Functional specification

Aldus Corporation

text and graphics software systems

ALDUS DOCUMENT LAYOUT SYSTEM FUNCTIONAL SPECIFICATION

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Introduction

Document layout is the process of combining text and graphics and arranging them on a page. Today this process involves designing the page, gathering the text and graphics to be laid out, and specifying how the text should be typeset. After typesetting, the text and graphics are arranged and pasted on a layout sheet by hand.

This functional specification for the Aldus document layout system describes how a user can electronically lay out documents on an Apple Macintosh or Lisa computer by running the Aldus layout software. It also describes how a user can send documents to be typeset in page position. For the purposes of this specification, documents are defined broadly. Examples of documents are reports, small brochures, newsletters, and display ads.

Building documents interactively using the Aldus layout system rather than pasting down typeset text and graphics by hand results in several benefits:

- 1) Time savings the time required to construct a page is reduced, since the amount of cutting and pasting is eliminated or reduced. The Aldus layout software lets the full capabilities of the output device (such as the typesetter or laser printer) be used to set as much of the text and graphics as possible in page position. In addition, production time is reduced because the layout person can handle the entire production cycle by himself rather than relying on others to produce it from a paper layout.
- 2) Cost savings labor costs are reduced because no specially trained production staff is needed to produce the page from its layout. Not only can the Aldus layout software be used to electronically position the elements of a page on the Macintosh or Lisa screen, it can also generate the commands necessary to set the page (or most of it) in position on a printer or typesetter. The person using the Aldus layout system is not required to understand how to drive typesetters; instead that job is relegated to the software, and the layout person can concentrate on creating the best possible layout without writing complex composition commands. Materials costs are reduced because most of the page (if not all) can be set in page position, thus reducing the amount of photographic paper used.
- 3) Reduced error rates errors become less likely, since the layout person sees a representation of the page before it is typeset and corrects potential problems.

Production Scenarios

Figure 1 shows the production flow for a typical "cut & paste" environment. Note that many different proof cycles are needed, since production of the page is a separate activity from creation of the page. The layout artist sketches how the page should look, but must pass this sketch on to a person skilled in typesetting for the page to actually be produced. The resulting galleys of type must then be

integrated into a page by pasting the elements together. At each stage of development, another person may be involved. If the final page is to match the expectations of the page creator, the production of the page must be carefully monitored by the creative person after each step of production.

Figure 2 shows the production flow for pages created using the Aldus layout system. In this case, the production of the page is managed largely by the layout system. The layout system user sees the page on the screen as it will be produced on the printer or typesetter. As a result, the proof steps required to monitor the production of the page are eliminated.

Advantages of Aldus Document Layout

The critical advantages of the document layout terminal are that it --

- o Allows the user to organize the many pieces that go into a publication.
- o Is integrated with other important tools, allowing the user to use text files created by word processing programs and graphic illustrations created by picture creation programs.
- o Allows the user to easily create page layouts by placing text and graphic elements on predefined page formats. It then allows the user to manipulate the resulting page for fit and appearance.
- o Provides the user with a proof of the page before output to a laser printer or typesetter.

Orientation of Aldus Document Layout

Because the layout system is a creative tool, the accuracy of the display is very important. The display must show the document accurately enough so that the user can make esthetic judgements about the type and layout. Speed is also very important, but cannot take priority over accuracy.

Typesetters don't always support everything users would like to do, because they generally use characters as the smallest unit that can be placed on the page. New generation typesetters and laser printers, since they are digital devices, can place individual "bits" (dots that make up a character or graphic) on the page, thus providing flexibility limited only by the size of a bit. Since the bits in these "bit-mapped" typesetters and laser printers can be from 1/300 down to 1/3000 inches square, graphic elements along with text can be printed by these devices. The Aldus document layout system drives these bit-mapped devices with everything set in page position.

If the Aldus layout system is being used to produce pages on a typesetter, some of the functions the typesetter can't do must still be possible with the layout system. For example, few typesetters can set rotated text; typically, the text is set separately and pasted

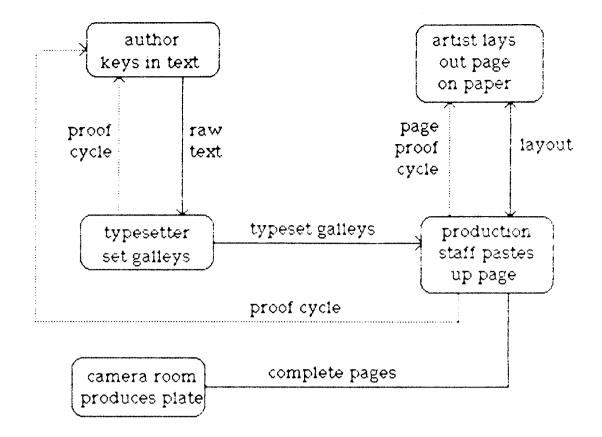


Figure 1.

Traditional "cut & paste" page form production.

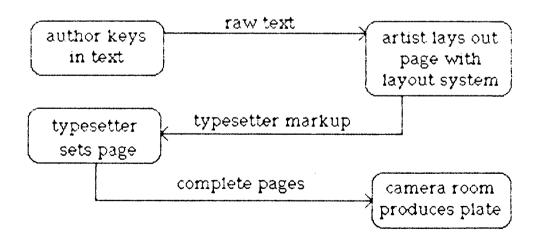


Figure 2.

Page form production using Aldus document layout terminal

into the page. Aldus document layout lets the creative person eliminate the paper layout by allowing him to place rotated text (and other things not supported directly by most typesetters) into the document. Once into the document, these unsupported functions are emulated on the typesetter as best as possible; for example, the rotated text could be output separately from the rest of the document (in unrotated position) with instructions to cut and paste into place.

With this product orientation in mind, we now look at the description of the Aldus layout system. The description is divided into four major sections, one describing the overall flavor of how the user interacts with the layout system, one discussing the composition principles to which the layout system adheres, one showing the screens that are presented to the user for each function, and a fourth describing how other equipment, such as typesetters and printers, can be used along with the layout system. In addition, two appendices are included, one describing the algorithm that allows the user to place text onto the page with the layout software making line end decisions for him, and one showing an example of making up a simple display ad using this system.

User Interface Principles

This section describes ways in which the user interacts with the system, including how the screen is divided up, how the user works with pieces of the document, how commands are invoked, and what the user sees as he uses the functions described here.

In general, the user interacts with the system using a pointing device called a "mouse", and a keyboard. The mouse is a small box that rides on a roller, and can move in any direction on a flat surface (such as a table top). A "cursor" is connected to the mouse, so that as the mouse is rolled around the table top, the cursor is moved on the screen. The appearance of the cursor can change, but it is usually a small arrow (called the "pointer") that the user points at things he wants to choose on the screen.

Screen Layout

The user is presented with different screens at different times, depending on which tool is controlling the screen. When the Macintosh or Lisa is first started up, the file system (the Finder) controls the display. The Finder shows the user the "desktop," a representation of the objects the user can manipulate. (A sample desktop is shown in figure 3.) The user starts up the Aldus layout software by selecting the icon that represents the layout tool (or by selecting an icon that represents a document previously built by the layout software), and opening it from the File menu. Once the user starts up the layout software, the display is changed to the basic layout shown in figure 4.

The "document window" is the user's view of the document he is working on. If the document is small enough (4.75 by 7 inches on the Mac, 6.5 by 8.5 inches on the Lisa) and fits on a single page, the entire document will be visible in the window. If the document is too big to fit in the window or is several pages long, only a piece of the document will be visible through the window at any time. The user is able to move the window so that he can look at different sections of large documents, or change the page display size to see a full page at a reduced size.

The "scroll bar" is used to change what the user sees through the document window. Since a full page may not fit into the document window, the user can change which section shows through the window by manipulating the scroll bar. The scroll bar is discussed in more detail later.

Across the top of the screen appear several different menu titles for the "pull-down menus". The pull-down menus are small boxes containing lists of commands. The user selects a menu by placing the cursor over a title and pressing the mouse button. When a user selects a menu title, the menu "pulls down" over a portion of the document window. It momentarily overlays the document window, just as if a small piece of paper was unrolled from below the menu title onto the document window. Once the user makes a selection, the menu disappears.

The "tools bar" contains several small symbols that the user can

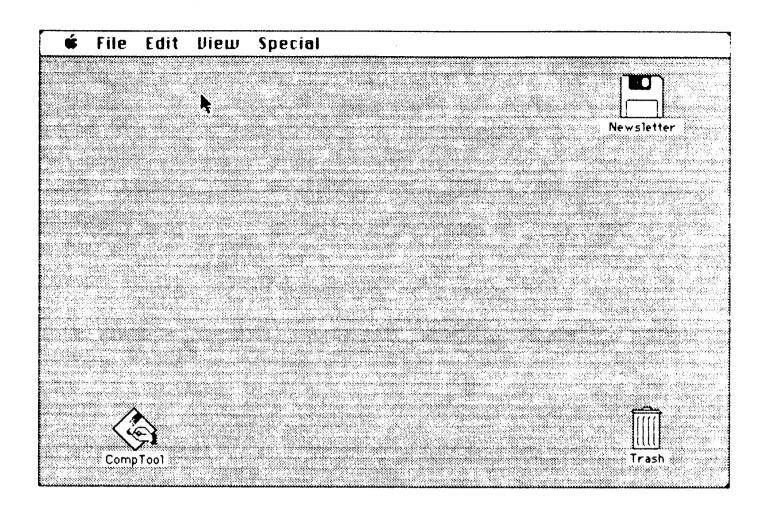


Figure 3. The Desktop

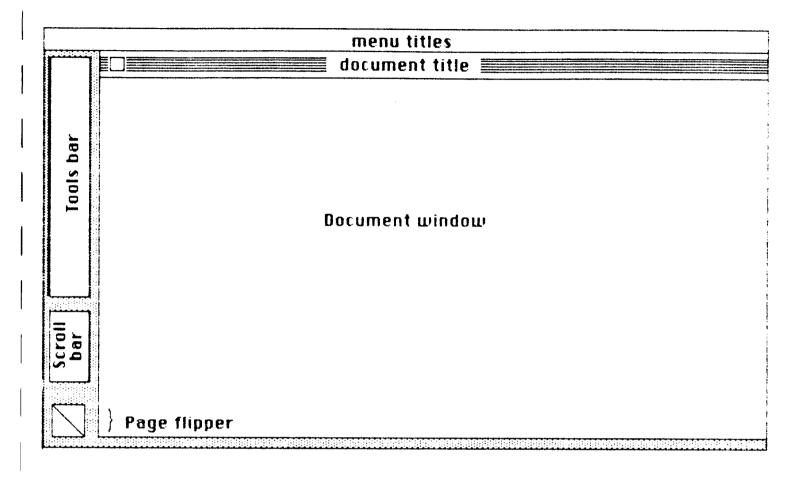


Figure 4. Screen layout.

select. These symbols allow the user to quickly switch between constructing graphic elements and placing or editing text elements. Each symbol corresponds to a method of interacting with the display. For example, the tool for the construction of a line rule is used to specify the end points of the rule.

Documents and Document Elements

Documents are the objects ultimately created by the layout terminal. Documents may be one of two types, multi-page or single page. The user will be able to decide how many pages are in each multi-page document.

Multi-page documents can act much like sketch pads; they may be used for trying alternate layouts for a particular newsletter page or ad, and allow the user to quickly flip back and forth between these different layouts. The user may try one layout on the first page, and then flip to the second page to try something else.

Multi-page documents can also be the newsletter (or a section of it) that the user is producing. Typically, the user builds a scratch pad document for trying alternate layouts for each newsletter page (as described in the previous paragraph), and then chooses the best layout for each page and copies it to the publication document.

Single-page documents are used for two purposes: for documents that the user knows will never be larger than a single page, and for page formats. As a page format, single-page documents can be used to quickly set up the overall "look" of a particular page. For example, the user could build a single-page document with three columns and a mast head, and then copy that page onto those pages in his publication document that use that format.

Organizing a Publication. The layout system user groups pages together by placing the pages into a multi-page document. Also, the user may use the Mac or Lisa Finder to collect documents together into folders. For example, the user may want all of his newsletters collected in a folder, or all the stories that will be run in the next newsletter edition. Figure 5 shows a view of the Mac desktop with several different folders (fillers, stories, ads, and art) and a multi-page document named "newsletter." The folders may be opened by the Finder to examine their contents, as is shown in figure 6 for the stories folder. The newsletter document, which was created by the Aldus layout software, can only be opened by that software.

Working Surface. The user can start up the Aldus layout software from the Finder in one of two ways: by opening the layout tool itself, or by opening a document previously created by the layout tool. If the user opens a document previously created by Aldus layout, then it appears on the screen exactly as it was saved. If the user opens the layout tool itself, he is presented with a dialog box asking the user for the name, number of pages, and page size for the new document.

The document pages may (at the user's choice) have a reference grid laid over them (e.g., showing columns and inches), which the user may use if he chooses to do so. When the grid is displayed, items the user positions on the page are aligned to the grid; however, the user

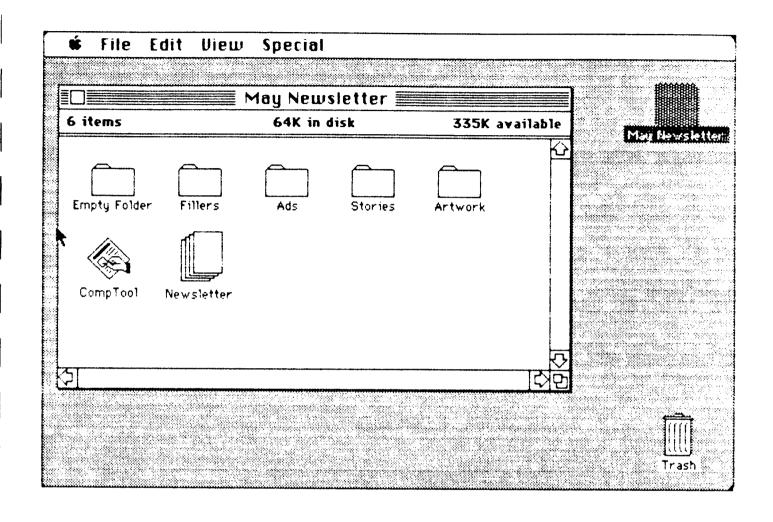


Figure 5. Contents of "May Newsletter" disk.

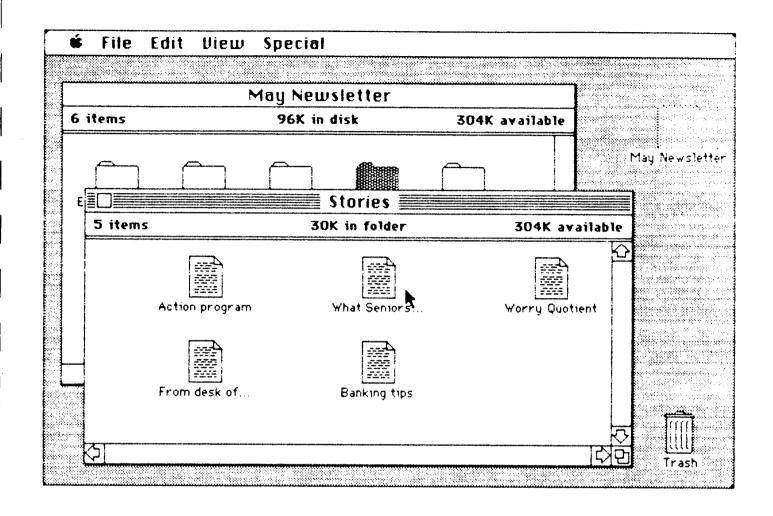


Figure 6. Contents of "Stories" folder.

may turn off the display of the grid, thus giving him complete freedom to place elements anywhere on the page. The user may change the grid at any time without affecting elements that have already been placed on the page.

