



VP EQUATIONS

XEROX

VP Series Reference Library
Version 1.0

This publication could contain technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of this publication.

This publication was printed in September 1985 and is based on the VP Series 1.0 software.

Address comments to:

Xerox Corporation
Attn: Product Education (N2-15)
701 S. Aviation Blvd.
El Segundo, California 90245

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.

Printed in U.S.A. Publication number: 610E01060

XEROX®, 6085, 8000, 8010, 860, 820-II, 8040, 5700, 8700, 9700, 495-1, ViewPoint, and VP are trademarks of Xerox Corporation.

IBM is a registered trademark of International Business Machines.

DEC and VAX are trademarks of Digital Equipment Corporation.

Wang Professional Computer is a trademark of Wang Laboratories, Inc.

Lotus 1-2-3 is a trademark of Lotus Development Corporation.

MS-DOS is a trademark of Microsoft Corporation.

The Source is a service mark of Source Telecomputing Corporation.

VisiCalc is a registered trademark of VisiCorp.

WordStar is a registered trademark of MicroPro International Corporation.

Teletype is a registered trademark of Teletype Corporation.

© 1985, Xerox Corporation. All rights reserved.

Table of contents

1. VP Equations overview	1
Related information	2
VP Series reference library	2
VP Series training guides	2
Hardware/software requirements	3
Equation frames	4
Equation keyboard	5
Mathematical symbols and argument fields	6
Automatic adjustment	8
Statistics and facts	9
2. Actions and procedures	11
Loading fonts	12
Inserting an equation frame	12
Typing an equation	13
Equation structures	14
Filling in argument fields	16
Selecting and editing an equation	16
Inserting text in an existing equation	16
Moving and copying equation structures	17
Deleting an equation structure	17

3. Property/option sheets and windows	19
Equation frame property sheet	21
Block property sheet	25

List of figures

1-1	Equation frame with border	4
1-2	Equation keyboard	5
1-3	Summation structure and argument fields	6
1-4	Equation using multiple keyboards	7
1-5	Continued fraction bar	7
1-6	Automatic adjustment: summation sign	8
1-7	Automatic adjustment: lower limit	8
3-1	Equation frame property sheet	20
3-2	Block property sheet	24

(This page intentionally blank)

1. VP Equations overview

VP Equations software provides a full range of special symbols and constructs needed when writing equations. These symbols and constructs, along with the software's ability to automatically position them within an equation, allow workstation users to produce equations that look as if they have been professionally typeset.

Related information

The materials in the following paragraphs provide information related to the VP Equations application.

VP Series reference library

- Xerox ViewPoint
- VP Document Editor

VP Series training guides

- Xerox ViewPoint
- VP Document Editor
- VP Equations

Hardware/software requirements

The following are the hardware and software requirements for VP Equations:

- A 6085 Professional Computer System, or an 8010 Information System
- Xerox ViewPoint software
- VP Equations software
- VP Document Editor software
- VP Classic font package

VP Equations software and all prerequisite software must be installed, , and running on the workstation. Before using the software, open the application loader icon to verify that the appropriate software is loaded and running.

The sub-tab titled "Application Loader" in the VP Series reference library contains additional information on the application loader.

Equation frames

To enter an equation into a document, an area in which to work must first be provided. This area is called an equation frame. An equation frame is entered by holding down <KEYBOARD> pressing the function key corresponding to <SPECIAL>, and pressing the key corresponding to <C> on the standard keyboard. Then release <KEYBOARD>.

An equation frame is similar to a graphic frame. Like a graphic frame, an equation frame can be moved, copied, and deleted. Just as various widths and types of borders can be added to a graphic frame, a border can be added to an equation frame. In addition to borders, captions can be added above, below, and beside the frame for annotation and numbering purposes. The sub-tab titled "Frames" in the VP series reference library contains additional information regarding border and caption options for frames.

Figure 1-1 shows an equation frame with a border and caption.

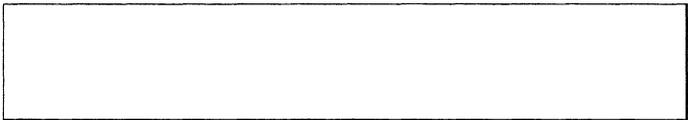


Figure 1-1 Equation frame with border

Equation keyboard

The virtual equation keyboard contains the special mathematical symbols and structures used for typing equations.

