VP EQUATIONS

XEROX

WARNING: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to subpart J of part 15 of the FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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1.   Introduction

Every ViewPoint package helps you build your creative expertise in controlling the look, format, and content of your documents. VP Equations software is no exception. It can save you time and keystrokes by transforming the traditional processes of incorporating equations into documents. This software package visually guides you through the process of inserting even the most complex equations into a document.

Figure 1-1 is an example of an equation created with VP Equations software.

$$\prod_{}^{c} = \int \frac{(x - x_n)}{(n+1)\,(x-x)(y-n)} + \sum_{i=l}^{mws} b^{\,wx} cos$$

Figure 1-1 **Sample equation**

Equations are created in frames, which reside in your documents. They consist of symbols, such as the summation or integral sign. In the VP Equations software package, these symbols are surrounded by structures that automatically guide you through their subscript and superscript fields. Once they are created, you can use a wide variety of editing options to modify them, regardless of whether they are in the initial input process or already in final format.

These equations, along with the documents they reside in, can become the nucleus of a resource library that you can copy and move from to customize new documentation.

Although the primary users of VP Equations are scientists and engineers, this self study guide has been written to present the basic powers and versatility of the software to the general workstation user. The

sophistication of the ultimate applications is, as always, dependent on the end user.

This self study guide is designed to provide you with the general concepts and practice necessary to create simple to complex equations, and to effectively work with a variety of equation structures and editing processes.

After completing this self study guide, you should be able to:

• Insert an equation frame

• Display the virtual equation keyboard

• Create an equation

• Move, copy, and delete equation frames

• Enter complex equations, including integral structures, script structures, fraction structures, and delimiters

• Edit complex equations, including moving and copying equation structures

Getting started

Before you begin this self study guide, you should know how to operate your 6085 or 8010 workstation. Complete the following:

• "Training Introduction" tab

• "Xerox ViewPoint" self study guide

• "Document Creation" chapter of the "VP Document Editor" self study guide.

To complete this self study guide, you need a 6085 Professional Computer System or an 8010 Information System with VP Document Editor software and VP Equations software installed and running. To verify that the software packages are installed and running, open the application loader, which is located in the workstation divider of the directory. If either of the

packages is not displayed when you open the application loader, or if its status is set to Idle, refer to the "Application Loader" chapter of the "Xerox ViewPoint" self study guide.

Additionally, you need the training disk labeled VP Training Exercises.

NOTE: You must have the Classic and Scientific Thin fonts loaded to use VP Equations

Each chapter of this self study guide introduces a number of related concepts. When these concepts involve on-line practice, practice exercises are included. At the end of each chapter, you test your knowledge with a self check.

After each self check you will find an answer sheet containing step-by-step instructions for that check. In addition, you can open the associated answer document to have an on-screen representation to compare your document against.

When a term that is new or unique is introduced, it is italicized and placed in boldface type. You can find a more detailed explanation of each term in the "Glossary" tab of the VP Series reference library.

To get started, you need the folder titled VP Equations on the VP Training Exercises floppy disk. Within the folder are all the documents necessary to complete this self study guide.

The folder contains three categories of documents:

- EQuations PRactice documents (for example, EQ PR 2-1)

- EQuations Self Check documents (for example, EQ SC 2-1)

- EQuations Answers to Self Check documents (for example, EQ A SC 2-1)

At this point, you are ready to load the VP Training Exercises floppy disk onto your desktop. To review the procedure for loading a floppy disk, refer to the chapter titled "Floppy Utility" in the "Xerox ViewPoint" self study guide. If your system does not

have a floppy disk drive, see your System Administrator.

You can copy the VP Equations folder and rename it. This automatically allows you to work with a copy of the original documents and to store your completed practices.

Beginning with this introduction, continue through each chapter sequentially, at your own pace, until you have mastered the skills taught. Your training should take approximately four to six hours.

While you are completing this self study guide, it is advisable that you have the tab titled "VP Equations" in the VP Series reference library available for easy referral.

The reference library provides more detailed descriptions of VP Equations techniques. The combination of these two sources should provide you with a firm foundation to begin your own application development.

2.   VP Equations

Overview

Your workstation has the ability to call upon more character keys than one physical keyboard can hold. These extra keys are categorized into virtual keyboards. The Greek and Russian keyboards are examples of virtual keyboards.

In order to create equations, you must access a virtual equation keyboard. This keyboard allows you to create an exact representation of the equations in your final document.

Equations must reside in equation frames. Frames keep the equations centered between column margins and allow you to enter text or special equation symbol structures. The equation frame is physically located where an "anchor" character appears in your document. This anchor character resembles a miniature verson of its real life counterpart, a ship anchor.

After completing this chapter, you should be able to:

- Insert an equation frame
- Display the equation property sheet
- Open the virtual keyboard
- Create a simple equation
- Redisplay the English keyboard

Inserting an equation frame

In the following exercise, you insert an equation frame and view its anchor.

1. **Copy** and **open** document EQ PR 2-1.

2. **Select** [EDIT].

3. **Select** the flashing caret.

   NOTE: If there is not a flashing caret, select [EDIT] in the window header.

4. **Hold down** <KEYBOARD>.

   A variety of keyboard choices appears on the display screen.

5. **Press** the function key corresponding to <SPECIAL>.

6. **Press** the function key corresponding to <SHOW>.

7. **Press** the function key corresponding to <SET>.

8. **Release** <KEYBOARD>.

NOTE: <SET> holds any keyboard until you wish to change it. If you do not press the function key corresponding to <SET>, the special keyboard reverts back to English as soon as you release <KEYBOARD>.

Many different keyboard functions are accessible by means of this special keyboard. Note the key corresponding to <EQ'N>. This key calls up the virtual equation keyboard.

1. **Press** the key corresponding to <EQ'N> (<C> on the standard keyboard).

   "Inserting equation frame" appears at the top of your screen. An equation frame is entered in your document.