If the user is working with a multi-page document, he may choose any page to work on. The user moves from page to page by clicking the mouse over the "page flipper" icon.

If the user is working with a single-page document, the page may be called up and edited just as the multi-page documents are. The only difference is that the single-page documents don't have a page flipper icon for moving from one page to the next.

Elements are the contents of a document page. The following sections discuss what elements the user works with, why element selection is done before command selection, how elements are selected, and how elements may be grouped together.

Kinds of Elements. The user may build or place the following types of elements in a document using the Aldus layout system:

- o stories text of any length that the user chooses to treat as a unit; they may have anything from one character to several paragraphs of text in them.
- o rules lines (straight or free-form) or boxes with specific thicknesses that the user may either typeset or just use on the screen as an aid in designing his document.
- o art graphical elements created using compatible software tools and pasted electronically into the document (the user may not do anything other than cut, copy, or paste art).

Element First. Element selection is always done prior to command selection, because the normal method of building a document is to work with a particular element until it is right. For example, a paragraph may have its typeface, character size, and line width changed before the user is prepared to move on to the next paragraph. When the user selects elements first, the same element can have an unlimited number of changes made to it without being reselected.

Element selection first has another important implication: since it doesn't make sense to do some things to some kinds of elements, the currently selected element (if any) affects which functions the user can do. For example, if the user has selected a paragraph, the function 'Change rule weight' will not be selectable. Obviously, some functions don't care what element is currently selected. An example of a function that doesn't care is the one that creates a new rule, since it "starts from scratch" rather than working with an element the user has selected.

How Elements are Selected. The mechanism for element selection varies depending on the element to be selected. Page design works with two very different types of elements, text and graphics. The user really can't do that much with graphic elements (except to build,

cut, copy, or paste them), but can do all sorts of things with text elements. For example, a text element can have its typeface, character size, and letter spacing all changed, and can be left-justified, right-justified, centered, or flowed into an irregular shape. As far as the Aldus layout system is concerned, text is much more complicated than graphics are.

When dealing with text, the user wants three ways of making selections: (1) he wants to select arbitrary pieces of text (for example, the first three words in the third line of a paragraph); (2) he wants to select a position somewhere so he can insert or delete some text; and (3) he wants to select logical chunks of text (for example, a story or a paragraph).

The user selects arbitrary pieces of text by pushing the mouse button down, stroking the mouse through the desired piece, and letting the button up. If the piece runs over several lines, the user need only push down over the first character, drop down to the last character, and let the button up. The system will then select all text that falls between the starting and ending characters (including the first and last characters).

The user chooses a point for the purposes of adding or deleting text (an "insertion point") by positioning the mouse to the desired point and clicking the mouse button once. The user can choose an insertion point either inside some text that has already been placed, or anywhere else on the sheet or page.

Selection of paragraphs is done by double-clicking anywhere over the paragraph. An entire story (all text placed on the page together via the "Place text" function) can be selected by holding down the command key and double-clicking anywhere over the story.

Selection of graphic elements is much simpler: the user merely makes a single click anywhere on the graphic element to select it. If the user wants to select a group of graphic elements that are located near each other, he may depress the mouse button at one corner of the group of elements, drag the mouse to the opposite corner, and release the button. As a result, all elements completely inside this box are selected. Entire chunks of bounded text may also be treated as graphic elements using this selection method.

The following chart summarizes how the user may select text and graphic elements.

User wants to select	So he does a
a text insertion point a paragraph a story an arbitrary piece of text a graphic text and graphics together	click anywhere on the page double-click over the paragraph shift-double-click over the story drag thru the text he wants click over the graphic drag selection box around elements

If the user wants to change any of the selections, he need only

select a new element and the old element will be deselected. In addition, a click in the document window away from any element deselects the current element (since it selects a new insertion point).

Grouping. Elements may be grouped so that functions can operate on the entire group at one time, rather than forcing the user to perform the same function over and over again on several different elements. Grouping may be done two different ways: (1) after the first element has been selected, the user may add other elements to the group by holding down the shift key while selecting other elements; or (2) the user may depress the mouse button in the document window, stroke diagonally to build a box containing all the elements he wishes to group, and let the button up. Groups are strictly temporary, and only last until another element is selected.

There are a couple of restrictions on grouping elements. First, the user cannot select more that one contiguous chunk of text by using the shift-select method, since several functions need a single, unambiguous insertion point (more than one chunk means more than one insertion point). The user can select any number of graphic elements this way, but only one text chunk.

The selection box method of grouping elements allows the user to select any number of graphic and text elements, but restricts the way the user can work with the elements in the group. The user can only treat the text in the selection box as a graphic, and thus may cut, copy, paste, move, or rotate the elements in the box, but cannot do any of the text manipulation functions. Furthermore, the user can only have one selection box at a time.

Functions

This section discusses how the user chooses a function to operate on the elements he has selected, how defaults for the functions are handled, shortcuts available to the expert user, the 'undo' function, and what help aids are available.

Choosing a Function. Any time the user wants to change something in the document, he does so by selecting a function to operate on the currently selected element(s). Function selection is done using menus, the keyboard, or the tools bar.

The menu titles are displayed across the top of the screen, with the menus appearing as pull-down boxes covering part of the document window. The pull-down menus appear after the user has pressed the mouse button down over a menu title. They disappear after the user has made his selection from the menu by releasing the mouse button over the menu item he wants.

Many of the functions on the menus are also accessible from the keyboard. Those menu items that can be selected directly from the keyboard have their keyboard code displayed next to the menu item in the pull-down menus. As the user uses the system, he also learns shortcuts to the menu system. Using the keyboard is functionally the same as choosing the matching menu item from the menus.

The user can change the functions available to him by choosing a different tool from the tools bar. The user must always have one of these tools selected, since the current tool profoundly affects how the user can interact with the display. The functions to create new graphic elements can only be done when one of the construction tools is selected from this bar. Similarly, the user can only edit text elements if he has selected the edit tool.

The tools in the tools bar include an editing tool and a set of construction tools. The editing tool allows the user to place text in the document, select text and graphic elements in order to change their attributes, and move or rotate elements. The construction tools allow the user to build new graphic elements.

The following paragraphs show the icon for each tool and describe the functions that the user can perform while that tool is active.



The user edits text by simply pointing to the insertion point, clicking the mouse button, and typing at the keyboard. The following editing functions are supported:

Start editing. Editing always begins with the user pointing to the place where he wants to begin editing and clicking the mouse button. A vertical bar is displayed at the insertion point.

Delete characters. The user deletes characters to the left of the insertion point using the keyboard backspace keys.

Insert/Overstrike. The user replaces existing text by selecting the piece of text he wants to overstrike and typing in the new text. The selected text is deleted once the first character is typed, and the new text placed at the location where the deleted piece used to be.

Stop editing. At any time during editing the user may move the cursor using the mouse. This does not affect the location of the insertion point unless the user selects another element or another function. As soon as another element or function is selected, the insertion point goes away.

Menu functions. All of the functions in the menus are available while this tool is active.



Create line rule. When selected, the cursor shape changes to the graphics cursor, and the user is expected to press the mouse button at the first rule endpoint, drag the cursor to the second endpoint, and release the button. As the user drags the cursor towards the second endpoint, the system draws a line from the cursor back to the first endpoint so that the user can see how the line would look if he released the mouse button. The user is able to constrain the rule to being either vertical or horizontal

by pressing the shift key while drawing the rule. The current rule weight is used.



Create box rule. The cursor shape again changes to the graphics cursor, and the user is expected to indicate two opposite corners of the box rule by pressing the mouse button at one corner, dragging to the other corner, and releasing the mouse button. As the user drags the cursor from the first corner to the second corner, the system draws a box between the two corners so that the user can see how the box would look if he released the mouse button. The user is able to constrain the rule to being a square box by pressing the shift key while drawing the box rule. As before, the current rule weight is used.



Sketch. Selection of this function makes the user's mouse into a pencil; in fact, a pencil-shaped cursor is used to indicate to the user that he using this function. The user sketches by pressing the mouse button and dragging the cursor around the screen. When the user lets the mouse button up, the cursor no longer sketches. The user may lift the pencil up and down as many times as he likes.

Autowrap/Composition. The system wordwraps (i.e., breaks paragraphs into lines) and composes text as it is edited, according to the margins and type characteristics in effect around the text edit point. An important choice that the user must make deals with whether or not text is affected by other elements on the screen as it is placed in the document. Sometimes the user wants text to flow into columns, for example, or between two guides. Other times the user just wants the text placed on the sheet or page without regard for the other elements already there. Thus, one of the functions in the Styles menu controls whether or not text flows against other elements when it is placed on the sheet or page.

When the user chooses "Flow on", text that is being placed is fluid. The user is shown (using a stipple pattern) the area around the insertion point that the text will flow into. The user has the option to either begin typing in text or selecting "Place text file" from the File menu. The text flows so that the text stays within the bounded area. If the user changes the borders surrounding text that has already been placed and wishes to reflow the text, he must explicitly do so from the Styles menu. An example of flowing text onto the page is given in appendix A.

Adaptive Defaulting. Defaults are provided for most function parameters; for example, if the user builds a horizontal rule, he does not need to specify a rule thickness unless he wants to. Changes that the user makes to the parameters (e.g., rule thickness) are stored by the system and made the new defaults. Thus, the user, returning to a command, will find the default values to be those he last entered when using that command.

Scrolling. A scroll bar is always displayed below the tools bar. The scroll bar is a small representation of the current page or sheet,

with a box representing the current document window overlayed on the page. The user changes the current view of the page or sheet by grabbing the window box with the mouse and dragging it to another part of the page. Since the window may be only crudely placed by this technique, the user will also be able to scroll the window by pressing the option key on the keyboard while dragging the mouse on the screen. When the option key is pressed, the cursor shape will change to a small hand, reminding the user that as he drags the cursor, the window will be scrolled.

In addition to scrolling when the user moves the scroll box or uses the option key, the window scrolls automatically whenever the user attempts to drag the cursor out of the document window (e.g., while constructing a rule, or selecting something by dragging the cursor over it). Merely moving the cursor out of the window without holding the mouse button down will not autoscroll.

If the user is working on a sketch pad (rather than a page), a small icon called the "page flipper" is displayed below the scroll bar. The user moves from page to page by clicking the mouse button on this icon. The page flipper icon is split diagonally; clicks over the upper half advance to the next page in the document, and clicks over the lower half back up to the previous page in the document.

Undo Function. An 'undo' function is provided for rejecting the last change made to the document. If, for example, the user incorrectly places text in the document window, the undo function will remove the placed text and give him another chance. If the user undoes an undo, the original change to the document reappears. The undo menu item includes the name of the command that it will undo if chosen by the user.

In addition to the undo function, a replay file is kept of all user actions. This replay file is capable of driving the system by itself, and thus is usable for tutorials and documentation of bugs. The user starts and stops recording or replaying his actions from the 'tools' menu. The replay files may not be edited by the user.

Moving and Rotating Elements. The user may move or rotate text or graphic elements by either of two ways: (1) surrounding the element(s) using the box selection method and interacting with the selection box; or (2) directly interacting with graphic elements.

The user may move a graphic element by placing the pointer directly on the element and dragging it to its new location. The user may select a group of graphic elements (using the shift-select method) and drag all of them together by pointing at one of the elements and dragging it.

The user may move all elements that are completely inside the selection box (including text) by pointing to any box edge and dragging the box to the new location (the cursor changes to a sky hook shape when the user presses on the box edge). Holding down the shift key while moving the box and its contents forces the move to be strictly vertical or horizontal, depending on the direction the user first starts moving.

The user may rotate all elements inside the selection box by pointing to any box corner and dragging the corner in a circular motion (the box center is stuck to the paste-up sheet). When the user presses the mouse button over the box corner the cursor changes to a double-headed curved arrow. Holding down the shift key while rotating the box and its contents forces the rotation to jump in 45 degree increments.

Help Files. A help file is available for each user function, which contains a concise description of how each function is used. A help menu item is available in the anchor menu and is accessible at any time. Choosing the help function causes the help information for the current mode to be displayed in a pop-up window. The user gets rid of the help window by clicking in the window's close box.

Cursor Shape.

Several different cursor shapes are used to help indicate how the system is interpreting user input:

- o arrow shape used anytime the cursor is located outside the document window; also used inside the document window when in edit mode and not inside a text element.
- o I-beam shape used when the cursor is in edit mode and inside a text element in the document window.
- o cross shape used when the cursor is in the document window and the user is in a construction mode, except for sketch mode.
- o pencil shape used when the cursor is in the document window and the user is in sketch mode.
- o hand shape used when the user presses the option key; dragging the hand scrolls the window over the sheet or page.
- o sky hook shape used when the cursor is in the document window, the user is in edit mode, and he is pointing at the edge of a selection box in an attempt to move the objects wholly inside the box.
- o curved, double-headed arrow shape used when the cursor is in the document window, the user is in edit mode, and he is pointing at the corner of a selection box in an attempt to rotate the objects inside the box.

Composition Principles

The following section describes the general principles governing the composition techniques that are part of the layout software. Composition is the process of setting type; for the Aldus document layout terminal, the techniques are specialized to fill areas on the page with type in a pleasing manner, rather than just filling galleys.

Area composition is central to the Aldus layout system. Our primary objective is to eliminate the production of pages from paper layouts, as must be done if the composition system can only set galleys of type. Using the Aldus system, the electronic layout the page creator designs on the Mac / Lisa screen is directly typeset with everything on the screen set in page position.

Objectives

The composition subsystem has the following objectives, listed here in order of importance:

- 1. Ease of use. The composition subsystem is largely hidden from the user. Our users are not typographers; they do not want to learn a composition language or even many composition principles in order to use the layout terminal. Our users are expected to be familiar with the principles used by a typical word processor, and no more.
- 2. Performance goal. The composition subsystem is fast enough to compose and display an 8.5 by 11 inch 2-column newsletter page containing approximately 8000 characters in four seconds. This means that the composition subsystem can process characters at a rate of about 2000 characters per second.
- 3. Accuracy. The composition subsystem places characters on the page as accurately as possible so that possible conflicts can be recognized immediately.
- 4. Hyphenation. The composition subsystem offers a hyphenation scheme that results in as few hyphenation errors as is practical. An exception dictionary is provided to cover cases where the algorithm is unable to correctly break a word. Users can add their own words to this dictionary to decrease the annoyance of having words incorrectly hyphenated.

Features

To support the objective of an easy to use system, the complexity of the composition subsystem is hidden from the user. Most of the composition subsystem operates automatically, using values and methods that best fit the current situation. For example, details of hyphenation, such as the minimum number of characters in a word before or after a hyphen, are not controlled by the user.

Hyphenation. A small exception word dictionary is supplied along with an algorithm for handling most cases. The dictionary supplied by Aldus contains about 350 words. It can be expanded by the user to

approximately 1000 words, depending on available memory.

For future enhancements, additional hyphenation algorithms and dictionaries can be added to support foreign languages. It will be possible to compose more than one language in a single document.

Another future enhancement, given additional computer resources (particularly memory and hard disk), is a large (100,000 word) dictionary. This dictionary also may be modified by the customer, and will be used for both hyphenation and spelling checking.

Justification and Line-breaks. The primary objective of the justification algorithm is good performance, followed by pleasing appearance of the text. The algorithm considers only one line at a time, and once a line-break decision has been made, will not reconsider it. No attempt is made to redistribute words in a paragraph to minimize the differences in inter-word spacing throughout the paragraph.