The virtual equation keyboard is displayed by selecting within an equation frame, holding down <KEYBOARD>, and pressing the function keys corresponding to <SPECIAL> and <SHOW>. Equation symbols and structures can then be entered by pressing the key for the desired structure. Figure 1-2 shows the symbols and structures available on the virtual equation keyboard.

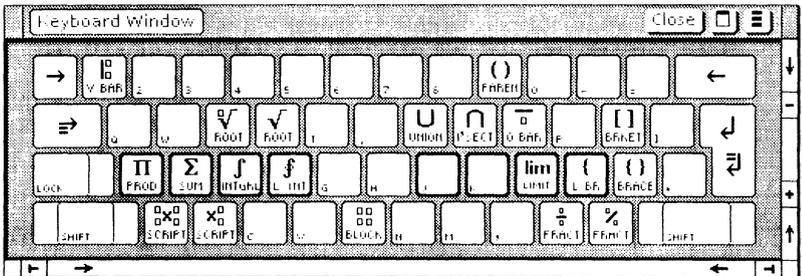


Figure 1-2 Equation keyboard

Once an equation structure has been typed, the caret automatically appears in the first logical position for an element of that structure. Each time <NEXT> is pressed, the caret progresses to the next logical position. The data entered at these positions is automatically formatted appropriately, based on typographical standards for equations.

Mathematical symbols and argument fields

Equation structures are made up of mathematical symbols, together with argument fields. A summation field, for example, has two possible argument fields: the lower limit and the upper limit. 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. The summand follows the sign in normal-size type. When the summation structure is entered in an equation frame, the entire structure is entered, including the two empty argument fields. The software automatically changes the font size and typeface to be appropriate for the position in which text is entered.

Figure 1-3 shows a summation structure and its three argument fields. In this case, the border style for the equation has been set to [NONE].

$$\begin{array}{c} \textit{top} \\ \sum \textit{normal size text} \\ \textit{bottom} \end{array}$$

Figure 1-3 Summation structure and argument fields

Within the equation frame, it is possible to move among several different keyboards. For example, the equation in Figure 1-4 was typed using the equation, English, math, and Greek keyboards.

$$\int_1^1 f(x)dx \geq \sum_{k=1}^M H_k f_{\pi} + E$$

Figure 1-4 Equation using multiple keyboards

Individual elements within the equation can be edited, much as text in paragraphs can be edited. For example, material can be copied or moved within an equation and between equations. The equation software performs the necessary adjustments to the surrounding material.

An example of the copy feature is shown in Figure 1-5. The equation software allows the user to select the initial fraction structure, then copy it to a logical place within the frame. (Multiple clicking selects a structure, just as multiple clicking selects a word in text.) The software expands the fraction bars and correctly positions all symbols.

$$\frac{1}{x+\Lambda} \rightarrow \frac{1}{x+1 \frac{1}{x+\Lambda}} \rightarrow \frac{1}{x+\frac{1}{x+1 \frac{1}{x+1}}}$$

Figure 1-5 Continued fraction bar

Automatic adjustment

The equation software automatically adjusts the size and placement of equation structures and their elements as the equation is typed. When a fraction is typed, for example, the horizontal bar separating the numerator from the denominator automatically expands to accommodate larger numbers and symbols. In Figure 1-6, the horizontal bar adjusts to accommodate the summation sign.

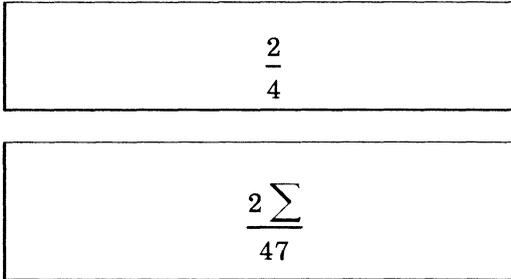

$$\frac{2}{4}$$
$$\frac{2 \sum}{47}$$

Figure 1-6 Automatic Adjustment:
Summation sign

Additionally, when a lower limit is added to the summation, the software automatically adjusts the bar to make room for it as shown in Figure 1-7.