2. **Select** [SHOW STRUCTURE] on the document auxiliary menu.

The anchor should appear next to the page format character. The equation frame will be placed directly after this anchor when you paginate the document.

Like graphic frames, equation frames have their own property sheets. See Figure 2-1. These property sheets allow you to customize the appearance of the frame itself into a variety of "looks." You can choose borders that are thin, thick, broken, or solid. You can even make them invisible. You can also choose from a selection of widths for these borders. Captions can be aligned with your frames either horizontally or vertically.
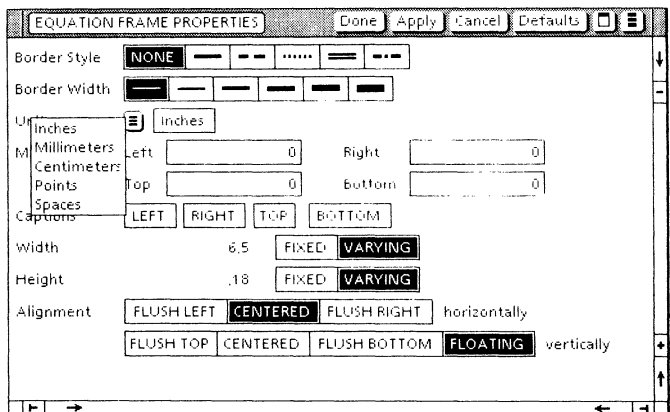
Figure 2-1 **Equation frame property sheet**

You will find more in-depth information on the property sheet for equation frames in the tab titled "VP Equations" in the VP Series reference library.

In the following exercise, you call up the equation frame property sheet.

1. **Select** the entire frame.

2. **Press** <PROP'S>.

3. **Select** [DONE] when you are finished viewing its default settings.

Opening the equation keyboard

In order to type equation symbols in this frame, you have to open the virtual equation keyboard, with the caret inside the equation frame.

In the following exercise, you display the virtual equation keyboard.

1. **Hold down**<KEYBOARD>.

2. **Press** the function key corresponding to <SPECIAL>.

3. **Press** the function key corresponding to <SET>.

The keyboard interpretation window now represents the equation keyboard. Some of the many symbol structures that are representated are *summation*, *integral*, and *square root*. You can insert these symbols when this window is open.

Creating an equation

In the following exercise, you create an equation.

1. **Select** inside the equation frame you created in document EQ PR 2-1.

    NOTE: The caret changes it's appearance to *◢=* inside an equation frame.

2. **Press** the key corresponding to $<\Sigma>$ ($<S>$ on the standard keyboard).

The summation symbol is automatically centered in the frame.

As most equations are a combination of text and symbol structures, you will find it necessary to move between the equation and English keyboards.

In the following exercise, you change back to the English keyboard to type the rest of the equation.

1. **Hold down** $<KEYBOARD>$.

2. **Press** the function key corresponding to $<MORE>$.

3. **Press** the function key corresponding to $<ENGLISH>$.

4. **Press** the function key corresponding to $<SET>$.

5. **Release** $<KEYBOARD>$.

6. **Select** [CLOSE] in the upper righthand corner of the keyboard window.

7. **Select** the summation symbol you typed in the equation frame.

8. **Press** the spacebar twice.

9. **Type:** $4i = 2n(n + 1)$.

   VP Equations software automatically sets all text in 10-point Classic. You may have also noticed that the "n" and "i" are in italics. English letters are automatically inserted in italics; all other text is inserted in normal face.

10. **Paginate** your document.

VP Equations does the rest. The equation frame now appears just after its anchor. To check that you are on the right track, you can compare your document against Figure 2-1.

$$\sum 4i = 2n(n+1)$$

Figure 2-2 **Sample equation**

NOTE: It is extremely important to always paginate your document after you have inserted an equation. When an equation frame is placed in a document, its anchor appears at the point of insertion. However, the frame itself often appears much lower on the page. Pagination aligns the frame next to its anchor.

11. **Close** document.

Summary

In this chapter, you studied how to:

- Insert an equation frame
- Display the equation property sheet
- Open the virtual equation keyboard
- Create a simple equation
- Redisplay the English keyboard

If you need more practice, complete the exercises again. To do this, use a new copy of the practice document for this chapter.

The following pages contain an optional self check exercise.

Self check 2-1

You have practiced the steps needed to enter a simple equation. Now you are ready to try it on your own. If you need assistance with any of the procedures, turn to the next page for detailed instructions.

1. Open EQ SC 2-1. and select [EDIT].

2. Insert an equation anchor and frame.

3. Type in the following equation:

$$6n = 2x(x - 3)$$

4. Paginate your document.

Compare your final result with EQ A SC 2-1.

Answers to self check 2-1

1. **To insert an equation anchor and frame:**

    Open EQ SC 2-1and select [EDIT].

    Hold down <KEYBOARD>.

    Press the function key corresponding to <SPECIAL>.

    Press the function key corresponding to <SHOW>.

    Press the key corresponding to<EQ'N> (<C> on the standard keyboard)

    Release <KEYBOARD>.

    Select [CLOSE] on the keyboard window that is displayed on your screen.

2. **To type in an equation:**

    Select inside the equation frame.

    Type: $6n = 2x(x-3)$.

3. **To paginate your document:**

    Select [PAGINATE].

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3.   Symbol structures

Overview

In the last chapter you studied how to open and close the virtual equation keyboard and enter a simple equation.

Most equations are more complex than the example in Chapter 2. Equations involve the use of special mathematical and scientific symbols (for example, the **Greek sigma**). These symbols, in turn, are often surrounded by superscripts and subscripts. These equation symbols are termed structures, which are selectable parts of the entire equation. Within these structures are *argument fields* (refer to Figure 3-1)
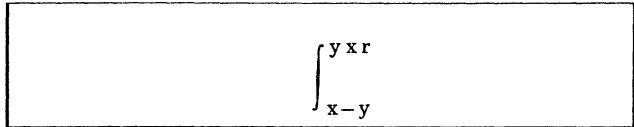
$$\int_{x-y}^{y \, x \, r}$$

Figure 3-1 **Equation symbol with argument fields**

In this figure, you see an example of the integral symbol, with its upper and lower limits. The integral sign, along with its superscript, subscript, and argument fields, constitutes the structure.