In general, the line-break algorithm attempts to justify a line using the optimum inter-word spacing. If it fails, it tries inter-word spacings between the minimum and the optimum values, followed by spacings between the optimum and the maximum values. If it still cannot justify the line, it tries altering letter-spacing values in the line (again within a permissible range of values). If changing the letter spacing does not justify the line, it tries to hyphenate the last word on the line. If all these attempts fail, then the algorithm exceeds the maximum values allowed for word and letter spacing so that the line is justified.

A different algorithm is used to set ragged (non-justified) text. It also provides good performance and a pleasing appearance for ragged text.

Flowed Text. Text can be composed (flowed) into not only areas with rectangular shapes, but also into areas with arbitrary convex shapes. This is useful for display ads — flowing text around artwork, for example, and also useful when a distinctive appearance of text is desired.

Typefaces. Actual typefaces (described by their outlines) are displayed on the screen whenever the character size is larger than a pre-defined switch-over point (probably around 12 to 18 point characters). Below the switch-over point, bitmapped, generic typefaces (supplied by Aldus) are used. The generic typefaces include roman, italic, and bold faces.

As a minimum, eight different typefaces can be used on a single page. When more typefaces are required, more can be added if computer resources permit.

Character width information for Aldus-supplied typefaces are delivered with the layout terminal. Width information for customer typefaces must be entered manually by the customer.

Unit of Measurement. The composition subsystem uses the micron (one-millionth of a meter, or one-thousandth of a millimeter) as its

basic unit of measurement. The units of measurement are stored as signed 32-bit integers, so that more than two kilometers at one-micron precision can be represented internally. One point is almost exactly 352.777777 microns; we round up to 353 microns. In a 50-pica line, the possible error is about 0.38 points (211,666.6667 actual microns versus 211,800 computed microns).

The external composition units, those visible to the user, can be anything convenient to the user, including inches, points, picas, didots, ciceros, centimeters, and millimeters.

Functions and Their Screens

The following several pages show the screen layouts for each function included in the first release of the software. Following each screen layout is a brief description of what the function does, including any actions the user has to take to perform the function and any actions the user can't (or shouldn't) take.

Before proceeding to the first screen, however, some general terms used in this document need to be tied to specific symbols and locations on the screen (see figure 7). First of all, the distinction between windows and dialog boxes needs to be made.

Windows are a means by which the user can look at a document. The two main windows used by the layout software are the paste-up window and the help window. The paste-up window shows the user a view of the document he is producing, and the help window provides information about each function in the system. Windows can be opened and closed by the user.

Dialog boxes are objects that temporarily overlay a window, and are used by individual functions to get more information from the user or confirm a user action before proceeding with the function. For example, the function to change character spacing has several options by which the user may specify the new spacing, and uses a dialog window to present the options to the user. Once the function is complete, the dialog window disappears. Dialog boxes are completely under the control of the function that put them on the screen; they may not be manipulated by the user except to respond to specific options presented in the dialog box.

Dialog boxes may present options to the user in several different ways, including the opportunity for the user to type in something, or to manipulate controls. Controls are graphic objects that cause an action to take place when manipulated with the mouse. The controls used in the dialog boxes include buttons, check boxes, and dials.

Buttons are small objects labeled with words or a symbol. Clicking a button performs the action described by the button label instantly. For example, if the user wants to do an irreversible function, the function will bring up a dialog box warning the user that the function is irreversible and require the user to verify that he really wants to do it (by clicking an " OK " button) before the function is allowed to proceed. Some buttons may also be pressed (rather than clicked) to perform an action continuously.

Check boxes are used by dialogs to allow the user to set various states, rather than perform instant actions. Check boxes are small squares accompanied by a word or symbol that describes the meaning of the box. The boxes may contain a check mark showing that the state indicated by the text is set. Clicking in a check box flips its state from checked to unchecked, or vice versa.

A variant of the standard check box is a collection of check boxes with some relationship to each other. For example, perhaps only one box out of a collection of alternatives can be checked at a time. In this case, the check boxes can be set up to act like car radio

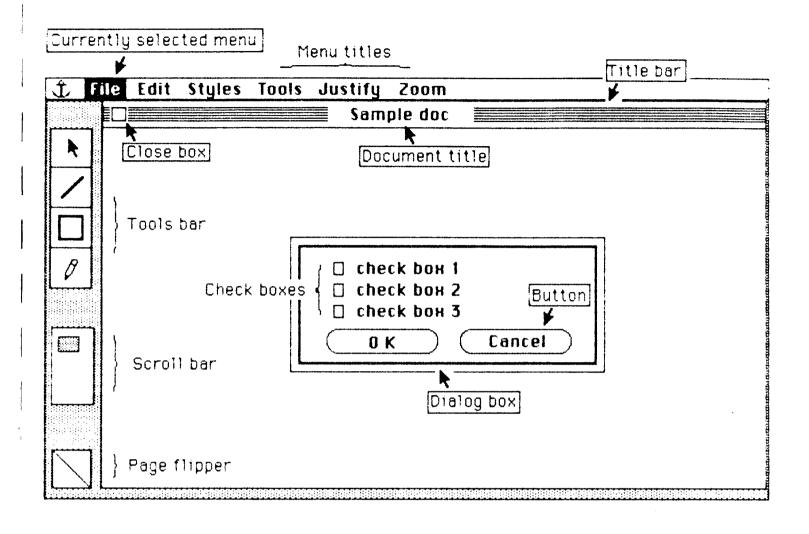


Figure 7. Screen symbols.

buttons, so that when the user checks one box, all the other boxes in the collection are unchecked automatically.

Dials are used to display a value assigned to something and to allow the user to change the value by dragging the dial indicator. For example, the scroll boxes in the scroll bar are dials, since they show the current position of the window in the document, and can be dragged to a new position by the user with the mouse.

With this basic understanding of the terms, we now look at the specific displays and dialogs for each function.

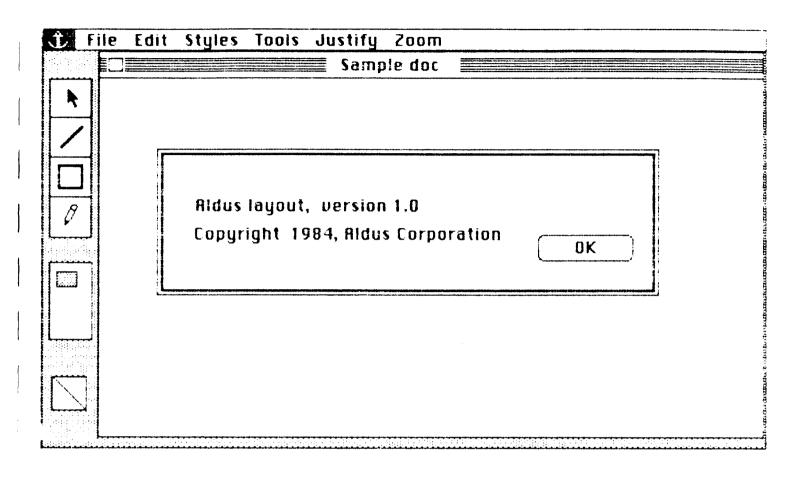
Anchor menu

File Edit Styles	Tools Justify	Zoom	
About Aldus layout	Sam;	ole doc	
About document			
Scrapbook	3		
Alarm clock			and the state of t
Note pad			EXECUTE OF THE PROPERTY OF THE
Calculator	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
Key caps			55 E F
Control panel			n or a second se
Puzzle			en de la companya de
Help			איינו פיסידיים

Menu description: contains the standard MacIntosh desk accessories plus some layout-specific items. Information that is helpful to the user, including the help window and the tool and document information, may be called up from this menu.

<u>User steps</u>: The user gets to this screen by placing the pointer over the anchor menu title and pressing the mouse button. The user may either move the cursor over one of these menu items and release the button (thereby selecting that menu item) or pull the cursor outside of the menu and release the mouse button (thereby not doing anything).

About Aldus layout...



Function description. tells the user what version of the Aldus layout software he is running.

User steps: The user gets to this screen by pulling down the anchor menu and selecting the "About Aldus layout." menu item. When the user is done looking at the dialog box, he clicks over the "OK" button.

About Document...

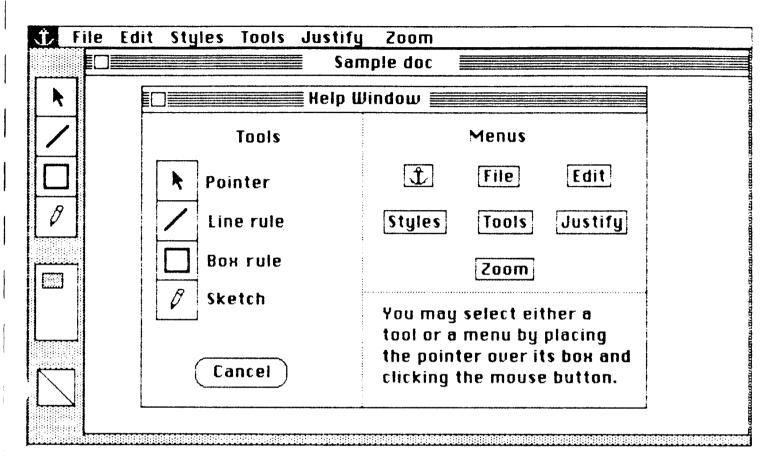
J.	File	Edit	Styles	Tools Justify Zoom
,				Sample doc
•				
	- 1			About document
	_			Name:
				Pad size: units by
19				Number of sheets:
. P				Document size: bytes
	_			Creation date: Last modified:
				Edst modified.
arana aranga				

Function description tells the user about the document he currently has open.

User steps: The user gets to this screen by pulling down the anchor menu and selecting the "about document..." menu item. The user may not change the contents of any of the fields. When the user is done looking at this window, he closes it by clicking in the close box or selecting the close command from the file menu.

Caveats: A document must be open on the screen in order to access this function.

Help Window



Function description: allows the user to retrieve help information for all the functions provided by Aldus.

User steps: The user gets to this screen by pulling down the anchor menu and selecting the "Help..." menu item. Once this window is displayed, the user may either select one of the tools on the left side or one of the menu titles on the right side of the window. In either case, a dialog box will appear containing help information specific to the item the user chooses (see next screen). The user leaves the help window by clicking on the help window close box.

Help Window

Tile	Edit Styles Tools Justify Zoo Sample d Help Windou	oc	
	Edit Menu Undo Cut Copy Paste Select entire sheet Select to end of story Cut with jump report	Choose the menu item that you need help with by putting the cursor over its box and clicking the mouse button. Cancel	·

Function description: allows the user to retrieve help information for all the functions provided by Aldus.

User steps. The user gets to this screen by pulling down the anchor menu and selecting the "Heip." menu item, followed by choosing the "Edit" menu title. Similar dialog boxes will appear for each menu and each tool. The user may now select one of the menu items, and a new dialog box will appear with information specific to that menu item.

File Menu

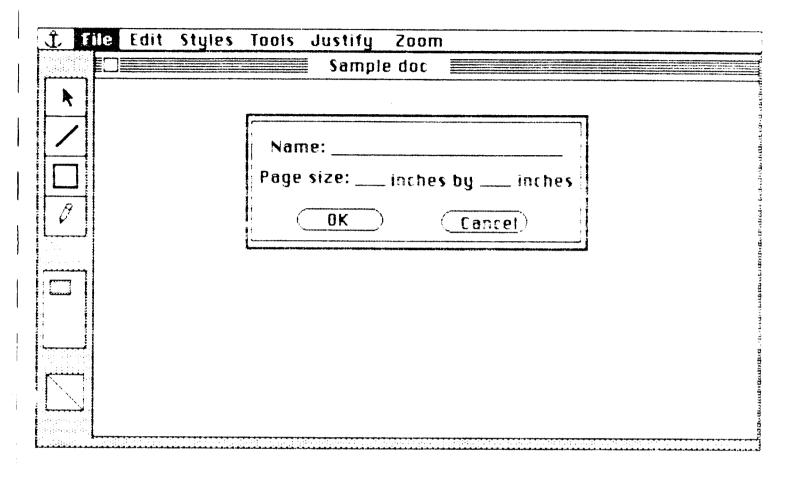
1	File Edit Styles 1	ools	Justify	Zoom		
	New document		S am	ple doc		
	Open document					
	Sane					
	Save as					
H	Revert					
	Close					
	Make new sheet					
	Throw sheet away					
	Place text file					
	I ince teut ine					
	Quit					
	Proof print Typeset					
\Box	Proof pad catalog					
1	From pau catainy					

Menu description: contains the menu items necessary for pulling documents into Aldus layout, printing them, and writing them back to the disk. In addition, there are functions for reverting to the previous version of the current document, and for quitting Aldus layout.

User steps: The user gets to this screen by placing the pointer over the "File" menu title and pressing the mouse button.

The user may either move the pointer over one of these menu items and release the mouse button (thereby selecting the item) or pull the pointer outside of the menu and release the mouse button (thereby not doing anything).

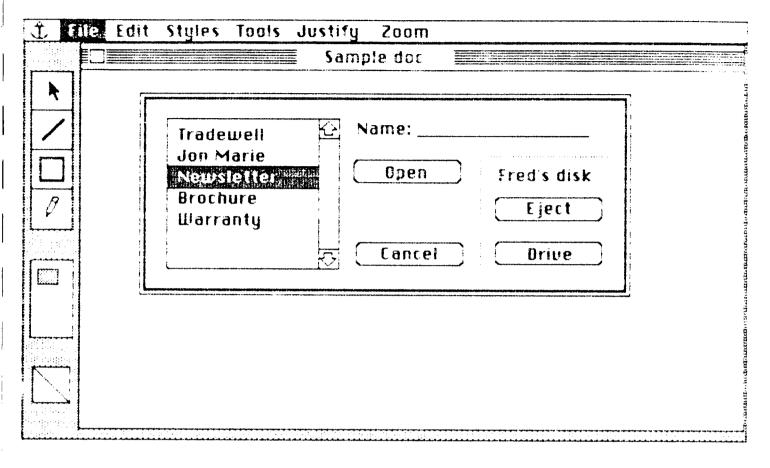
New document ...



Function description: creates a new document. New documents may contain any number of sheets that can fit on the disk

User steps. The user gets to this screen by selecting "New document" from the "File" menu. Once here, the user must type in a document name and may choose to specify the page size also (a default will be provided). Once the user is satisfied with the contents of the dialog box, he clicks the "OK" button to begin layout on the new document.

Open document

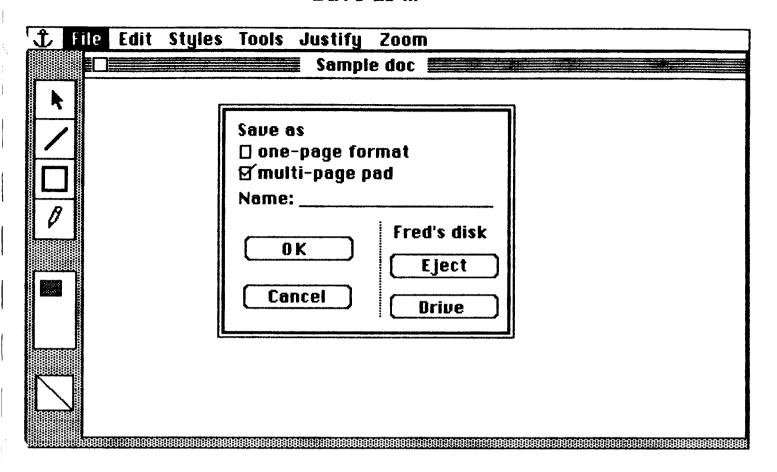


Function description: opens an emsting document

User steps: The user gets to this screen by selecting "Open document" from the "File" menu. Once here, the user may choose the document he wishes to open by:

- clicking on a document name, followed by clicking on the "Open" button.
- ii) double-clicking on a document name,
- iii) typing the name into the prompt line and clicking on the "Open" button

Caveats Support for multiple disks is now done through the eject and drive buttons, but will be changed when Apple changes their support for multiple disks.