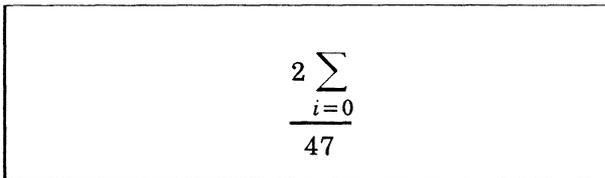

$$\frac{2 \sum_{i=0}}{47}$$

Figure 1-7 Automatic adjustment: lower limit

After entering the upper limit, the user is guided back to the standard baseline to complete the equation.

Statistics and facts

- The VP Classic font package must be loaded on a print server before documents that contain equation frames can be printed.
- Since the typographical standards for equations require a serif font, symbols, numbers, and letters can be entered only in Classic font.
- Because the system determines the character properties of the equation based on typesetting conventions, the ability to change properties of text within an equation frame is limited to two sizes (98 and 10), three typefaces (normal, bold, and italics), and one font.
- Equation frames can only be entered in text. An equation frame cannot be entered in a graphic or text frame, nor can a graphic or text frame be entered in an equation frame.
- Line numbering for equations can be placed in the frame's righthand caption area.
- An equation within an equation frame is limited to a single line. Multiple-line equations must be entered through the insertion of a comparable number of equation frames or the use of block structures from the virtual equation keyboard. Chapter 2 describes block structures.
- All equations are centered within their frames. Other alignment choices, such as left or right flush, are not yet available (though they may be simulated by adding blank spaces).
- The "growing" square root structure is not yet available, although a simple square root character is contained on the math keyboard.
- An equation frame cannot reside on the same line as text in a document: it must be below the line.

- Descriptive text can be typed in an equation frame; however, it is constrained by the same formatting standards as equations. It can also be placed in caption areas around the equation frame.
- When an equation is typed, the hyphen key is used to enter a minus sign.
- Inserting more characters into an equation than will fit in the column width causes the equation to extend past the frame and into the right margin; some of the characters become invisible.

2. Actions and procedures

The actions and procedures in this chapter provide the information necessary to insert an equation frame into a document and type equation structures.

Loading fonts

To use VP Equations software, Classic fonts must be loaded on the workstation. The tabs titled "6085 Software Installation" and "8010 Software Installation" contain instructions for loading the VP Classic font package.

Inserting an equation frame

To insert an equation frame:

1. Select the character that the equation frame should follow.
2. Hold down <KEYBOARD>, press the function key that corresponds to <SPECIAL>, and press the key corresponding to <C> on the standard keyboard.

Note: <SPECIAL> appears on the row of keys at the bottom of the document.

The message "Inserting an equation frame" appears in the message area of the screen, and the frame is inserted after the character that was selected. An anchor also appears in the document if the document structure is turned on by selecting [SHOW STRUCTURE].

3. Release <KEYBOARD>.

Typing an equation

After an equation frame has been inserted into a document, equations and equation structures can be typed within the frame.

To type an equation:

1. Select anywhere inside the equation frame.
2. Hold down <KEYBOARD> and press the function keys corresponding to <SPECIAL> and <SHOW>.

<SPECIAL> makes the equation keyboard available for use. <SHOW>, displays the equation keyboard on the screen. If you already know the key associated with the structure you wish to type, you do not have to press the function key corresponding to <SHOW>.

Note: If the function key corresponding to <SET> is pressed after <SHOW> the equation keyboard stays in effect until it is reset to English. Otherwise the keyboard reverts to English when <KEYBOARD> is released.

3. Review the equation keyboard for the desired structure. Then press the key that corresponds to the appropriate key on the equation keyboard.

The caret automatically appears in the first argument field of the structure.

4. Release <KEYBOARD>. Then enter the text in the first argument field.
5. Press <NEXT> to move to the next field. Continue entering the necessary text and pressing <NEXT> until the equation is completed.

Use <NEXT> to move the caret from one field to the next throughout the structure. When all fields are completed, the caret appears

immediately following the equation anchor in the text preceding the frame.

6. If the function key corresponding to <SHOW> was pressed to display the keyboard, select [CLOSE] on the keyboard window to close it.

Pressing the function key corresponding to <SET> holds the equation keyboard until it is reset to English. To return to the English keyboard:

1. Hold down <KEYBOARD>.
2. Press the function key corresponding to <MORE> as many times as necessary until the English keyboard appears.
3. Press the function key corresponding to <ENGLISH> and <SET>, and release <KEYBOARD>.
4. Select [CLOSE] in the keyboard interpretation window.

