Project Menu, double click on the Module and type the following code.

```
Sub Drawline ()
'draw the line
    frmInputLine.Show
End Sub
```
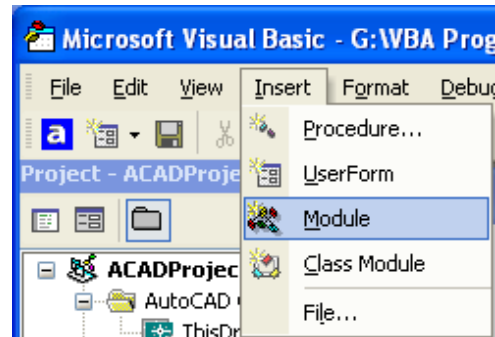

Figure 3.28 – Inserting a Module

The line of code, **frmInputLine.Show** will display the form at the beginning of the program.
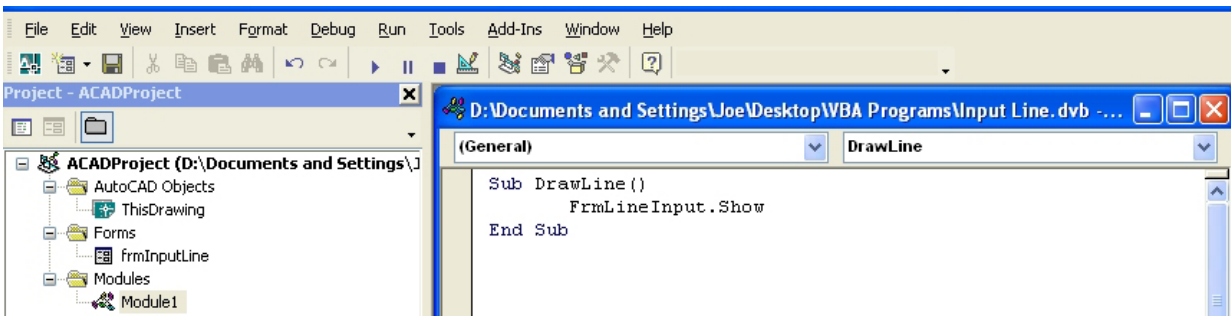

Figure 3.29– Coding the Module

Running the Program

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After noting that the program is saved, press the F5 to run the Input Line application. The Input Line window will appear on the graphical display in AutoCAD as shown in Figure 3.30.
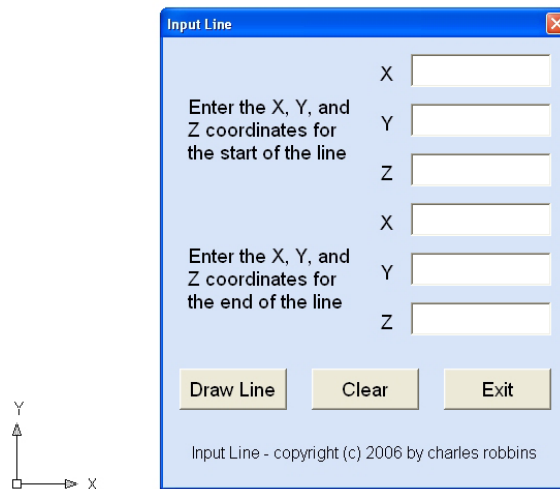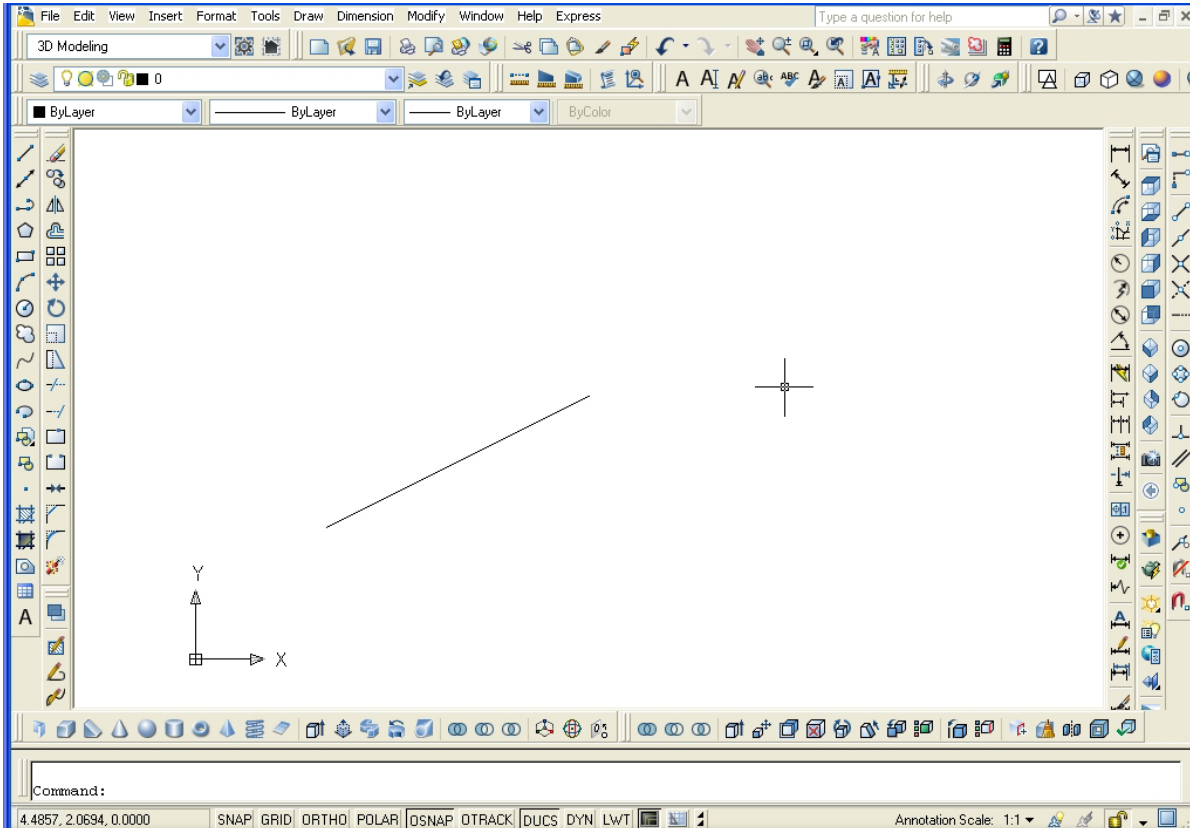

Figure 3.30 – Launching the Program

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Type the following data or something similar into the textboxes and select the Draw Line Command Button to execute the program.

X	1
Y	1
Z	0
X	3
Y	2
Z	0

Figure 3.31 – Input Data

Figure 3.32 – The Finished Draw

There are many variations of this Visual Basic Application we can practice and draw many single view orthographic drawings. While we are practicing with forms, we can learn how to use variables, make point assignments and draw just about anything we desire. These are skills that we want to commit to memory.

* World Class CAD Challenge 5-2 * - Write a Visual Basic Application that draws a line and is executed by a inputting data into a form. Complete the program in less than 120 minutes to maintain your World Class ranking.

Continue this drill four times making other shapes and simple orthographic views with more than one line, each time completing the Visual Basic Application in less than 120 minutes to maintain your World Class ranking.