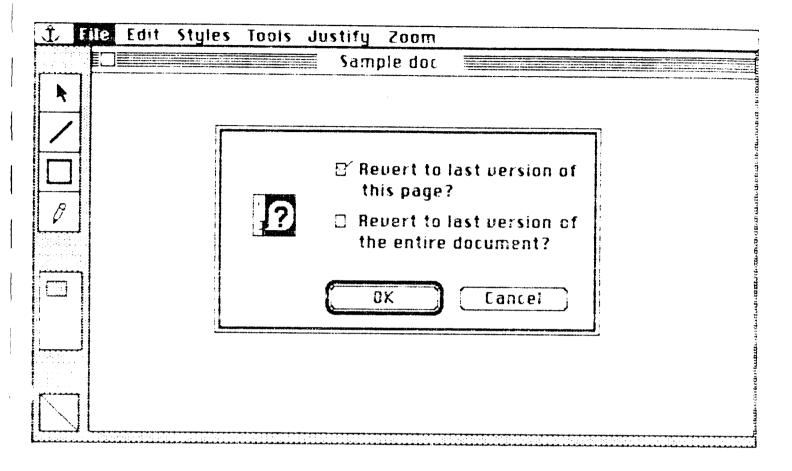


Function description: saves the current document with the name specified by the user but does not exit Aldus layout.

User steps: The user gets to this screen by selecting "Save as..." from the File menu. Once here, the "Name" prompt line will contain the old name of the current document (if it has been previously saved). The user may either save the document under its old name by just clicking "OK", or he may type in a different name and then click "OK". If the user wants to save the document on a different disk than the one currently in the drive, he may choose "Eject" or "Drive." "Eject" will cause the system to eject the current disk and wait for the user to insert another disk. Once the new disk is inserted, the same dialog box will appear for the new disk. "Drive" will allow the user to save the file to the external disk, if one exists.

The user may save the current sheet only as a format by checking the "one-page format" box; otherwise, the entire pad is saved.

Revert dialog

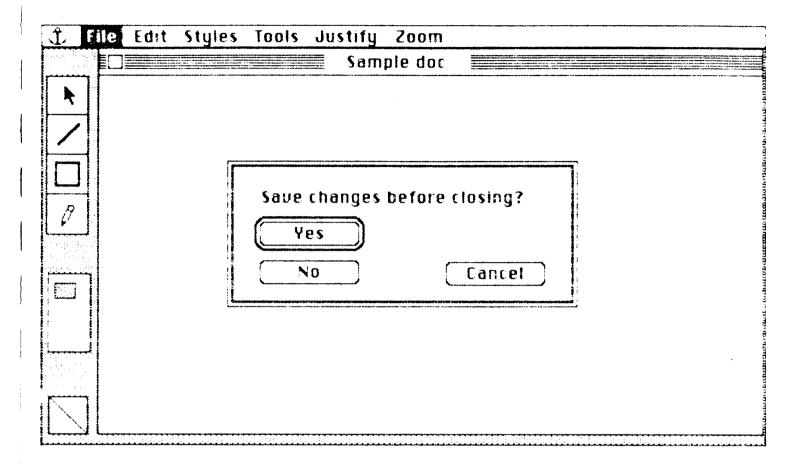


Function description lets the user go back to the last version of the page (or entire document) that he is working on

User steps: The user gets to this screen by choosing "Revert" from the File menu. The user may either click the "OK" button or the "Cancel" button to leave this screen

Caveats: If the user selects "OK," then all the work he has done since the last time he saved the page (or document) will be lost

Close document

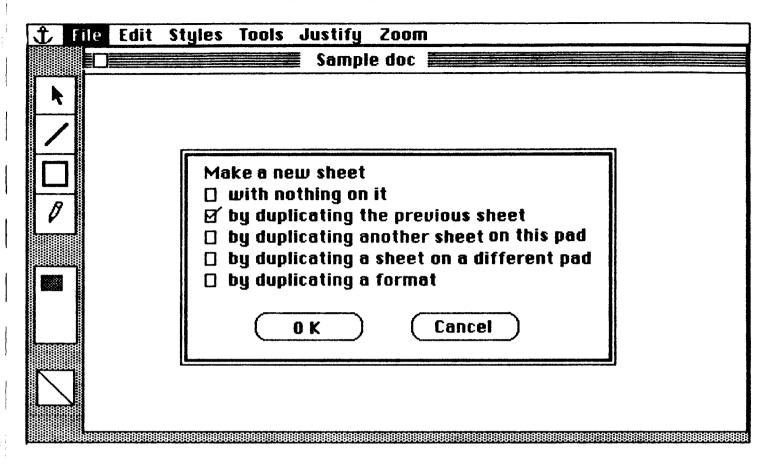


Function description. lets the user close the current document he is working on.

User steps: The user gets to this screen by choosing "Close" from the File menu or by clicking on the document close box. At this point he must choose "Yes", "No", or "Cancel" to exit.

<u>Caveats</u>: If the user selects "No", then all the work he has done since the last time he saved his document will be lost.

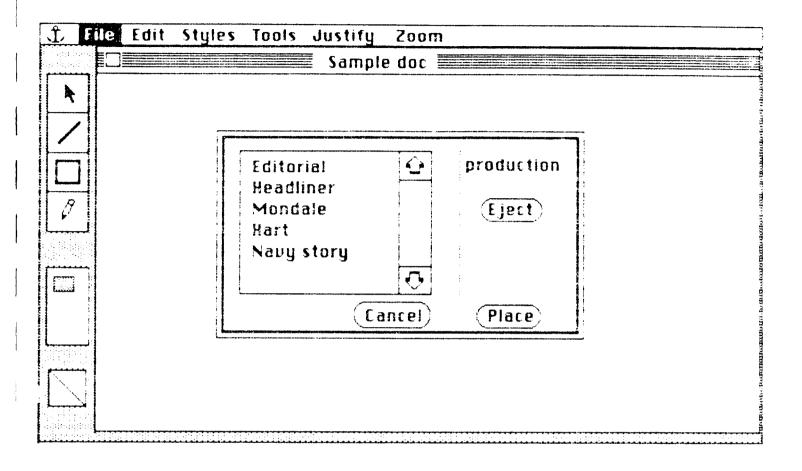
Make new sheet ...



Function description: Adds a sheet to the currently open pad by duplicating another sheet or a format, or by starting with a clean sheet.

User steps: The user gets to this screen by selecting "Make new sheet ..." from the File menu. Once here, the user may choose what is to be on the new sheet initially by selecting one of the checkboxes, or he may take the default. If he selects either "duplicate from a sheet in a different pad" or "duplicate from a format" he will be prompted to select the pad or format by the standard file open dialog.

Place file

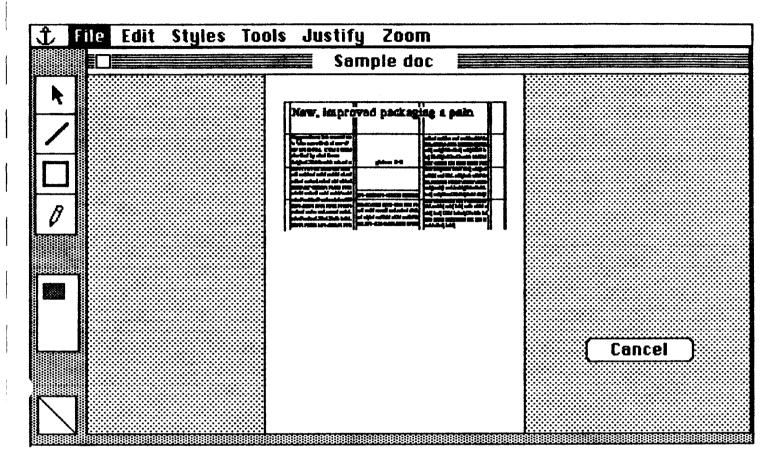


Function description: takes text from a file and places it into the current document at the insertion point. If Flow mode is on, then the text is restricted to the area enclosing the insertion point, and line end decisions are made to force the text to stay inside the boundaries. If Flow mode is off, then the line end decisions are determined solely by carriage returns in the text file and page, boundaries.

User actions: The user gets to this screen by choosing "Place text" from the File menu. At this point, the user may choose a file to place, or eject the current disk and place from a file on a different disk. The user may abort the Place file command by typing "Command-.".

Caveats. When Apple changes the way they handle multiple disks, this function will also change.

Proof print

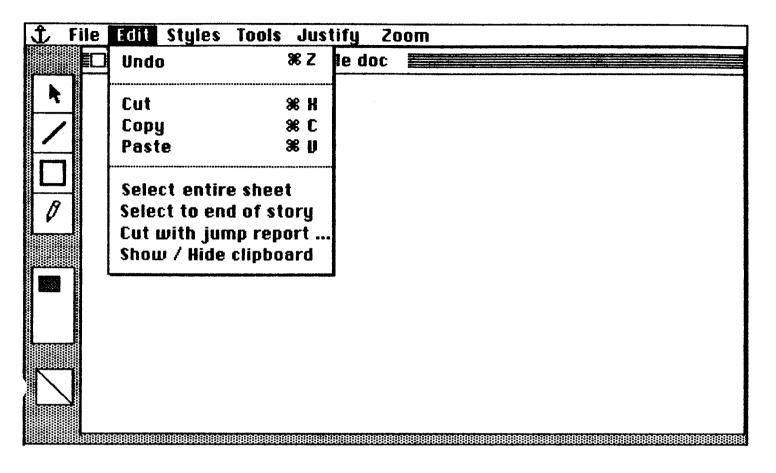


Function description: lets the user send the current page to the proof printer.

User steps: The user gets to this screen by choosing "Proof print" from the "File" menu. While the document is being printed, the only action the user can take is to click "Cancel."

The proof printer will print the page at full size. If the page is too large to fit on a single proof printer page, the proof printer will automatically strip the page into sections that can fit on a page.

Edit Menu

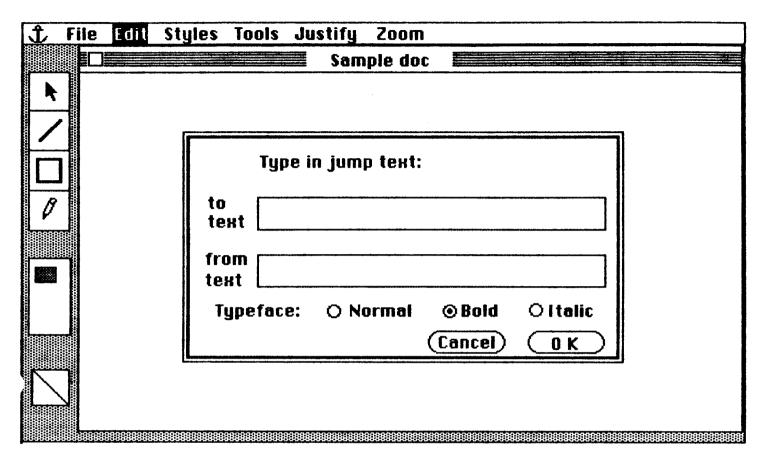


Menu description: contains the Macintosh standard editing functions for deleting, moving, and copying text or graphic elements, plus functions for selecting or cutting story parts.

User steps: The user gets to this screen by pressing the mouse button down while the cursor is over the Edit menu title. The user may now move the cursor down over one of the menu items and release the mouse button, thereby selecting that menu item, or move the cursor away from the menu and release the button, thereby not selecting anything.

Caveats: Undo will not be selectable if the last operation cannot be undone. Cut and Copy will not be selectable if no element is currently selected.

Cut with jump report ...

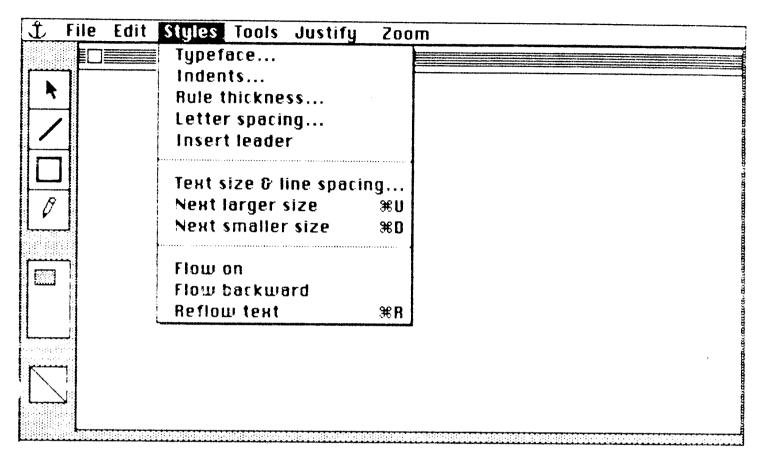


Function description: works just like the normal "cut" command except that the text in the "to text" line is inserted before the cut point, and the text in the "from text" line is prepended to cut text on the clipboard.

<u>User actions</u>: The user can fill in both, one, or none of the jump text lines. If one or both of the jump text lines is blank, a blank line is not appended or prepended around the cut point.

The "jump text" is in the same character size as the cut text, but can be in a normal, bold, or italic typeface.

Styles Menu

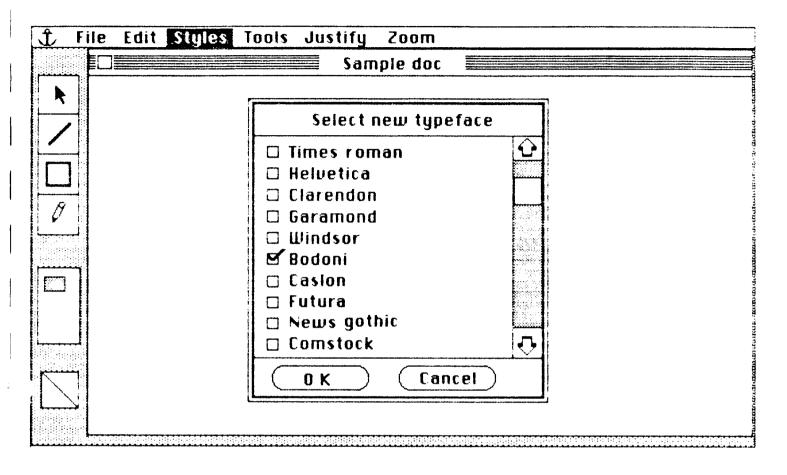


Menu description: contains several functions for changing the appearance of text and graphic elements, including the typeface used to display text, its size and spacing, and rule weights. In addition, the functions that control flowing of text are on this menu.

User steps: The user gets to this screen by pressing the mouse button down while over the Styles menu title. Most of the items in this menu lead to dialog boxes (shown on succeeding pages), except for the flow functions.

"Flow on" changes the way new text is placed into the document (see discussion in "Place" function). "Reflow" allows the user to flow the selected text against the elements bordering it. Reflow is only selectable when flow mode is on. "Flow forward" places text from the top left of the current hole; "Flow backwards" places text so that the text ends in the bottom right corner of the current hole.

Typeface...