When you have completed this chapter, you should be able to enter equation symbol structures and move within the argument fields of these structures. You will use this same process to fill in the limits of a variety of structures in this self study guide.

Argument fields

Argument fields are predefined places for text within each structure. Text in argument fields is automatically positioned according to the rules of the particular structure.

For example, a summation structure has two possible argument fields, one below and one above. The summation's lower limit is below the summation sign in small type, and the upper limit is above the summation sign in small type. Normal size type is restored following the structure.

When you enter a summation structure using VP Equations, you are entering more than the summation sign. You are actually entering the entire structure, which includes two empty argument fields. Pressing <NEXT> allows VP Equations software to guide you, via a blinking caret prompt, through the limits of these fields. You do not have to manipulate the format.

In addition, the software automatically changes the font size and face to the appropriate choice for the position at which you are entering text, according to standard mathematical typesetting principles. Text or numbers can be entered into argument fields.

Symbol structures and their argument fields

Figure 3-2 contains an example of the summation symbol, which is a large sigma bordered by two argument fields. The first field is located below the symbol and the second is located above it. In this example, these fields contain the following information: i = I in the lower limit and n in the upper limit.

$$\sum_{i=l}^{n} 5i = 3n\,(n+2)$$

Figure 3-2 **Summation symbol with argument fields**

To create this equation, you insert an equation frame and use the virtual equation keyboard to insert the symbol. You move through the two argument fields using <NEXT>.

In the following exercise, you create the equation in Figure 3-2.

1. **Open** practice document EQ PR 3-1.

2. **Select** [EDIT].

3. **Hold down** <KEYBOARD>.

4. **Press** the function key corresponding to <SPECIAL>.

5. **Press** the key corresponding to <EQ'N> (<C> on the standard keyboard).

6. **Release** <KEYBOARD>.

   This process enters the equation anchor and frame.

Accessing the virtual equation keyboard:

7. **Hold down** <KEYBOARD>.

8. Press the function key corresponding to <SPECIAL>.

9. Press the function key corresponding to <SHOW>.

10. Press the function key corresponding to <SET>.

11. Release <KEYBOARD>.

Entering the summation structure:

12. Press the key corresponding to <Σ> (<S> on the standard keyboard).

You have now inserted a summation structure, which includes a large sigma. Notice that the caret is in the first argument field of the summation. This is its lower limit. Do not move the caret; you will need it to type into the limit field.

Completing the equation:

13. Change back to the English keyboard.

14. Close the English keyboard window.

Refer to Chapter 2 if you need to review these steps.

Filling in argument fields

You fill in the limits of a structure by typing into each argument field in turn and then pressing <NEXT>. <NEXT> moves the caret into each argument field, according to the design for the particular structure you are working on. When this process is complete, the caret is placed after the completed structure.

In the case of the summation structure, when you press <NEXT>, the blinking caret appears above the large sigma, indicating that you can enter text into the upper limit of the summation. Pressing <NEXT> a second time moves the caret to the lower limit of the summation. Since the summation structure has

only two argument fields <NEXT> places the caret after the structure when it is pressed a third time.

In the following exercise, you use <NEXT> to fill in the summation structure.

1. **Type:** i = 1 into the lower limit.

2. **Press** <NEXT>.

   This moves the caret into the second argument field of the summation structure.

3. **Type:** n into the upper limit.

4. **Press** <NEXT>.

   This finishes the second argument field and selects the entire summation structure, placing the caret after it.

5. **Type:** 5i = 3n (n + 2).

6. **Press** <NEXT>.

   This completes the equation and positions the caret after the frame's anchor character.

   Text typed at this location will be placed after the frame when the document is paginated.

   NOTE: If you need to make corrections to your equation, select anywhere in its structure and proceed.

7. **Select** [PAGINATE].

8. **Select** [CLOSE].

Summary

In this chapter, you studied how to:

● Enter equation symbol structures

● Use <NEXT> to move within argument fields

If you need more practice, complete the exercises again. To do this, use a new copy of the practice document for this chapter.

The following pages contain an optional self check exercise.

Self check 3-1

You have practiced the steps needed to enter equation symbol structures and move within argument fields. Now you are ready to try it on your own. If you need assistance with any of the procedures, turn to the next page for detailed instructions.

1. Open EQ SC 3-1 and select [EDIT].

2. Type the following equation:

$$\int_{x-y}^{y\,x\,r} 33\,y\;(x-7)$$

3. Save this document for exercises in Chapter 4.

Compare your final result with EQ A SC 3-1.

Answers to self check 3-1

1. **To insert an equation anchor and frame:**

   Open EQ SC 3-1 and select [EDIT].

   Hold down <KEYBOARD>.

   Press the function key corresponding to <SPECIAL>.

   Press the key corresponding to <EQ'N> (<C> on the standard keyboard).

   Release <KEYBOARD>.

   Hold down <KEYBOARD>.

   Press the function key corresponding to <SPECIAL>.

   Press the function key corresponding to <SHOW>.

   Press the function key corresponding to <SET>.

   Release <KEYBOARD>.

2. **To set the integral sign:**

   Press the key corresponding to <∫> (<D> on the standard keyboard).

   Close the equation keyboard window.

   Reset back to English keyboard.

   Select [CLOSE] in the English keyboard window.

3. **To type an equation:**

   Type: x-y into the lower limit.

   Press <NEXT>.

   Type: yxr into the upper limit.

   Press <NEXT>.

   Type: 33 y (x-7).

4. **To paginate your document:**

   Select [PAGINATE].