Equation structures

The equation structures are as follows:

-
- Block** - A rectangular array of arguments used for the construction of a matrix of arguments. Once they are entered into the equation frame, the number of arguments within the block can be defined through the block property sheet. The block is the only equation structure that possesses its own property sheet. To view this property sheet, select the block structure and press <PROP'S>.
- Brace** - A pair of braces, centered vertically on the surrounding line, that assumes one of a set of discrete sizes, depending on where in an equation it appears.

- [] **Bracket** - A pair of square brackets, centered vertically on the surrounding line, that assumes one of a set of discrete sizes, depending on where in an equation it appears, .
- ÷ **Fraction** - A horizontal line of variable width, together with mutually centered numerator and denominator arguments in the normal typeface.
- ∫ **Integral** - The large integral sign, together with upper and lower arguments in a smaller typeface.
- ∩ **Intersection** - The large intersection sign, together with upper and lower centered arguments in a smaller typeface.
- ∫ **Line integral** - The large line integral sign, together with upper and lower arguments in a smaller typeface.
- lim **Limit structure** - The abbreviation "lim," together with a lower centered argument in a smaller typeface.
- () **Parentheses** - Parentheses, centered vertically on the surrounding line, that assume one of a set of discrete sizes, depending on where in an equation they appear.
- Π **Product** - The large Greek pi, together with upper and lower centered arguments in a smaller typeface.
- **Overbar** - An overbar of variable length, equal to the width of the single enclosed argument. When the overbar key is pressed, the overbar appears and the caret is placed below it.
- X □
□ **Scripts** - Base, lower righthand corner, and upper righthand corner arguments. The corner arguments appear in a smaller typeface.

- Σ **Summation** - The large Greek sigma, together with upper and lower centered arguments in smaller typeface.
- ∪ **Union** - The large union sign, together with upper and lower centered arguments in a smaller typeface.
- | **Vertical bar** - A vertical bar of fixed height, together with upper and lower arguments in a smaller typeface.

Filling in argument fields

An argument field is a space that is set aside for text or numbers. Argument fields are filled in by pressing <NEXT> after the equation symbol has been typed.

Selecting and editing an equation

All the text in an equation can be edited, including text in structures and argument fields.

To select and edit a single character, select the character, press <DELETE>, and enter the new text.

To select and edit a sequence of characters, select the sequence of characters using the select-adjust method (select the first character with the left mouse button, and select the last character with the right mouse button), and press <DELETE>.

Inserting text in an existing equation

Normally <NEXT> is used to move from field to field. When text is entered into an existing equation, however, the mouse must be used. In those instances, you must use the mouse to select where the text will be entered.

Procedures for editing an existing equation are as follows:

- To enter text following an equation structure, select the equation structure and enter the new text.
- To enter text before the first item in an argument field, select before the first item and enter the new text.
- To enter text in an empty argument field, select an argument field before the empty argument field, press <NEXT>, and enter the new text.
- To enter text to follow an equation frame:

Select the equation frame anchor,

Press <RETURN>, enter the desired text, and paginate the document. The text is not repositioned until the document is paginated.

Moving and copying equation structures

Equation structures can be moved or copied from one equation to another.

To move or copy a structure select the first character in the structure with the left mouse button and the last character with the right mouse button; then press <MOVE> or <COPY> and select the destination.

Deleting an equation structure

Equation structures can be deleted without deleting the equation frame.

To delete an equation structure, select a character in one of the argument fields to be deleted, click the left mouse button successively until the entire structure is highlighted, and press <DELETE>.

(This page intentionally blank)

3. Property/option sheets and windows

This chapter describes the property sheets, option sheets, and windows related to VP Equations.

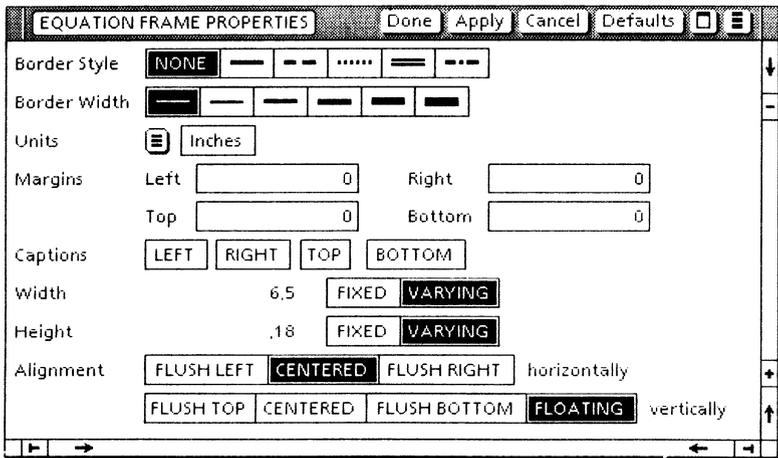


Figure 3-1 Equation frame property sheet

Equation frame property sheet

The equation frame property sheet (Figure 3-1) is used to set properties such as border style, border width, captions, and alignment for the equation frame.