Function description: lets the user either find out what face is currently being used to display the selected text, or to change the face for the selected text and subsequent text.

User steps: The user gets to this screen by selecting "Typeface..." from the Styles menu. The user may choose a new face by clicking in its box or scroll the typeface menu using the vertical scroll bar. Once a face is selected, the user must either choose the "OK" button or the "Cancel" button to leave this dialog.

Indents

Ĵ	File	Edit Styles	Tools Justify Zoom Sample doc
	7		The state of the s
*			Indent the first line of the paragraph(s).
			Indent every line of the paragraph(s) except the first
			Indent each succeeding line of the paragraph according to placement of the edit point.
			Cancel all indents in the selected text
			(Cancel) (Ok)

Function description: lets the user specify indentation for the selected text.

User actions: The user gets to this screen by selecting "Indents "
from the Styles menu. At this point, he may choose any
of the indent styles shown above. Indents are defined
by the distance from the left margin to the indent marker
on the horizontal ruler. The selected text need not have the
same left margin as is shown on the ruler.

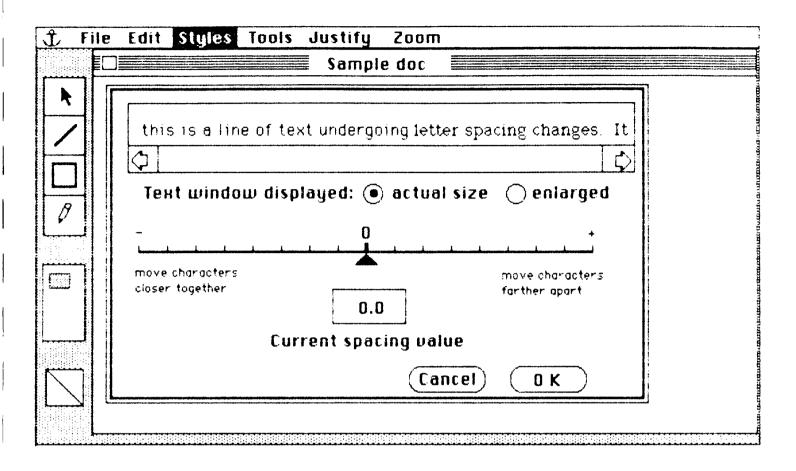
Rule thickness...

1 File	Edit Styles Tools Justify Zoom
	Sample doc
	Tung in pour rule thinkings
	Type in new rule thickness: - or -
18	Select a rule weight below:
	not typeset
	□ 0.5 points ☑ 1.0 points
	1.5 points
i immi	☐ ——— 2.0 points
	□ 2.5 points
	3.0 points
	Make a dashed rule Cancel Ok

Function description: lets the user either see what thickness the currently selected rule is, or to change the thickness of the currently selected (and subsequently created rule(s).

User steps: The user gets to this screen by choosing "Rule thickness" from the Styles menu. The user may choose any of the rules in the window or type in a rule thickness. The user exits from this dialog by selecting either the "OK" button or the "Cancel" button. Dashed rules are built by choosing the last box in the dialog.

Letter spacing ...



Function description: lets the user change the amount of white space between characters.

User steps. The user gets to this screen by choosing
"Letter spacing..." from the Styles menu. The user may
change the letter spacing value by dragging the pointer icon
along the scale, or by clicking in the value box and typing in
a new value. The text can be displayed at actual size or at
enlarged size, so that the user can more easily see the effect
that the letter spacing has on the selected text. The user
exits this function by clicking either the "OK" button or
the "Cancel" button.

Caveats: This function is not available if

- no text is selected,
- justified text is selected, or
- more than one line is selected

Insert leader

🗘 File Edit	Styles Tools Justify Zoom
k D	Sample doc
8	Enter new leader characters: - or -
	Select one of the characters below:
	☑ . period □ blank
	underline Cancel 0 K

Function description: lets the user insert leader characters at the current edit point. Multiple copies of the character(s) are inserted in this line until the right margin and left margins are encountered, or until guides or rules are encountered.

User steps: The user gets to this screen by choosing "Insert leader" from the Styles menu. The user may choose either the blank or period leader character by clicking on one of the two boxes, or may type in one or more other characters. The user exits from this function by clicking either "OK" or "Cancel".

Text size / line spacing

	Select character size/line spacing						
	Character 🗘 7 8 9 10 12 14 16 🗘	>					
	Line spacing 🗘 8 9 10 12 14 16 20 🗘	>					
7	Character size: 10.0 points Line spacing: 12.0 points						
☐ Adjust line spacing to fit ☐ Adjust character size to fit							
	(Cancel) (OK						

Function description: lets the user either see what the current character and line spacing is for the selected text, or change the character and line spacing for the selected and subsequent text.

User steps: The user gets to this screen by selecting

"text size / line spacing" from the Styles menu. To select
a character size, the user points to the desired size and clicks.
Line spacing is chosen based on character size. The user can
choose a different line spacing by typing it in or clicking over
a different one in the window. Changing the character size to
fit adjusts the size so that the selected text fits between the
margins on the horizontal ruler. Changing the line spacing
to fit adjusts the size so that the selected text fits between the
margins on the vertical ruler. Automatic line spacing will
determine line spacing according to the sizes of characters
in the current and previous lines.

Tools Menu

🗘 File Edit Styles	Tools Justify Zoom	
	Show rulers Measurement system Reference grid Column guides	
	Square story	
8	Start journal Replay journal	

Menu description: contains tools useful for laying out the page form, including a pair of rulers, a selection of grids, a guide builder, a function to square the legs of a story, and a capability for capturing and playing back user actions.

User steps: The user gets to this screen by placing the pointer over the Tools menu title and pressing the mouse button. If the rulers are currently displayed, then the menu item above will read "Hide rulers", so that when it is selected the rulers will disappear (and vice versa). Similarly, if journalling is currently turned on, then the menu item will read "Stop journal," and vice versa.

Screen showing ruler pair

Ĵ	File	Edit	Styles	Tools	Justif	y Zoom				
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k		$\mathbf{\Xi}$	inches	🗆 pic	as [centime	ters			200
) 	1		2	3		4	5	
										775
8	1									yn cu
	2									
	_]]									1 1 1 1
	- 3									Sign

Function description: brings up a pair of rulers that the user can move anywhere in the document.

User steps: The user gets the rulers on screen by choosing "Show rulers" from the Tools menu. The measurement system shown on the rulers can be changed by clicking on a different check box on the horizontal ruler. The user can position this ruler pair anywhere in the document by dragging it with the mouse. The user gets rid of the rulers by selecting "Hide rulers" from the Tools menu.

Measurement system ...

🗘 File Edit Styles	Tools Justify Zoom	
	Sample doc	
*		
	Change measurements	
	⊠inches	
B	□ picas	
	□ points □ centimeters	
	☐ millimeters	
	ciceros	
	(Cancel) (Ok)	

Function description lets the user see the current measurement system or change to a different system.

User steps: The user gets to this screen by choosing
"Measurement system..." from the Tools menu. The checked
box shows what measurement system is in effect. The user
may click on a different box to change measurement
systems. The chosen measurement system is used for
all functions where the user may specify a measurement
by typing in a value, or where a measurement is displayed
to the user. The ruler measurement system is specified
separately (directly on the ruler).

Reference grid ...

The Edit S	tyles Tools Justify Zoom
	Sample doc
k	
	☐ Turn grids off ☐ Make grids invisible
	Grid spacing: Number of divisions:
TABARANA Nga tabak Makatakata	⊙ inches
	☐ centimeters ☐ 6 ☐ 8 ☐ 10 ☐ 12 ☐ 16 ☐
	□ picas □ 20 □ 32
	

Function description: lets the user choose a grid to be placed on the page in order to constrain element placement

User steps The user gets to this screen by choosing "Reference grid..." from the Tools menu.

Caveats When a grid is turned on, all placement and alignment is forced to the nearest grid intersection.

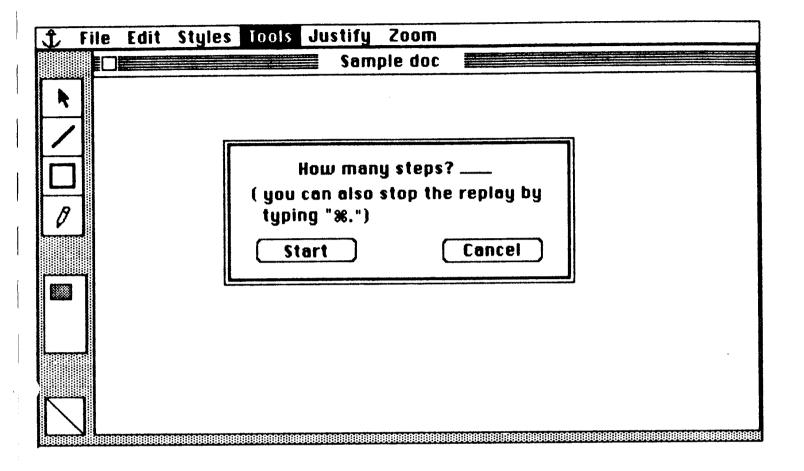
Column guides...

Ĵ.	File Edi	t Styles Tools Justify Zoom					
,		Sample doc					
*							
/		⊠ Build guides for page/boн					
		- Number of columns: 1					
0		-Width between columns: 0.5 inches					
		-Offset from left edge: 0.5 inches					
		-Offset from right edge: 0.5 inches					
	☐ Remove guides from this page/box						
		(Cancel) (Ok)					

Function description: lets the user quickly build guides for the page or the currently selected box.

<u>User actions</u>: To build guides, the user enters the number of columns and the width between them. After clicking OK, the column guides are drawn in the selected area. On the left and right sides of the selected area, the margin is half the width specified in the dialog. The third query asks for the offsets from the left and right edges of the page. Often, different offsets are used for left and right hand pages. Selecting "Remove guides ..." causes the guides to be removed from the selected area.

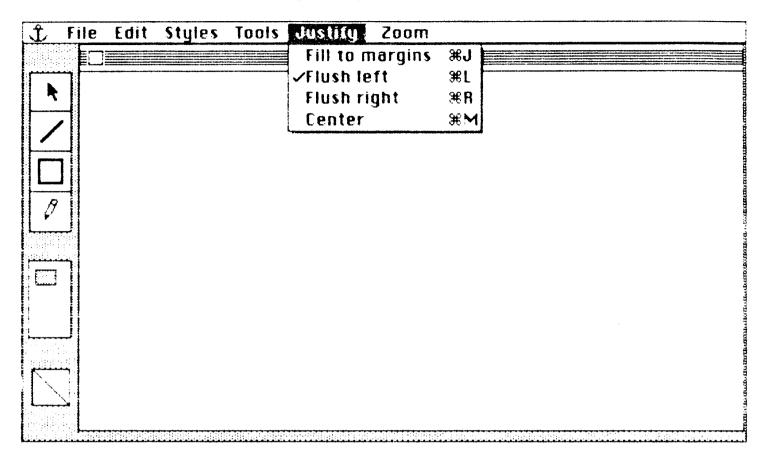
Replay journal ...



Function description: lets the user replay a file containing a previously saved sequence of user steps.

User steps: The user gets to this screen by choosing "Replay journal" from the Tools menu. Only one replay file can exist on a disk, so no name specification is needed. The user may either type in the number of steps he wants from the replay file, or let the replay file run without specifying the number of steps (by leaving the field blank) and stop the replay by using the "command-period" key combination.

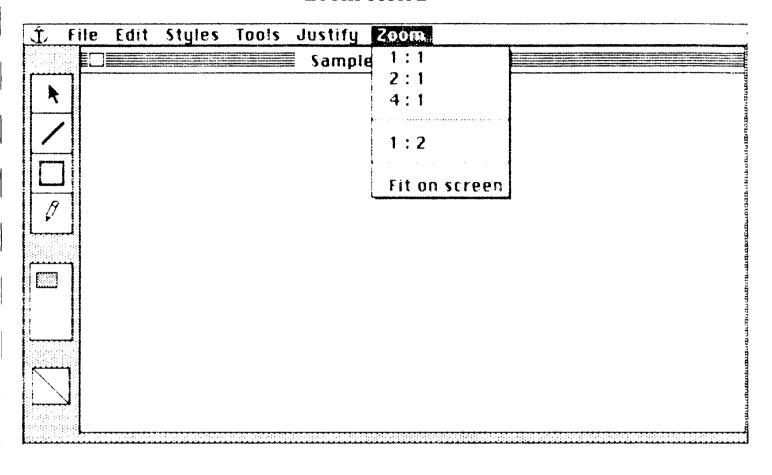
Justify Menu



Menu description: contains functions for controlling the justification of text.

User steps: The user gets to this screen by pressing the mouse button while over the Justify menu title. None of these functions have dialog boxes; each takes effect immediately. The pointer, used to place elements on the page, changes orientation depending on which of these functions have been selected. If "Flush left" is selected, the pointer points left. If "Flush right" is selected, the pointer points right. If "Center" is selected, the pointer points up. If "Fill to margins" is selected, the pointer points left (just as if "Flush left" had been selected)

Zoom Menu



Menu description: contains functions for changing the scale used to display the document.

User steps. The user gets to this screen by pressing the mouse button while over the Zoom menu title. All of the functions in this menu take effect immediately. All of the ratios shown here are for linear measures (the scale factor for the areas is the square of the linear factor). The center of the screen will be fixed for all the scale factors except the "Fit on screen" scale factor. When the "Fit on screen" function is chosen, the center of the sheet or page becomes the center of the screen.

Caveats: The only way to get the original center of the screen back after doing a "Fit on screen" is to do an "Undo"

Aldus Document Layout Terminal Environment

This section describes the hardware on which the Aldus layout software runs and the way typesetters and printers built by different manufacturers are supported.

Hardware Configuration

The first version of the Aldus layout software runs on the Apple Macintosh and Lisa personal computers. The decision to use the Apple computers was based on the responsiveness and quality of the display, along with the user interface philosophy. Of all of the mass market micros available today, the Macintosh and Lisa are the most appropriate to the interactive layout application.

The minimum configuration required to run the Aldus publication system is a Macintosh with keyboard, mouse, and a minimum of 800 KB disk storage, (see figure 8). A 400 KB version is provided for sales & demo purposes. However, because of the limited file space, the sales & demo version is limited in the number of screen fonts available, and in the amount of document storage.

Connections to the output device (typesetter or laser printer) will be through the "modem" port. Either a direct (RS 232C) connection or a modem may be used.

The Apple Imagewriter is supported as a proof printer.

An external disk drive can be used with the Macintosh. A Macintosh with a 400 KB internal disk drive requires a second Apple external disk drive.