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4.   Frame manipulation

Overview

In previous chapters, you entered equation frames, inserted symbol structures, and filled in their argument fields.

In this chapter, you are introduced to procedures that will aid you in customizing your equations.

Once you have created an equation or even series of equations, you can manipulate them to create a customized document library with a minimum of keystrokes. You can save time and keystrokes by copying equation frames within and between documents, moving existing equations to any location you specify, and deleting unnecessary ones. These procedures follow the same basic rules as text. The few exceptions will be introduced as you proceed through this chapter.

When you complete this chapter, you should be able to copy, move, and delete equation frames.

Copying equation frames

You probably would want to copy an equation frame for the same basic reason you copy text, or graphics: to place part of an existing application into another location without rekeying it.

You follow basically the same rules to copy equations as you do to copy text. The only procedural difference is that equation frames are locked to their anchor characters. To copy an equation frame, select the anchor of the   frame you wish to copy, press

<COPY>, and designate its new location. Pagination will then place the frame in its proper location.

In the following exercise, you copy the equation frame in EQ SC 3-1.

> **NOTE:** If you did not do EQ SC 3-1, use EQ A SC 3-1.

1. **Open** EQ PR 4-1.

2. **Open** EQ SC 3-1.

3. **Select** [EDIT].

4. **Select** [SELECT WINDOW].

5. **Set** EQ PR 4-1 to the right side of your screen.

6. **Select** the anchor for the equation frame in EQ SC 3-1.

   NOTE: To view an anchor character, you must select [SHOW STRUCTURE] in the window menu.

7. **Press** <COPY>.

8. **Select** near the top of EQ PR 4-1.

   You should now have an exact copy of Figure 4-1 in both of your documents.

$$\int_{x-y}^{y\,x\,r} 33\,y\,(x-7)$$

Figure 4-1 **Finished equation**

9. **Paginate** your document.

10. **Close** your document.

Both documents should have their equation anchors near their page format characters and their equation frames in the same relative locations.

Moving equation frames

Moving an equation frame removes it from its original location and places it in another. It no longer exists in its original location.

Moving equation frames also follows the same basic procedures as moving text, with the additional concept of the anchor frame. To move an equation frame, you select the anchor of the frame you wish to move, press <MOVE>, and designate its new location. Pagination will then place the frame in its proper location.

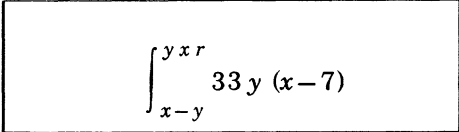In the following exercise, you move the equation frame in EQ A SC 3-1.

1. **Open** EQ PR 4-2.

2. **Select** [EDIT].

3. **Open** EQ A SC 3-1.

4. **Select** [EDIT].

5. **Select** [SET WINDOW].

6. **Set** EQ PR 4-2 to the right side of your screen.

7. **Select** the anchor for your equation frame in EQ A SC 3-1.

    NOTE: To view an anchor character, you must select [SHOW STRUCTURE] in the window menu.

8. **Press** <MOVE >.

9. **Select** near the top of EQ PR 4-2.

10. **Paginate** EQ PR 4-2.

The equation frame and its anchor have now moved from EQ A SC 3-1 to EQ PR 4-2.

Deleting an equation frame

Occasionally you may wish to delete an equation frame. You can select and delete the anchor character of an equation frame in order to delete the frame itself. You can also delete a frame by selecting it and then deleting it. When you paginate your document, it will reformat into the area where the frame had been.

1. **Open** EQ PR 4-2.

2. **Select** [EDIT].

3. **Select** the anchor character of the frame.

   NOTE: To view an anchor character, you must select [SHOW STRUCTURE] in the window menu.

4. **Press** <DELETE>.

   Select [YES] to the message in the header area: Are you sure you want to DELETE the flashing object?

5. **Paginate** the document.

6. **Delete** this document when you are finished.

Summary

In this chapter, you studied how to:

- Use <COPY> to copy equation frames
- Use <MOVE> to relocate equation frames
- Use <DELETE> to delete equation frames

If you need more practice, complete the exercises again. To do this, use new copies of the practice documents for this chapter.

The following pages contain an optional self check exercise.

Self check 4-1

You have practiced moving, copying, and deleting equation frames. Now you are ready to try it on your own. If you need assistane with any of the procedures, turn to the next page for details.

1. Open EQ SC 4-1.

2. Open EQ A SC 2-1.

   Open EQ A SC 3-1.

3. Copy the equation in EQ SC A 2-1 into EQ SC 4 -1, between the first two paragraphs.

4. Copy the equation in EQ A SC 3-1 into EQ SC 4-1, after the third paragraph.

5. Paginate the document.

6. Move the equation after the second paragraph,above the first paragraph.

7. Delete the equation after the last paragraph.

8. Paginate the document.

Compare your final result with EQ A SC 4-1.

Answers to self check 4-1

1. **To copy an equation frame:**

   Open EQ SC 4-1.

   Open EQ A SC 2-1.

   Open EQ A SC 3-1.

   Select [EDIT] in all three documents.

   Select the anchor for the equation in EQ SC A 2-1.

   Press <COPY>.

   Select after the first paragraph in EQ SC 4-1.

   Select the anchor for the equation in EQ A SC 3-1.

   Press <COPY>.

   Select after the third paragraph in EQ SC 4-1.

   Paginate EQ SC 4-1.

2. **To move an equation frame:**

   Select the anchor for the equation after the second paragraph in EQ SC 4-1.

   Press <MOVE>.

   Select above the first paragraph.

3. **To delete an equation frame:**

   Select the anchor for the equation after the last paragraph in EQ SC 4-1.

   Press <DELETE>.

   Paginate the document.

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5.　　Complex equations

Overview

In this chapter, you create equations that are more complex than the ones you have previously developed.

Equations are often built around a variety of symbol structures. Creating these multiple symbol structures is simply an extension of the keystrokes discussed in Chapter 3. As you do with simpler structures, you move through the fields of these structures using <NEXT>.