The equation frame property sheet is displayed by selecting an equation frame and pressing <PROP'S>.

Window commands

The following is a description of the commands located at the top of the property sheet window in the gray area.

[DONE]

Closes the property sheet and applies the properties currently set on it. If any information is incorrect, the property sheet remains open and an error message is displayed.

[APPLY]

Applies the properties currently set on the property sheet without closing it.

[CANCEL]

Closes the property sheet without applying any changes to the properties.

[DEFAULTS]

Resets the properties to the preassigned settings.



Causes the window management commands to appear when the pointer is placed over the auxiliary menu and the left mouse button is held down. The sub-tab titled "Windows" in the VP Series reference library contains detailed information on the window management commands.



Causes the window commands that have been placed in the floating item auxiliary menu to appear when the pointer is placed over the auxiliary menu and the left mouse button is held down. Window commands are placed in the floating item auxiliary menu when the window is not wide enough to accommodate the commands.

Properties

The following is a list of the properties.

Border Style

Sets the type of border used for the equation frame.

Border Width

Sets the width of the border used for the equation frame.

Units

Sets the units in which margins, width, and height are displayed to inches, millimeters, centimeters, points, or spaces.

Margins

Sets the left, right, top, and bottom margins of the equation frame.

Captions

Sets the caption area at the left, right, top, or bottom for the equation frame.

Width

Sets the width of the equation frame.

Height

Sets the height of the equation frame.

Alignment

Sets the horizontal and vertical alignment for the equation frame.

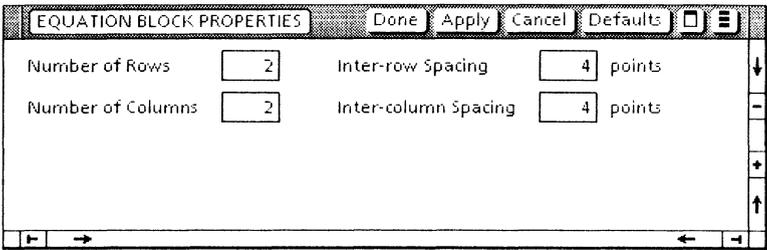


Figure 3-2 Block property sheet

Block property sheet

A block is used to insert a rectangular array of arguments in an equation. The block property sheet (Figure 3-2) is used to specify the number of rows and columns and the amount of spacing between rows and columns of the array.

The block property sheet is displayed by selecting the block and pressing <PROP'S>.

Window commands

The following is a description of the commands located at the top of the property sheet window in the gray area.

[DONE]

Closes the property sheet and applies the properties currently set on it. If any information is incorrect, the property sheet remains open and an error message is displayed.

[APPLY]

Applies the properties currently set on the property sheet without closing it.

[CANCEL]

Closes the property sheet without applying any changes to the properties.

[DEFAULTS]

Resets the properties to the preassigned settings.



Causes the window management commands to appear when the pointer is placed over the auxiliary menu and the left mouse button is held down. The sub-tab titled "Windows" in the VP Series reference library contains detailed information on the window management commands.



Causes the window commands that have been placed in the floating item auxiliary menu to appear when the pointer is placed over the auxiliary menu and the left mouse button is held down. Window commands are placed in the floating item auxiliary menu when the window is not wide enough to accommodate the commands.

Properties

The following is a list of the properties.

Number of Rows

Specifies the number of rows in the block structure. The number of rows must not be less than 1 or more than 256.

Inter-row Spacing

Specifies the amount of spacing between rows. Spacing between rows must not be less than 0 or more than 64.

Number of Columns

Specifies the number of columns in the block structure. The number of columns must not be less than 1 or more than 256.

Inter-column Spacing

Specifies the amount of spacing between columns. Inter-column spacing must not be less than 0 or more than 64.