Software Configuration

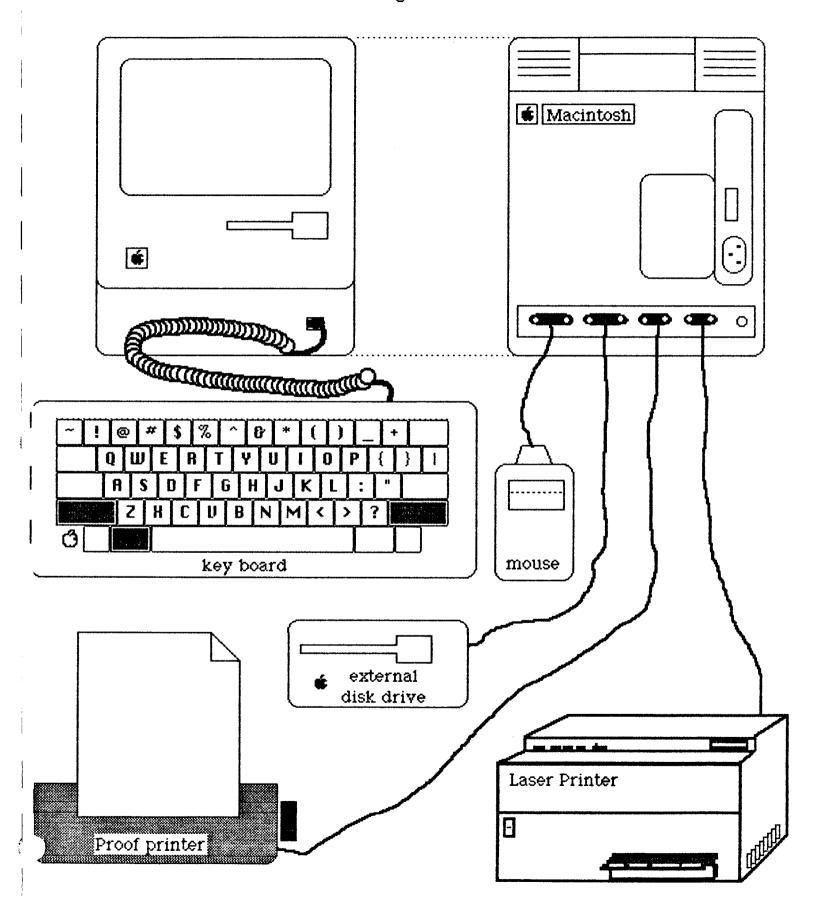
The Aldus layout software can be changed to meet the specific needs of each user. A default configuration is provided to meet the requirements of the market segment in which the system is sold.

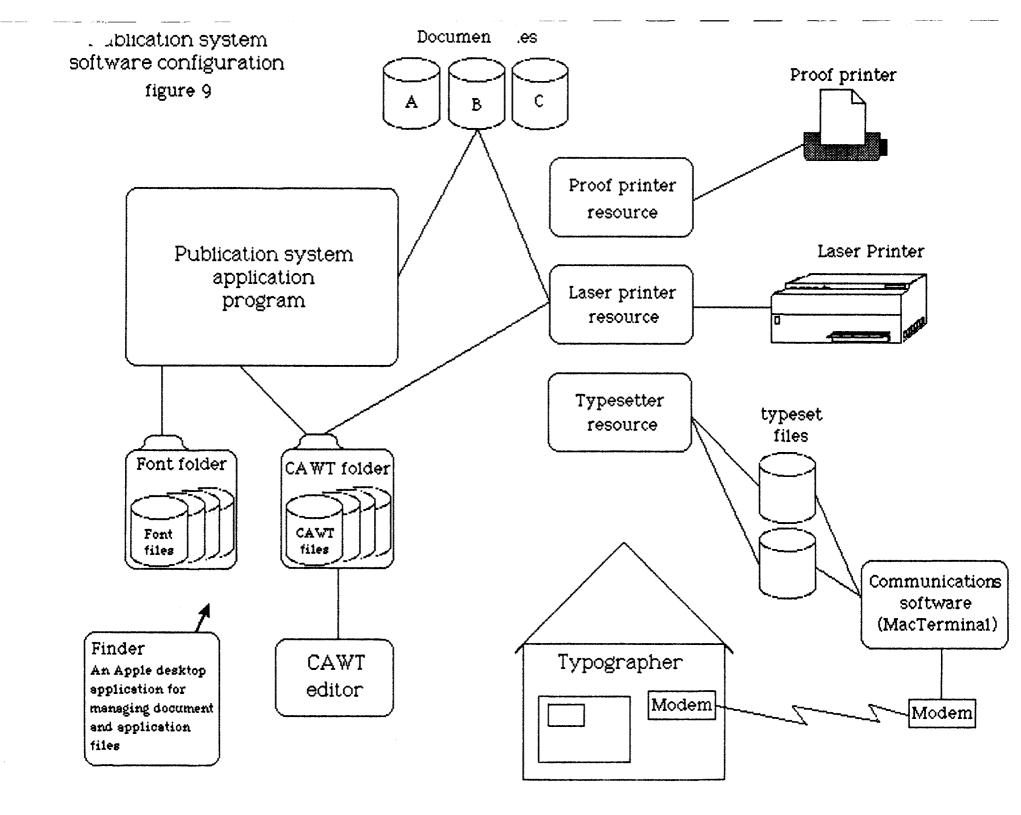
The configuration philosophy is to make options easy to install, and change. Options exists as separate files that are added or deleted with the Finder (see figure 9). The option files need only be on the application disk; the layout software will recognize and use them. The user modifiable options are the screen fronts, character attribute and width tables, and the output device resource.

Fonts. Aldus supplies a default set of eight generic screen fonts; serif and sans-serif in normal or bold, and Roman or italic. Additional screen fonts created by typographic designers may be purchased from Aldus.

These screen fonts are intended to represent as closely as possible the printing fonts. However, because of the limited resolution of the Macintosh screen, it is impossible to represent the fine details of many type faces. Similar looking printing fonts will

Publication system hardware configuration figure 8





be represented with the same screen font.

Each screen font is in a separate file that can be added or deleted with the Finder. Each screen font must be associated with one or more printing fonts. This association is made in the character attribute and width table (CAWT).

Character attribute and width tables (CAWTs) For each printing font there is a CAWT. The CAWT is a table of information about the characters in the font. It lists character widths, typesetter codes, kerning pairs, and ligatures. The CAWT also tells the system which screen font should be used to represent the printing font.

Aldus supplies a starting set of CAWTs for each of the laser printers or typesetters supported. Additional CAWTs may be purchased from Aldus or entered by the user.

Each CAWT exists as a separate file that can be added or deleted with the Finder. The name of the CAWT file is the name of the font, and is the same name that the layout software will use in the menu of fonts.

A CAWT editor is provided for creating or modifying CAWTs. It is capable of reading CAWT information from typesetters (when supported by the typesetter).

Output devices. The layout software is capable of driving different output devices (several typesetters, laser printers, and proof printers). Each particular output device has a device driver. These device drivers convert a document from layout software format to output device format. The device driver for the output device in use must be on the application disk. When more than one device driver is present, the layout software will ask the user through a dialogue box which output device to use. The device drivers can either create an output file, or drive the output device directly (as in the case of the proof printer). The configuration of the device drivers is controlled by a dialogue box within the layout software application program.

Interfaces

Input. The Aldus text editor is intended only for minor changes to text inside documents, and not for original entry of text to be used in the document. Instead, text is captured either by a third party text editor such as Apple's MacWrite or Microsoft's Word, or by a communications program. The layout software reads the "Text Only" documents created by these editors (the user must specify this document type). Except for carriage return and tabs, all formatting information is ignored.

Text may also be merged with a document using the "clipboard." The layout software is completely compatible with the Macintosh copy, cut, and paste paradigm.

 $\frac{\text{Output.}}{\text{RS-232C}}$ The interface to the output devices is either through an RS-232C connection or through a modem. The data format will be the output device format.

Some typesetters, such as the Compugraphic series, use an eight bit code. The Macintosh can transmit eight bit code so a direct connection to Compugraphic systems is possible. However, many communications facilities are set up for seven bit ASCII code. In this situation, an eight bit to ASCII protocol is used, but the underlying data format will still be that of the output device. The user will specify through a dialogue box which format to use.

Communications. No communications programs are provided by Aldus. The Apple program "MacTerminal" is used to handle all transmission and reception of data. This program is flexible and can handle seven or eight bit data at all the standard speeds from 300 to 9600 baud. MacTerminal also supports the Apple auto-dial modem.

To transmit typesetter files, the user contacts the typographer's computer using MacTerminal, and enters a dialogue. When the computer is ready, the user instructs MacTerminal to transmit the files.

APPENDIX A

This appendix contains a more detailed description of the "autoflow" algorithm used to place text on the page. This algorithm capability is most useful for placing stories on a page that is broken into columns, but can also be used to put chunks of text inside an odd-shaped area in a display ad.

The autoflow algorithm is intended to place text correctly 90% of the time for typical newsletter pages. Thus, it is optimized for placing text in columns broken by an occasional headline, photo, or graphic. Other page layouts can be at least partially accommodated, although we expect the user to manually place overset text for these less structured cases.

Simply stated, the autoflow algorithm fills the current column, jumping over boxed areas until it hits a blocking rule or guide, and then looks to the next column to the right and repeats the process, until its text supply is exhausted. The algorithm is shown below in 'Pascalic'.

current hole := area surrounding Insertion Point;

WHILE there is a current hole DO BEGIN

REPEAT

fill the current hole;
IF blocking element is a box THEN
move past it and make the new area the current hole;
UNTIL the current column is blocked by a line rule or guide;

move the insertion point across the column guide to the right; look above the insertion point for a blocking line rule or guide; look below the insertion point for a blocking line rule or guide; call the bounded area (if one exists) the current hole;

END; { WHILE there is a current hole }

The column guides that govern the algorithm are different from the rules and guides that the user builds directly. Column guides come in pairs, and are separated from each other by gutters. The user builds column guides using the "Create column guides" function from the Tools menu. This function asks the user how many columns the user wants, how wide the gutters should be, and whether there should be an offset from the left or right edge of the paper.

The autoflow algorithm works by filling "holes" with text. A hole is defined to be the area surrounding the insertion point completely enclosed by rules, guides, and the edges of the page. The text placed into a box rule or guide, or against a line rule or guide, does not butt up against the rule or guide; instead, it stands off half the gutter width.

Once the current hole has been completely filled with text, the algorithm looks for a new hole if it still has text to place. It looks below the current hole in the current column, jumping around boxed rules or guides, until (1) it finds a hole, or (2) it hits a line rule or guide that blocks the column. If it finds a hole, it makes it the current hole and repeats the filling process.

If the algorithm cannot find any holes below the current hole, it begins looking for a hole in the column to the right of the current column. The algorithm tries to move the insertion point directly to the right of the original insertion point until it crosses the column gutter, and then looks up and down inside the new column for line rules or guides or text that blocks off the new hole above and below the insertion point. It continues this process of looking for holes below and then to the right as long as it has text left to place.

Note that any areas enclosed by box rules or guides will not be filled by this algorithm unless the insertion point is placed inside the box to start with. Further note that if the insertion point is placed inside a box, no other hole can be found to place any text that oversets the box.

Because this algorithm requires fairly extensive processing to compose and place all the text, the user is always shown where the text will flow before it is actually placed on the page. When autoflow mode is turned on (through the menus) and the user indicates an insertion point (by clicking with the mouse), the area that the autoflow algorithm intends to place text into will be indicated with a stipple pattern (i.e., a light grey dot pattern). If the user does not really want to flow text into the indicated area, he may either turn autoflow off (thereby removing the stipple pattern) or change the area boundaries so that the stipple pattern shows the area he wants the text to flow into.

One of the options the user has in modifying the flow area is to move one or more of the guides that define the tops and bottoms of the holes.

Once the user has decided that the flow area shown by the stipple pattern is correct, he places the actual text by choosing the "Place text file" function, typing in the text directly, or by pasting text from the clipboard. The "Place text file" function takes text from a file, and is useful for putting entire stories onto the page. Typing in the text directly is most often used for relatively short text pieces, and the paste command is usually used for placing overset text.

When the text the user wants placed is too large for the autoflow area, the algorithm trails the excess text down the page below the last line of the autoflow area. The user may choose to select the overset text by clicking at the start of the overset portion, and then choosing a function from the Edit menu called "Select to end." The user may then cut this overset text either by using the "Cut" function in the Edit menu, or by choosing the "Cut with jump report" function. This function brings up a dialog that allows the user to type in "jump to" and "jump from" messages. In either case, the overset text is cut

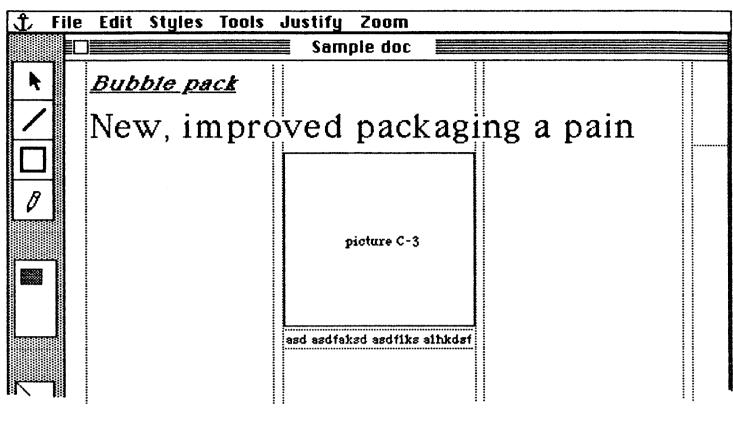
(and thereby placed on the clipboard), and then may be pasted wherever the user wants it to go. The paste command will also flow the text into the area the user indicates as long as "Flow on" is still selected on the Styles menu.

Once text has been placed into an area, the shape of that text cannot be changed without cutting it and pasting it again, or choosing the "Reflow text" function. (The reflow function assumes the same insertion point for the selected text.) Any editing changes to the text will cause the text to be recomposed, but it will maintain the shape that it was originally poured into.

The following example (along with Figure 10) shows autoflow in action. The user has already typed a headline onto the page, reserved room for a photo, and typed in a caption below the photo. He now wants to place a story he has in another file onto the page.

First, he pulls down the Styles menu and turns "Flow on." Next, he chooses an insert point below the headline. The system responds by placing a stipple pattern in the areas discovered by the autoflow algorithm. The user wants the fourth column to begin at the same level as the headline, so he moves the "cap guide" up for that column.

Now he is ready to place the story. He pulls down the File menu, selects "Place text file", and chooses the name of the file that contains the story from the dialog box. The story is placed into the area covered by the stipple pattern. The story oversets the area a little; the user could cut the overset portion and paste it someplace, but decides to edit the story to fit instead. He selects a couple excess phrases in the story and cuts them, causing the story to be recomposed in its area. The story now fits entirely inside the area it was flowed into.