After completing this chapter, you should be able to:

● Set the anchor and frame

● Insert an integral structure

● Enter the first and second script structures

● Enter a fraction structure

● Enter delimiters

Entering a complex equation

The equation in Figure 5-1 contains an array of typical equation structures: the integral and summation symbols, superscripts and subscripts, and fraction bars. It also contains text characters, which you will input by switching between the English and virtual equation keyboard. Let's approach it in bite-sized sections.

$$\int_{0}^{1} x_y^m e^{-ax} dx = \frac{m}{a^{m+1}} \left[1 - e^{-a} \sum_{i=0}^{m} \frac{a^i}{i} \right]$$

Figure 5-1 **Complex equation**

Setting the equation anchor and frame

In the following exercise, you set the equation anchor and frame.

1. **Open** EQ PR 5-1.

2. **Select** [EDIT].

3. **Insert** an equation frame.

   The blinking caret should be inside the equation frame.

Inserting an integral structure into the equation frame

In the following exercise, you insert an integral structure (Figure 5-2) into the equation frame.

$$\int_{0}^{1}$$

Figure 5-2 **Integral structure**

1. **Hold down** < KEYBOARD >.

2. **Press** the function key corresponding to < SPECIAL >.

3. **Press** the key corresponding to < $\int$ > (< D > on the standard keyboard).
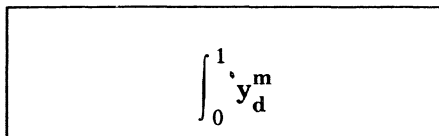
4. **Release** < KEYBOARD >.

Filling in the limits of the integral:

5. **Type : 0.**

6. **Press <NEXT>.**

7. **Type: 1.**

8. **Press <NEXT>.**

   NOTE: The structure is selected. The blinking caret is placed at the next point of entry.

Entering the first two-script structure

A *two-script structure* (Figure 5-3) consists of a base field and two argument fields: a subscript in the lower right corner and a superscript in the upper right corner. Base fields are in normal type size. The subscript and superscript fields are in a smaller type size.

$$\int_0^1 {}^\backprime y_d^m$$

Figure 5-3 **Two-script structure**

Unlike other structures, no visible symbol appears when you enter a two-script structure; only a blinking caret indicates your position. When you insert this structure, the caret is positioned in the base field. The field fill-in order is as follows: base, subscript, and superscript. This structure is inserted into your document by pressing $<x_0^0>$ (<X> on the standard keyboard).

In the following exercise, you insert a two-script structure.

1. **Hold down <KEYBOARD>.**

2. **Press** the function key corresponding to **<SPECIAL>.**

3. **Press** the key corresponding to $<x_\square^\square>$ ($<X>$ on the standard keyboard).

4. **Release** $<KEYBOARD>$.

   The blinking caret is positioned in the base field. Remember that at this point there is no visible symbol structure: the fill-in order is base, subscript, and superscript.

5. **Type:** y.

   This is placed in the base field in normal type size.

6. **Press** $<NEXT>$.

   This places the blinking caret in the subscript field.

7. **Type:** d.

8. **Press** $<NEXT>$.

   This places the blinking caret in the superscript field.

9. **Type:** m.

   Note that "m" and "d" are in a smaller font than "y."

10. **Press** $<NEXT>$.

    This completes and selects the two-script structure

Entering the second two-script structure

In the following exercise, you enter a second two-script structure (see Figure 5-4). However, this time you will only fill-in the base and superscript fields.

$$\int_0^1 y_d^m \ e^{-ax}$$

Figure 5-4 Second two-script structure

1. Insert a second two-script structure <×ₒᵈ> (<X> on the standard keyboard).

2. **Type:** e.

    It is placed in the base field.

3. **Press** <NEXT>.

    This moves you into the subscript field, which you will leave empty.

4. **Press** <NEXT>.

    This moves you into the superscript field.

5. **Type:** -ax.

6. **Press** <NEXT>.

    This structure is now complete.

Entering a fraction structure

The *fraction structure* < ÷ >, as seen in Figure 5-5, corresponds to <.> on the standard keyboard. When you enter this structure, the blinking caret is placed in the numerator, which is the first argument field. The denominator is the second argument field.

$$\int_0^1 y_d^m \ e^{-ax} \quad \frac{m}{a^{m+1}}$$

Figure 5-5 Fraction structure

The fraction bar has the capability to expand to accommodate information. It not only lengthens to accommodate your entry into the numerator but continues to lengthen to accommodate a longer entry

into the denominator. When your entry is complete, the numerator and denominator become centered.

In the following exercise, you enter the fraction structure in Figure 5-5.

1. **Hold down** <KEYBOARD>.

2. **Press** the function key corresponding to <SPECIAL>.

3. **Press** the key corresponding to < ÷ > (<.>on the standard keyboard).

4. **Release** <KEYBOARD>.

5. **Type**: m.

6. **Press** <NEXT>.

   This places the blinking caret in the denominator field.

Entering a two-script structure in the denominator:

7. **Press** the key corresponding to <$x_{\square}^{\square}$> (<X> on the standard keyboard).

8. **Type** : a.

9. **Press** <NEXT>.

10. **Press** <NEXT>.

11. **Type**: m + 1.

12. **Press** <NEXT>.

   The structure is now complete.

13. **Press** <NEXT>.

   This moves the blinking caret to a location following the fraction.

Entering large square brackets

The VP Equations package offers a selection of large delimiters, including, **brackets**, **braces,** and **parentheses**. They are extra-large characters that are entered in pairs.

In Figure 5-6, large square brackets are used to enclose a selection of equation structures.

$$\int_0^1 y_d^m e^{-ax}dx = \frac{m}{a^{m+1}} \quad \left[1 - e^{-a} \sum_{i=0}^m \frac{a^i}{i} \right]$$

Figure 5-6 **Large square brackets**

In the following exercise, you enter this part of the equation.

