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# **USER REFERENCE MANUAL**

**TouchNTalk**

by

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# Table of Contents

<b>List of Tables and Illustrations . . . . .</b>	<b>2</b>
<b>1 Introduction . . . . .</b>	<b>3</b>
<b>2 Soft Functions . . . . .</b>	<b>3</b>
2.1 Help . . . . .	3
2.2 Open . . . . .	3
2.3 Save . . . . .	4
2.4 Close . . . . .	5
2.5 Page . . . . .	5
2.6 Shell . . . . .	5
2.7 Windows . . . . .	6
2.8 Holo Set . . . . .	6
2.9 Speech Mode . . . . .	7
2.10 Configuration . . . . .	7
<b>3 Left Holophrasts . . . . .</b>	<b>7</b>
<b>4 Page Turning . . . . .</b>	<b>8</b>
<b>5 Locating Pages . . . . .</b>	<b>9</b>
<b>6 Bookmark Management . . . . .</b>	<b>9</b>
6.1 Adding Bookmarks . . . . .	9
6.2 Removing and Renaming Bookmarks . . . . .	10
6.3 Locating Bookmarks . . . . .	10
<b>7 Horizontal and Vertical Scrolling . . . . .</b>	<b>10</b>
<b>8 Cursor Location . . . . .</b>	<b>11</b>
<b>9 Tactile Document Display . . . . .</b>	<b>11</b>
<b>10 System Interaction Line . . . . .</b>	<b>12</b>
<b>11 Document Publishing . . . . .</b>	<b>12</b>
 <b>References . . . . .</b>	 <b>13</b>

## List of Tables and Illustrations

<b>Figure 1.</b> Soft Function Panel . . . . .	4
<b>Figure 2.</b> Open Document Window . . . . .	5
<b>Figure 3.</b> Document Selection Window. . . . .	6
<b>Figure 4.</b> Configuration Panel . . . . .	7
<b>Figure 5.</b> Annotated Regions of Textured Pad . . . . .	8
<b>Figure 6.</b> Bookmark Addition Panel . . . . .	9
<b>Figure 7.</b> Bookmark Removal and Renaming Panel . . . . .	10

# 1 Introduction

TouchNTalk is a document browsing system for the visually impaired. The system includes a visual display, a pseudo-display, and a document publishing facility.

The visual display allows sighted users to interact with the system through a traditional mouse and keyboard interface. Since the visual display corresponds directly to the pseudo-display, it serves as an alternate form of interaction for sighted and partly visually impaired users. Furthermore, it is helpful in aiding individuals who teach others how to use the system.

The pseudo-display allows visually impaired users to interact with the system through the use of a digitizing tablet, textured pad, stylus, and text-to-speech translation system. Various functions are invoked by moving the stylus through grooves and clicking one of the available buttons.

The document publishing facility allows text documents to be converted into a format understood by TouchNTalk. Both on-the-fly and off-line publishing of text documents are supported. Document publishing is a relatively quick process, so on-the-fly publishing is a feasible alternative if disk space is at a premium, or if a pre-published version of the document is unavailable.

This manual describes the various functions of TouchNTalk and how they are invoked. These functions will be described in terms of the pseudo-display interface. The same functions can be invoked from the visual display by using the mouse as the input device. This is accomplished by *dragging* in a particular area and clicking the right mouse button the required number of times (in rapid succession). Tapping the stylus on the tablet shall be referred to as a single click, while depression of the barrel button on the side of the stylus will be referred to as a double or second click.

## 2 Soft Functions

Soft functions are located in the left most vertical groove of the display. Moving the stylus or mouse within the soft function groove causes a beep to be emitted when a soft function is encountered, followed by the spoken name of the soft function. Clicking in the soft function groove selects the soft function adjacent the stylus or mouse. Clicking in the soft function groove a second time, selecting the same soft function as previously, results in the cancellation of the soft function. This only applies to soft functions which display a control window, such as *open*, and *windows*. The visual representation of the soft function groove is shown in Figure 1.

### 2.1 Help

The help facility consists of an on-line version of the current document. It primarily serves as a reference document for visually impaired users who already know the basics of the system.

### 2.2 Open

The *open* soft function allows users to open files located anywhere in the file system. When selected, it displays an open document window to display the contents of the currently active directory (shown in Figure 2). The current opened directory is the same as that which is currently

active in the visual NEXTSTEP open panel. Information in the *tactile document display* (the main document area) of the pseudo-display is organized such that the current directory path appears on the first line of the open document, followed by a block of child directory names, and a block of file names. Arbitrary directories in the current directory path on the first line of the open document, can be opened by double clicking on the appropriate directory name.