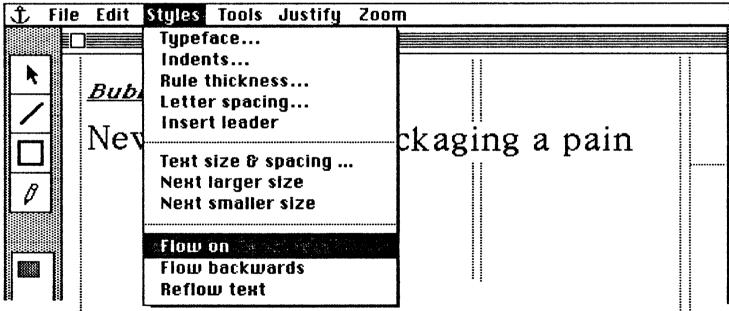
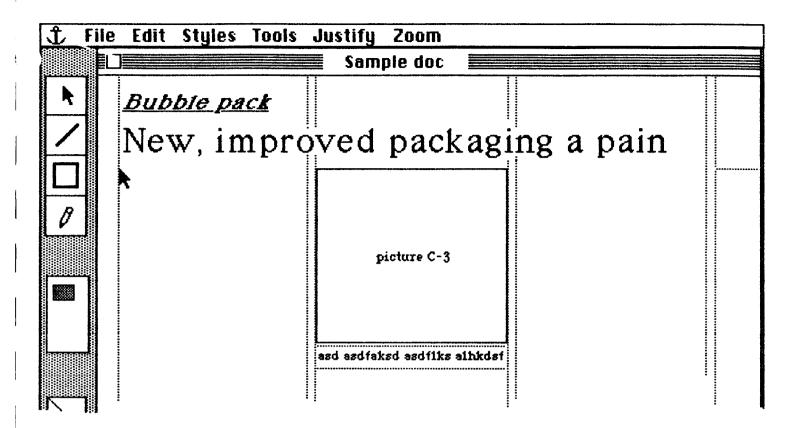
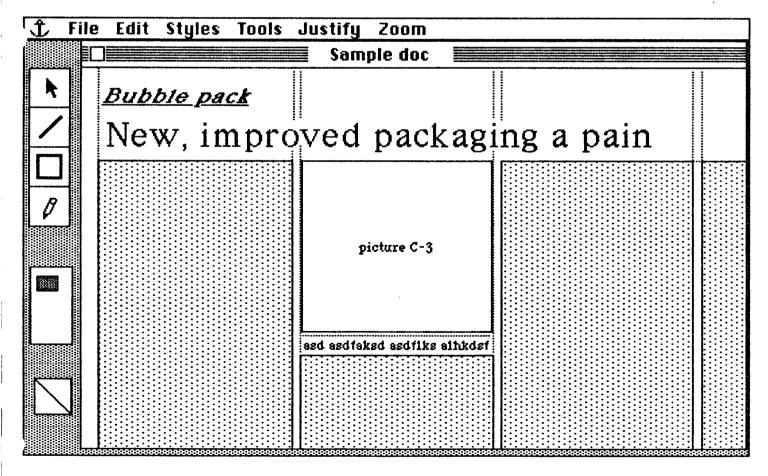
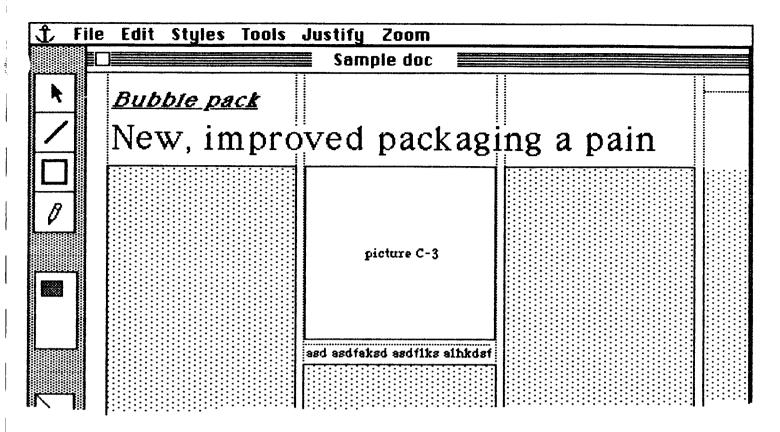


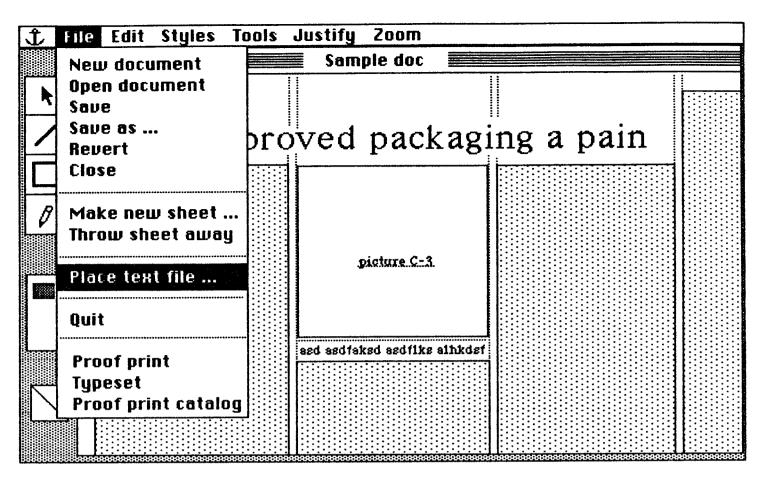
Figure 10.

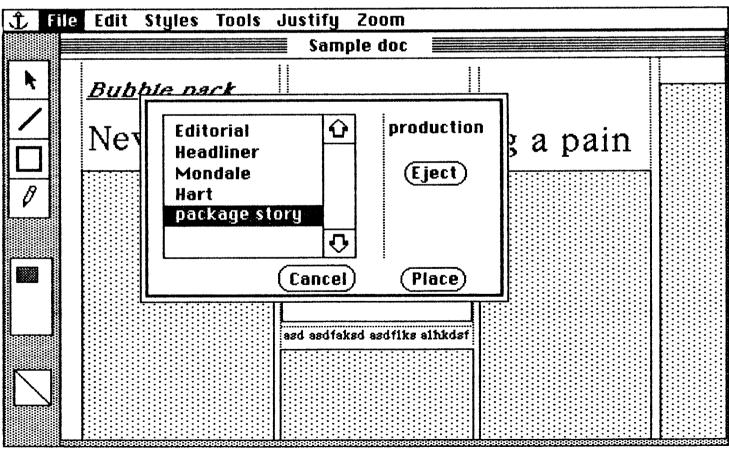


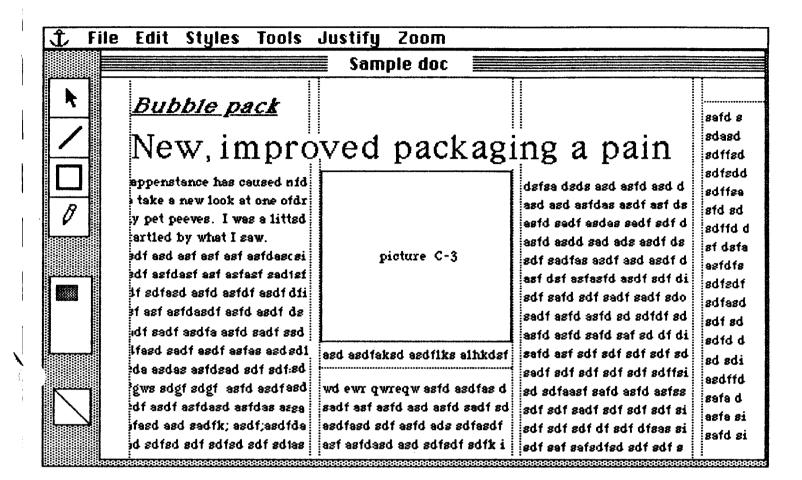




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APPENDIX B

This appendix contains an example of how one might make up a simple display ad using the Aldus document layout terminal. Display ads are the most free-form of the document types that we expect users to produce on the document layout terminal. More structured documents, such as newsletters, put more of the text placement burden on the computer, as was shown in Appendix A describing the autoflow algorithm.

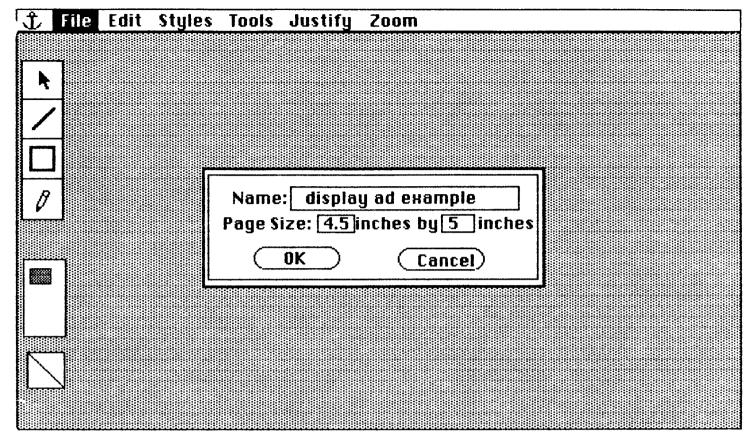


Figure 1

A display ad featuring a grandfather clock is created in this example. The artist first selects the New document command from the File menu and fills in the form shown above. In this example, the page size is the same as the ad size (4.5 by 5).

When the size and name are entered, click the OK box to tell the publication tool to create the new document.

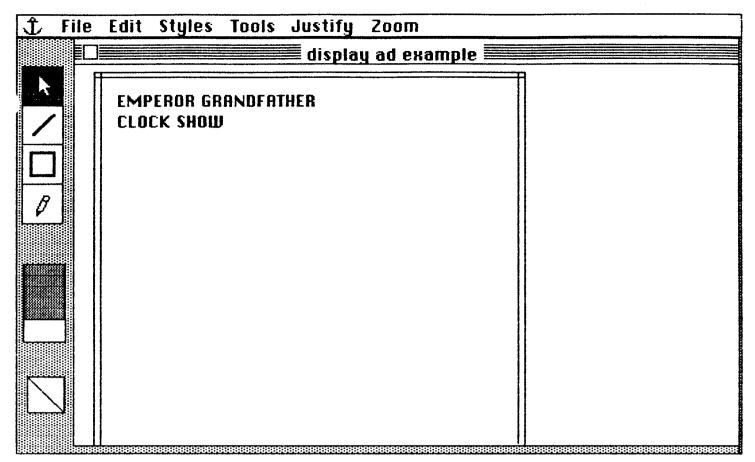


Figure 2

The artist first enters the primary message of the ad, the headline in this case. He does this by clicking at the upper left corner of the sheet to create an edit point. The headline is entered using the keyboard. The text could have been entered previously into a text file and pulled over to the sketchpad using the Place file command in the File menu. In this case, the artist is working from a thumbnail sketch received from the ad salesman.

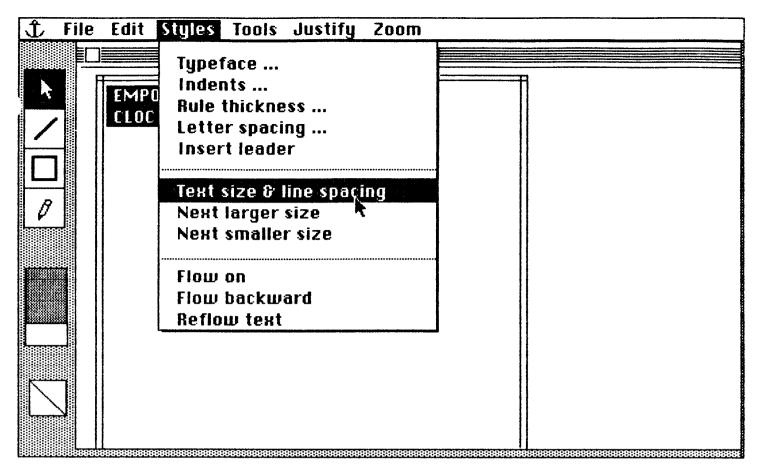


Figure 3

After entering the headline in the default size (12 point), the artist now will wish to increase the size. To do this, the artist selects the headline text by dragging the pointer through it. The text will be highlighted. Then, he pulls down the Styles menu and selects the "Text size & line spacing" command.

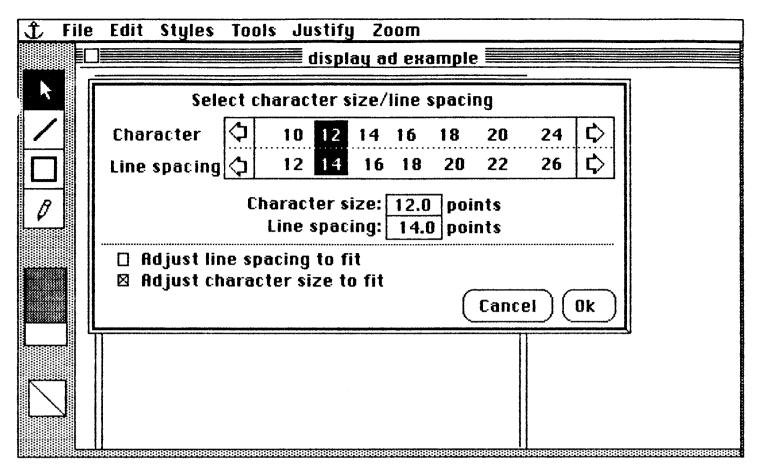


Figure 4

The artist has chosen the Adjust character size to fit function. The publication tool will adjust both lines so that the size of the largest line will determine the size of all other selected lines. To tell the publication tool to go ahead and perform the adjust character size to fit function, click the OK box. If the artist wished to exit from this dialog without making any changes, he would click the CANCEL box instead of the OK box.

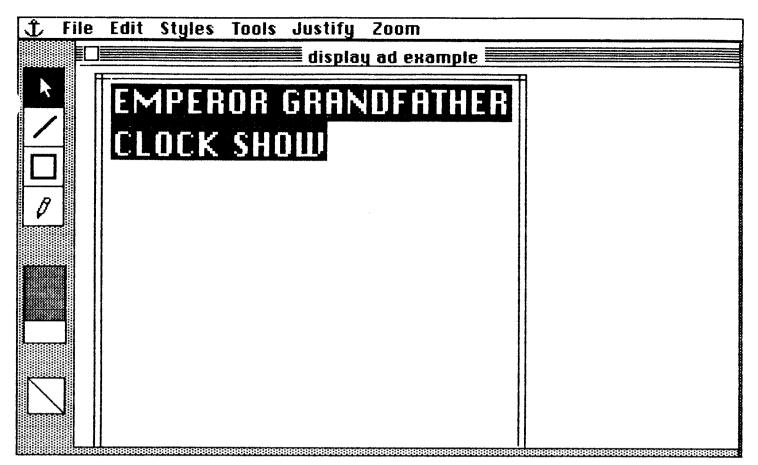


Figure 5

After the new size function has been called, the selected text (the headline) is now at the desired size. The headline remains selected until another element is selected or another mode is entered.

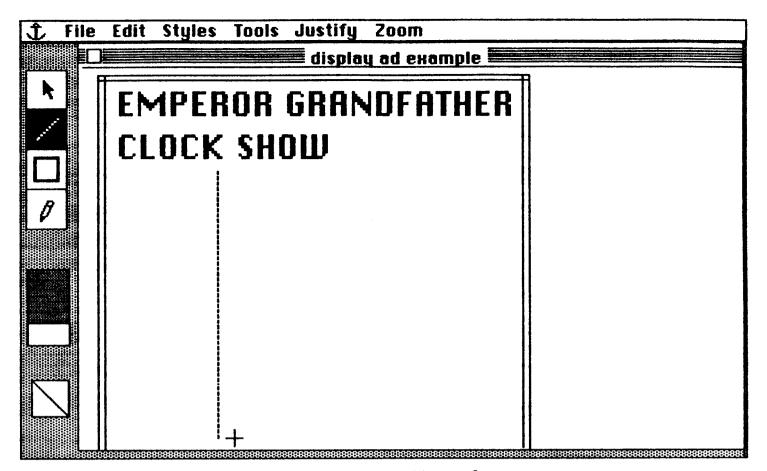


Figure 6

The artist, after entering the headline, then determines where to place the artwork and how to place the rest of the ad. The artist selects the rule mode by clicking the rule icon (below the arrow icon). The headline deselects and a graphics cursor replaces the pointer cursor. The artist draws a weightless rule (dashed line) to delimit the area for the artwork. The artist could have also traced the artwork using the mouse, but instead used the straight line rule. The artist, when drawing the rule, held the shift key down so that the rule was constrained to be either vertical or horizontal.