1. **Display** the virtual equation keyboard.

2. **Press** the key corresponding to $<[]>$ ($<[>$ on the standard keyboard).

3. **Release** $<$KEYBOARD$>$.

4. **Type:** 1-.

Using the equation keyboard to enter a two-script structure:

5. **Insert** a two-script structure using ($<$X$>$ on the standard keyboard).

6. **Type:** e.

7. **Press** $<$NEXT$>$.

8. **Press** $<$NEXT$>$.

9. **Type:** -a.

10. **Press** $<$NEXT$>$.

The entire structure is selected.

Entering the summation symbol:

11. **Press** the key corresponding to $<\Sigma>$ ($<$S$>$ on the standard keyboard).

12. **Type:** i = 0.

13. **Press** $<$NEXT$>$.

14. **Type:** m.

15. Press <NEXT>.

The entire structure is selected.

Entering a fraction structure and a two-script, structure:

16. Press the key corresponding to < ÷ > (<.> on the standard keyboard).

17. Press the key corresponding to the two-script structure (<X> on the standard keyboard).

18. Type: a.

19. Press <NEXT> twice.

20. Type: i.

21. Press <NEXT> twice.

22. Type: i.

You have now entered your first complex equation. It should look like the one in Figure 5-7.

$$\int_0^1 y_{ds}^m e^{-ax} dx = \frac{m}{a^{m+1}} \left[1 - e^{-a} \sum_{i=0}^m \frac{a^i}{i} \right]$$

Figure 5-7 **Completed equation**

23. Close the virtual equation keyboard.

24. Paginate your document before you store it.

Summary

In this chapter, you studied how to:

- Set the anchor and frame
- Insert an integral structure
- Enter the first script structure
- Enter the second script structure
- Enter a fraction structure
- Enter delimiters

If you need more practice, complete the exercises again. To do this, use a new copy of the practice document for this chapter.

The following pages contain an optional self check exercise.

Self check 5-1

You have practiced the steps needed to insert structures and delimiters. Now you are ready to try it on your own. If you need assistance with any of the procedures, turn to the next page for detailed instructions.

1. Open EQ SC 5-1 and select [EDIT].

2. Create the following equation. All of the symbols necessary to create this equation are contained in either the English or the virtual equation keyboard. You have used all of the symbol structures, with the exception of the parentheses, which are entered using the key that corresponds to $<()> <9>$ on the standard keyboard.

$$\int \frac{ax}{b+c\cos ax} = \left[-\frac{1}{a} \tan\left(\frac{m}{a^{m+1}} \right) \right] + C > y_d^m \, 1 - e^{-a}$$

Compare your final result with EQ A SC 5-1.

Answers to self check 5-1

1. **To insert an integral sign:**

    Open EQ SC 5-1 and select [EDIT].

    Hold down <KEYBOARD>.

    Press the function key corresponding to <SPECIAL>.

    Press the key corresponding to <∫> (<D>on the standard keyboard).

    Release <KEYBOARD>.

2. **To insert the first fraction structure:**

    Hold down <KEYBOARD>.

    Press the function key corresponding to <SPECIAL>.

    Press the key corresponding to < ÷ > (<.> on the standard keyboard).

    Release <KEYBOARD>.

    Type: ax.

    Press <NEXT>.

    Type: b + c cos ax.

    Press <NEXT>.

    Type: =

3. **To insert large square brackets:**

    Hold down <KEYBOARD>.

    Press the function key corresponding to <SPECIAL>.

Press the key corresponding to <[]> (<[> on the standard keyboard).

Type: -.

Press the function key corresponding to <SPECIAL>.

Release <KEYBOARD>.

4. **To insert the second fraction structure:**

Hold down <KEYBOARD>.

Press the function key corresponding to <SPECIAL>.

Press the key corresponding to < ÷ > (<.> on the standard keyboard).

Release <KEYBOARD>.

Type: 1.

Press <NEXT>.

Type: a.

Press <NEXT>.

Type: tan.

5. **To insert parentheses:**

Hold down <KEYBOARD>.

Press the function key corresponding to <SPECIAL>.

Press the key corresponding to <()> (<9> on the standard keyboard).

6. **To insert the third fraction structure:**

Hold down <KEYBOARD>.

Press the function key corresponding to <SPECIAL>.

Press the key corresponding to $< \div >$ ($<.>$ on the standard keyboard).

Release <KEYBOARD>.

Type: m.

Press <NEXT>.

7. **To insert the first two-script structure**

Hold down <KEYBOARD>.

Press the function key corresponding to <SPECIAL>.

Press the key corresponding to $<x_\square^\square>$ (<X> on the standard keyboard).

Release <KEYBOARD>.

Type: a.

Press <NEXT> twice.

Type: m + 1.

Press <NEXT> three times.

Type: + C >.

8. **To insert the second two-script structure:**

Insert the two-script structure.

Type: y.

Press <NEXT>.

Type: d.

Press <NEXT>.

Type: m.

Press <NEXT>.

Type: 1-.

9. **To insert the third two-script structure:**

Insert the two-script structure.

Type: e.

Press < NEXT > twice.

Type: -a.

6.　　Editing equations

Overview

In this chapter, you edit equations using a variety of selection methods. You can edit equations either during input or after you have entered them into a document. As they are never "frozen", you always have the creative freedom to change them.

In Chapter 4, you moved, copied, and deleted equation frames. In this chapter you use these same functions on symbol structures and their argument fields.

When you complete this chapter, you should be able to move and copy material within an equation, select an equation sequence, and select before and after an argument field.

Editing a complex equation

Editing equations basically follows the guidelines that rule text editing. In order for a symbol or field to be changed, you must first select it. Similarly to text editing, you can use <MOVE>, <COPY>, <DELETE>, and <SAME>. One exception is <PROP'S>, which cannot operate on a selection within an equation, unless the selection is a block character.

The equation in Figure 6-1 is the same one you created in self check 5-1. You will work with this same equation in the following exercises. You will find a

new copy of this equation in practice document EQ PR 6-1.

$$\int \frac{ax}{b+c\cos ax} = \left[-\frac{1}{a} \tan\left(\frac{m}{a^{m+1}}\right)\right] + C > y_d^m \, 1 - e^{-a}$$

Figure 6-1 **Complex equation**

Moving and copying within an equation frame

To move or copy equation structures and/or argument fields, you select the first and last character of the structure, press <MOVE> or <COPY>, and select the destination. The blinking caret indicates where the text will be entered. It usually is positioned to the right of a selection. You can use the same steps for either moving or copying equation structures.

In the following exercise you copy the "m" in the numerator in Figure 6-2 and place it after the righthand parenthesis.

$$\int \frac{ax}{b+c\cos ax} = \left[-\frac{1}{a} \tan\left(\frac{m}{a^{m+1}}\right)\right] + C > y_d^m \, 1 - e^{-a}$$

Figure 6-2 **Copy operation**

1. **Open** EQ PR 6-1.

2. **Select** [EDIT].

3. **Select** the "m" in the numerator.

4. **Press** <COPY>.

5. **Select** the righthand parenthesis after this structure.

Note: The "m" is highlighted in its new location. It should be positioned after the parenthesis, with the blinking caret to its right.

Your equation should now look like the one in Figure 6-3.

$$\int \frac{ax}{b+c\cos ax} = \left[-\frac{1}{a} \, tan\left(\frac{m}{a^{m+1}} \right)m \right] +C > \;\; y_{d}^{m} \;\; 1-e^{-a}$$

Figure 6-3 **Completed copy operation**

Selecting in equations by single or multiple clicks

It is easy to select characters and structures if you are comfortable with a few guidelines. To type after an equation symbol structure, either select the last character in the structure or select the entire structure. To select the entire structure, select a character in one of its argument fields, and then click the left mouse button three times.

In the following exercise, you select the two-script structure located after the "C " in Figure 6-2.

1. **Select** the "y."

2. **Click** the left mouse button three times   The entire two-script structure should now be selected.

3. **Type**: sin.

4. **Press** the spacebar once.

Your equation should look like Figure 6-4.

$$\int \frac{ax}{b+c\cos ax} = \left[-\frac{1}{a} \, tan\left(\frac{m}{a^{m+1}} \right)m \right] +C > \;\; y_{d}^{m} \, sin \;\; 1-e^{-a}$$

Figure 6-4 **Completed equation**

Selecting an equation sequence

Sometimes you will want to select a specific sequence of characters and script structures. Using the left and right mouse buttons gives you the flexibility of choosing more than one structure and less than the entire equation.

1. **Select** the "t" in "tan" with the left mouse button (in Figure 6-4).

2. **Select** the "m"after the righthand parenthesis with the right mouse button.

    This part of the entire equation should now be selected.

3. **Press** < DELETE >.

Your equation should now look like the one in Figure 6-5.

$$\int \frac{ax}{b + c \cos ax} = \left[-\frac{1}{a} \right] + C > \; y_d^m \; 1 - e^{-a}$$

Figure 6-5 **Equation after delete operation**

Selecting before an argument field

To type before the first character or structure in an argument field, you must place the caret before that item. In order to select before the square bracket in Figure 6-5, select the equal sign that precedes it.

In the following exercise, you place the product symbol in the equation.

1. **Select** the equal sign in front of the brackets

2. **Hold down** < KEYBOARD >.

3. **Press** < SPECIAL >.

4. **Press** the key corresponding to the product symbol, $<\Pi>$ $(<A>$ on the standard keyboard).

5. **Release** $<KEYBOARD>$.

The product symbol, contains two fields, one above and one below.

6. **Type:** i = p into the lower limit.

7. **Press** $<NEXT>$.

8. **Type:** ddc. This should go into the upper limit.

9. **Press** $<NEXT>$.

Your equation should now look like the one in Figure 6-6.

$$\int \frac{ax}{b+c\,cos\,ax} = \prod_{i=p}^{ddc} \left[-\frac{1}{a} \right] + C > \ y_d^m \ 1 - e^{-a}$$

Figure 6-6 **Product symbol added to equation**

Selecting empty argument fields

On occasion you may need to fill-in an argument field that was originally left empty. You can select it several different ways. You can locate the field before it, select the last character, and press $<NEXT>$ as many times as necessary until the blinking caret is placed in an empty field. After filling it in, you can use $<NEXT>$ to move to the next location.

In the following exercise, you use $<NEXT>$ to move through a complex equation.

1. **Select** the space before the integral sign at the beginning of the equation.

2. **Press** $<NEXT>$ and work your way through the equation.

Notice how <NEXT> follows the fill-in rules for each individual structure.

Another, and quicker, way to select empty argument fields is to use <SKIP>. <SKIP> is activated by pressing <NEXT> and <SHIFT> at the same time.

Pressing <SKIP> takes you directly to the first empty field. It only selects empty fields.

In the following exercise, you use <SKIP> to move through the equation.

1. **Select** the space before the integral sign.

2. **Press** <SKIP>.

The only fields selected are the upper and lower fields in the integral structure and the subscript field in the last two-script structure.

Summary

In this chapter, you studied how to:

- Move and copy material within an equation
- Select within the equation
- Select an equation sequence
- Select before and after an argument field

If you need more practice, complete the exercises again. To do this, use a new copy of the practice document for this chapter.

The following pages contain an optional self check exercise.

When you finish the progress check in Chapter 7, you will have completed the training for VP Equations software. Refer to the tab titled "VP Equations" in the VP Series reference library for further information on equations.