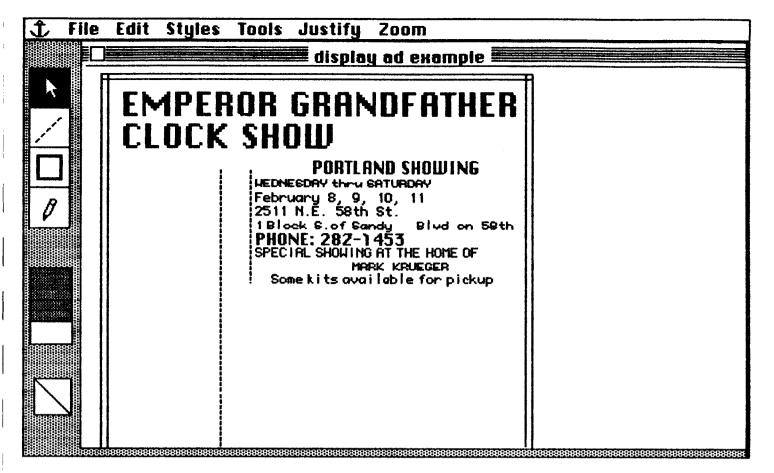


Figure 7

The artist has created a second rule, indented slightly from the first rule, to bound the next text entered. He then selected the pointer icon from the mode bar and selected a location to enter more text. The text entered was varied in the face and size (bold and 12 point) as well as justification (two lines were center justified and the rest were left justified). The artist could have entered each line as it was to appear in the ad or in one text entry session and afterwards changed each line.

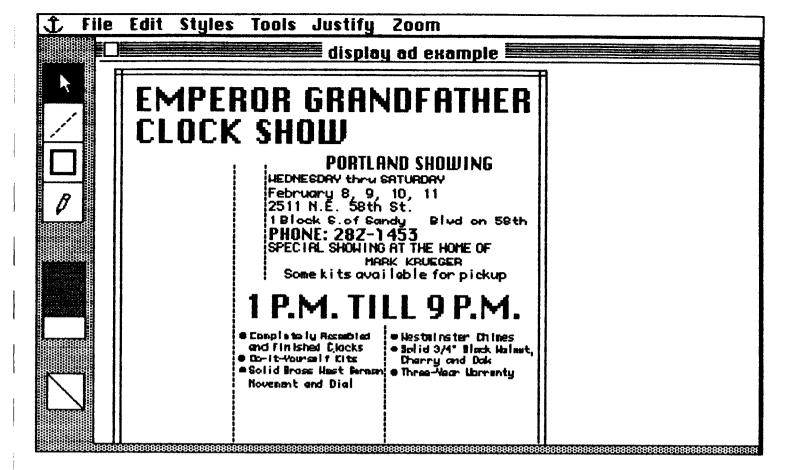


Figure 8

The artist has added another guide to help enter the two columns of detail product information. The artist has also set the hanging indent through the rulers and the Change indents command. The ruler contains icons which represent the amount of space to indent. The artist then entered the text in the proper size and justified left.

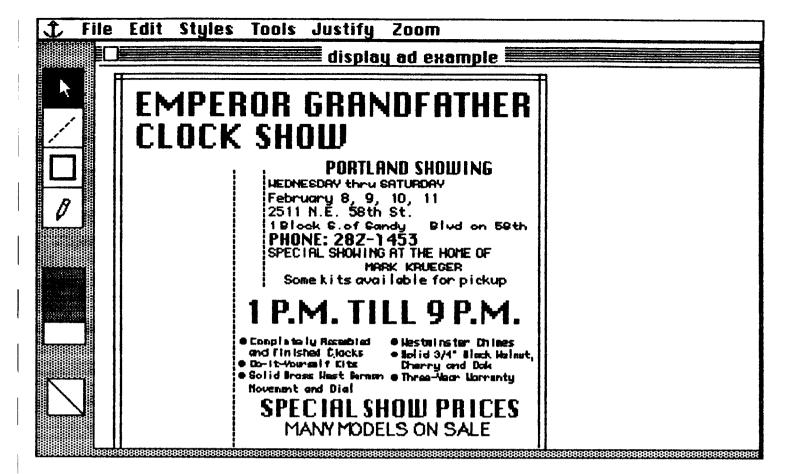


Figure 9

The artist has deleted the short guide used to bound the product description bullets and entered the two lines "SPECIAL SHOW PRICES" and "MANY MODELS ON SALE". These two lines were centered between the guide and sketchpad boundary by selecting both lines and entering the Center command in the Justify menu. The MANY MODELS line has a different size, so that line was selected and the new size was chosen from the Styles menu.

Now the artist must scroll the sketchpad to continue.

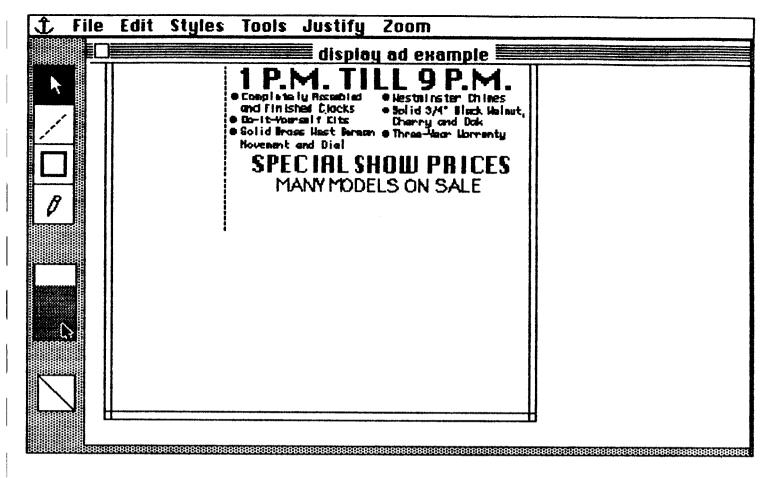


Figure 10

To scroll, drag the screen icon over the sketchpad icon in the scroll bar at the lower left of the screen. This will cause the display to scroll. In this example, the artist has scrolled to the bottom of the pad.

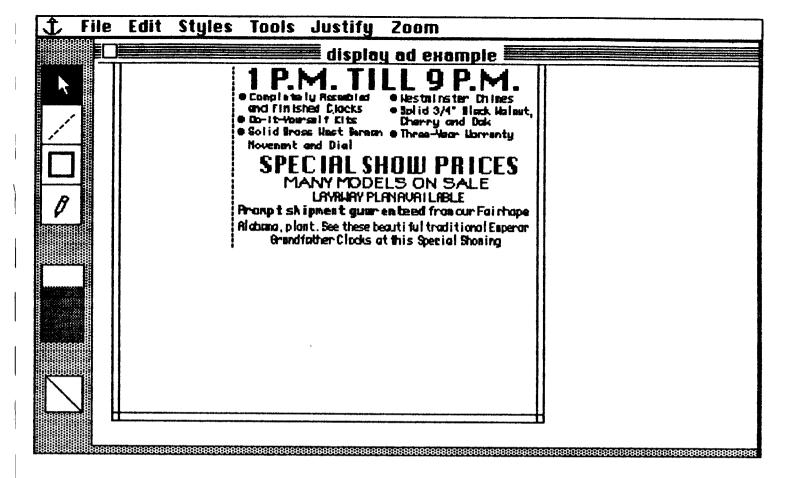


Figure 11

The artist entered the new lines below the MANY MODELS line after scrolling. Then, the LAYAWAY line was selected and the Center command was selected from the Justify menu. The first three words in the next line (PROMPT SHIP...) were selected and changed to a bold typeface. To change the typestyle, the artist selected the Change typestyle command from the Styles menu and then selected the bold face from the menu of typefaces in the command dialog.

The artist then selected the last three lines and selected the Fill to margins command from the Justify menu. This justified the final paragraph between the guide on the left and the ad boundary on the right.

At this point, the artist decided to center the last line of the paragraph. To do this, first he selected the line by stroking the mouse cursor through the line while pressing the button. Then, he hit the M key on the keyboard while holding down the '%' key. This is a shortcut to the CENTER command in the JUSTIFY menu. These two actions centered the last line.

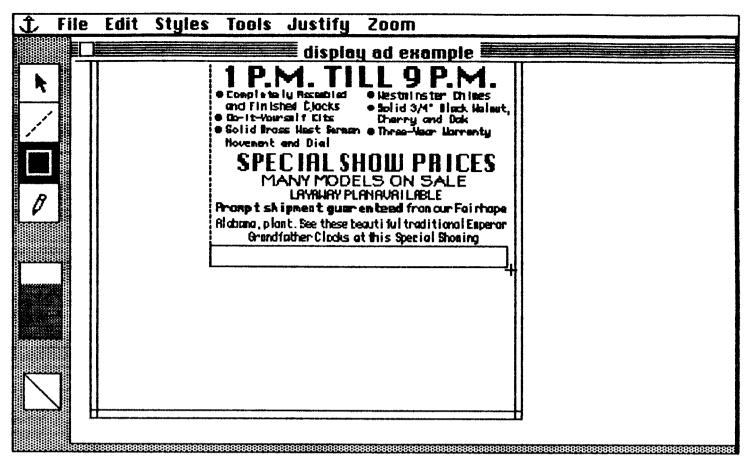


Figure 12

The artist has created a boxed rule by selecting the box icon from the mode bar on the left, selecting the desired rule weight from the Styles menu and drawing the boxed rule. The box is drawn by centering the graphics cursor (cross), pressing the mouse button and dragging the mouse until a box of the desired shape has been formed on the screen. If exact sizes are needed, the rulers may be used.

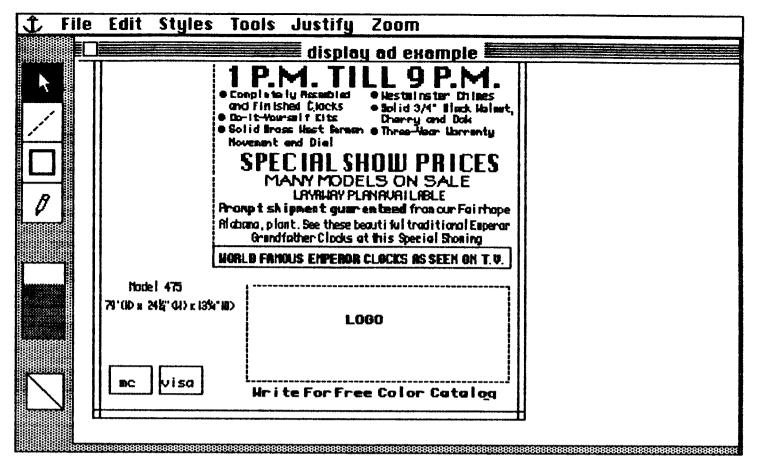


Figure 14

The artist has now added a weightless boxed rules to reserve space for the logo and credit card artwork. Finally, he added the model information for the grandfather clock artwork. After doing this, the artist can add a rule around the boundary of the desired weight (this may be done at any time during the makeup of the ad).

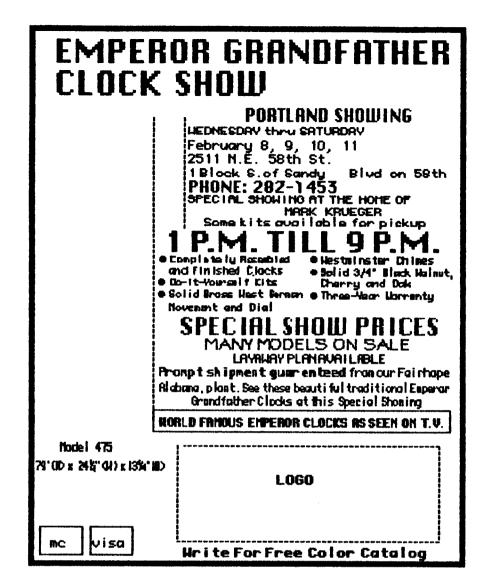


Figure 15

This is the first draft from the Mac Imagewriter. The artist may use this as a check that the clip art and text work together. The artist will discover, using this draft copy of the ad, that the clock artwork is too tall to fit between the second line of the headline and the model number. The artist now must go back and change the layout so that the artwork will fit.

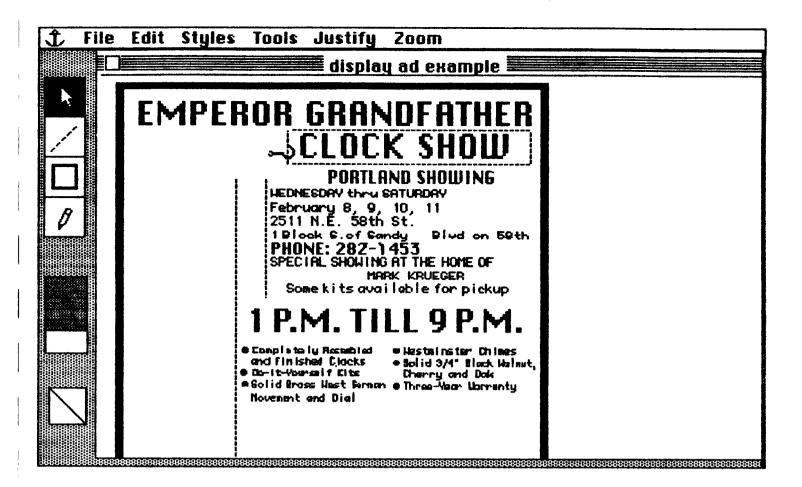


Figure 16

First, the artist scrolled back to the top of the ad and returned to the pointer mode. He then built a select box around the last line of the headline (CLOCK SHOW). The artist then moved the line horizontally by moving the pointer to the side of the box and, while holding the shift key down, dragged the mouse. The move was constrained to the horizontal direction because the shift key was held down during dragging.

This corrected the layout by moving the headline so that there would be room for the grandfather clock artwork.

EMPEROR GRANDFATHER	
CLOCK SHOW	
	PORTLAND SHOWING HEDNESDRY thru SATURDAY
	February 8, 9, 10, 11 2511 N.E. 58th St.
	1 Block S. of Sandy Blud on 58th PHONE: 282-1453 SPECIAL SHOWING AT THE HOME OF
	MARK KRUEGER Some kits available for pickup
	Complete ly Recembled Wester Inster Chines and Finished Clocks Solid 3/4* Nack Walnut.
	Do-It-Yourself Kits Cherry and Dak Solid Bross Hest Bress & Three-Year Horrenty Hovenent and Dial
	SPECIAL SHOW PRICES MANY MODELS ON SALE
	LAYAHAY PLANAVAILABLE Promptshipment guar enteed fronour Fairhope
-	Alabana, plant. See these beautiful traditional Enperor Grandfather Clocks at this Special Shoning
<u> </u>	NORLD FAMOUS EMPEROR CLOCKS AS SEEN ON T.V.
	LOGO
mc visa	Hrite For Free Color Catalog

Figure 17

This is the final draft from the Mac imagewriter. Notice that the guides are still printed. The guides would be eliminated when the ad is sent to a typesetter.

EMPEROR GRANDFATHER



WEDNESDAY thru SATURDAY February 8, 9, 10, 11 2511 N.E. 58th St. 1 Block S. of Sandy Blvd. on 58th PHONE: 282-1453 SPECIAL SHOWING AT THE HOME OF MARK KRUEGER

Some kits available for pickup.

- Completely Assembled and Finished Clocks
 Do-It-Yourself Kits
- Do-It-Yourself Kits Cherry and Oak
 Solid Brass West German Three-Year Warranty Movement and Dial
- Westminster Chimes • Solid 3/4" Black Walnut,

SPECIAL SHOW PRICES

MANY MODELS ON SALE LAYAWAY PLAN AVAILABLE

PROMPT SHIPMENT GUARANTEED from our Fairhope, Alabama, plant. See these beautiful traditional Emperor Grandfather Clocks at this Special Showing.

WORLD FAMOUS EMPEROR CLOCKS AS SEEN ON T.V.

Model 475 79"(H) x 24%"(W) x 13%"(D)





CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS

Write For Free Color Catalog