Self check 6-1

You have practiced the steps necessary to move and copy material within an equation as well as to select equation sequences and argument fields. Now you are ready to try it on your own, using the equation shown below. If you need assistance with any of the procedures, turn to the next page for detailed instructions.

$$\prod_{x=y}^{c} = \frac{(x-x)(x-x_n)}{(n+1)(y-n)} + \sum_{i=l}^{mws} b^{wx}$$

1. Open EQ SC 6-1 and select [EDIT].

2. Move $(x - x)$ in the numerator between $(n + 1)$ and $(y - n)$ in the denominator.

3. Select after the last two-script structure and type: cos. It should be on the same level as the base character "b" in the preceding structure.

4. Delete $(x = y)$ in the lower limit of the product symbol.

5. Insert an integral symbol before the fraction structure.

Compare your final result with EQ SC A 6-1.

Answers to self check 6-1

1. **To move the numerator to the denominator:**

    Select (x-x) by the multiple click method.

    Press <MOVE>.

    Select the bracket on the right side of (n + 1).

    Click the right mouse button.

2. **To type after the last entry:**

    Select the entire two-script structure either by multiple clicking or by moving through the structure with <NEXT>.

    Type: cos.

    NOTE: If the caret aligns on either a subscript or a superscript level, you have not selected the entire previous structure.

3. **To select and delete (x = y):**

    Select the space before the product sign, Π:

    Press <NEXT>. This should select (x = y).

    Press <DELETE>.

4. To insert the integral symbol.

Select = .

Press <KEYBOARD>.

Press the function key corresponding to <SPECIAL>.

Press <D>.

Your equation should look like the following:

$$\prod^{c} = \int \frac{(x - x_n)}{(n+1)(x-x)(y-n)} + \sum_{i=l}^{mws} b^{wx} cos$$

7.   Final progress check

You have practiced all of the steps necessary to create the following two equations. Now you are ready to try them on your own. If you need assistance with any of the procedures, turn to the next page for detailed instructions.

1. Open EQ FPC 7-1 and select [EDIT]. Create the equation in Figure 7-1 in that document.

2. When you have created this equation, copy it below the paragraph

3. Edit it to replicate Figure 7-2.

$$4\left[sin\ a + \frac{3-d}{c_c^d\ m+1} \right] = \sum d_c^d < 1\left(\frac{mdc}{5+m_2} \right)$$

Figure 7-1

$$4\left[\sin\ a + \frac{3-d}{1_c^d\ m+1}\right] = \sum_{n=1}^{m} c_c^d < \int_1^2 \left(\frac{jdc}{5+m_4}\right) + \sum_{n=1}^{m}$$

Figure 7-2

Answers final progress check 7-1

Figure 7-1

1. **To insert an equation anchor and frame:**

   Open EQ FPC 7-1.

   Select [EDIT].

   Hold down <KEYBOARD>.

   Press the function key corresponding to <SPECIAL>.

   Press the function key corresponding to <EQ'N>.

   Release <KEYBOARD>.

   Type: 4.

2. **To set large square brackets:**

   Display the virtual equation keyboard.

   Press <[]>, (<[>on the standard keyboard).

   Release <KEYBOARD>.

   Type: sin a +.

3. **To insert a fraction structure:**

   Hold down <KEYBOARD>.

   Press the function key corresponding to [SPECIAL].

   Press the key corresponding to < ÷ > (<.>on the standard keyboard).

   Release <KEYBOARD>.

   Type: 3-d.

   Press <NEXT>.

4. **To insert a two-script structure in the denominator:**

   Insert a script structure $<x_{\square}^{\square}>$ (<X> on the standard keyboard).

   Type: c.

   Press <NEXT>.

   Type: c.

   Press <NEXT>.

   Type: d.

   Press <NEXT>.

   Type: m + 1.

   Select the end large square bracket.

   Type: = .

5. **To insert a summation symbol:**

   Hold down <KEYBOARD>.

   Press the function key corresponding to <SPECIAL>.

   Press the key corresponding to <Σ> (<S> on the standard keyboard).

   Press <NEXT> twice.

6. **To insert the second two-script structure:**

   Insert a script structure $< x_\square^\square >$ ($<X>$ on the standard keyboard).

   Type: d.

   Press $<NEXT>$.

   Type: c.

   Press $<NEXT>$.

   Type: d.

   Press $<NEXT>$.

   Type: <1.

7. **To insert parentheses:**

   Hold down $<KEYBOARD>$.

   Press the function key corresponding to $<SPECIAL>$.

   Press the key corresponding to $<()>$ ($<9>$ on the standard keyboard).

8. **To insert the second fraction structure:**

   Hold down $<KEYBOARD>$.

   Press the function key corresponding to $<SPECIAL>$.

   Press the key corresponding to $< \div >$ ($<.>$.on the standard keyboard).

   Release $<KEYBOARD>$.

   Type: mdc.

   Press $<NEXT>$.

   Type: $5 +$.

9. **To insert the third two- script structure:**

    Insert a script structure $<x_\square^\square>$ ($<X>$ on the standard keyboard).

    Type: m.

    Press $<NEXT>$.

    Type: 2

Figure 7-2

Copy Figure 7-1 below the paragraph.

1. **To edit the first two-script structure:**

   Select the c in the two-script structure.

   Press <DELETE>.

   Type: 1.

2. **To edit the summation symbol:**

   Select the equal sign before the summation symbol.

   Press <NEXT>.

   Type: $n = 1$.

   Press <NEXT>.

   Type: m.

   Select the 1 after the less than sign.

   Press <DELETE>.

3. **To insert the integral sign:**

   Press <KEYBOARD>.

   Press <SPECIAL>.

   Press the key corresponding to $< \int >$ (<D> on the standard keyboard).

   Release <KEYBOARD>.

   Type 1.

   Press <NEXT>.

   Type 2.

   Press <NEXT> twice.

Select the "m" in mdc.

Press <DELETE>.

Type: j.

4. **To edit the third two-script structure:**

   Press <NEXT> three times.

   Press <DELETE>.

   Type: 4.

   Select the end bracket.

   Type: + .

   Copy the summation structure after the plus sign.