**Figure 1.** Soft Function Panel

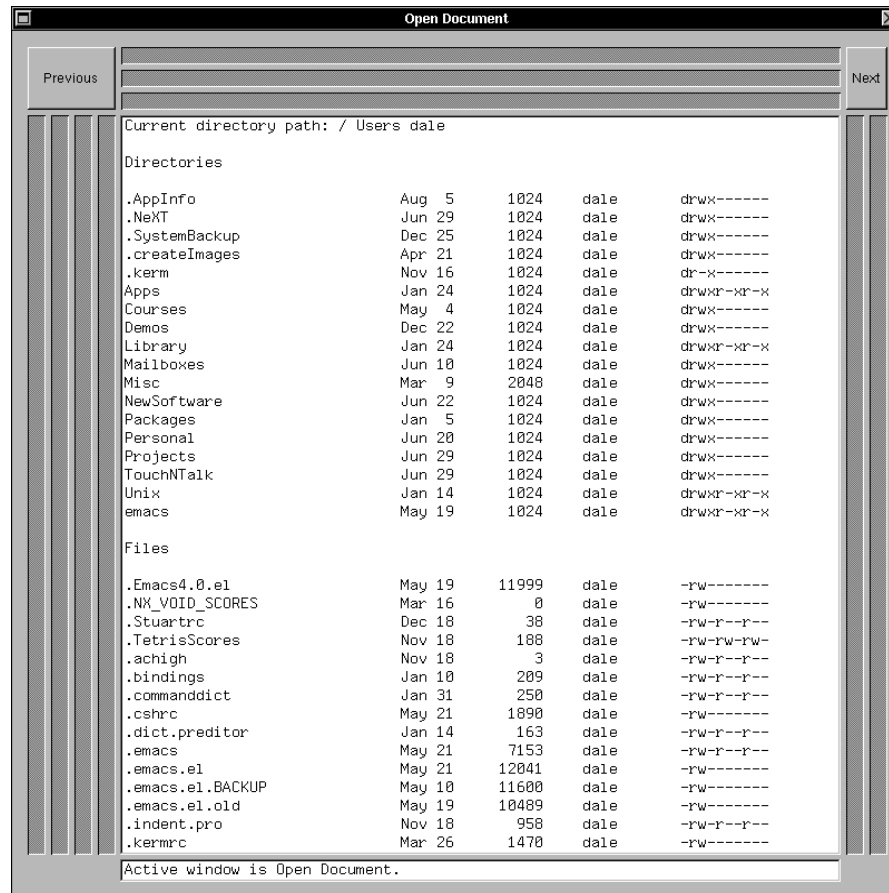
The directory name and file name blocks are preceded by a title indicating the start of the directory name and file name blocks, respectively. In the event there are no child directories, the directory block will contain a single line of text indicating no directories are present. Similarly, if there are no files, the file block will contain a single line of text indicating no files are present.

Directories of the file system can be opened by double clicking on the directory name in the tactile document display. Files can be opened by double clicking on the desired file. Opening directories and files always results in a displayed and spoken message indicating the name of the new directory or the name of the new active document.

Each line containing a directory or file includes various pieces of information, beginning with the name of the directory or file, followed by the last modification time, size, owner and UNIX file permissions.

## 2.3 Save

The *save* soft function is currently unsupported. Future versions of TouchNTalk will include an editing facility for composing and saving documents for later retrieval.



**Figure 2.** Open Document Window

## 2.4 Close

The *close* soft function closes the currently active document window. The next document as maintained by the NEXTSTEP Windows palette is made active. A message is displayed and spoken indicating the name of the new active document. Closing document windows results in a spoken message indicating the document window has been closed.

## 2.5 Page

The *page* soft function simply displays and speaks a message indicating the number of the page currently being viewed.

## 2.6 Shell

The *shell* soft function is currently unsupported. Future support of this feature will allow the user to interact with the underlying operating system. This feature is an extension of the currently unsupported editing facility.

## 2.7 Windows

The *windows* soft function allows users to select between various open documents. When selected, it displays a document selection window that contains a list of all the currently open documents (shown in Figure 3). Each line of the document contains the document number and the full document path name. Documents can be selected by double clicking on the line of the document name. In doing so, the window control document is automatically closed, and the requested document becomes active. Activating new documents always results in a displayed and spoken message indicating a new document has become active.



**Figure 3.** Document Selection Window

## 2.8 Holo Set

A holophrast is a groove which represents material of a particular type in a condensed form as nodes. The four vertical grooves on the left side of the display are the left holophrast grooves. Each groove represents different textual material in condensed form. Two holo sets are currently supported. The first (from left to right) represents titles, paragraphs, sentences, and phrases. The second represents parenthetical expressions, double quoted expressions, single quoted expressions, and line/columns for tabular data. Selecting the *holo set* soft function switches

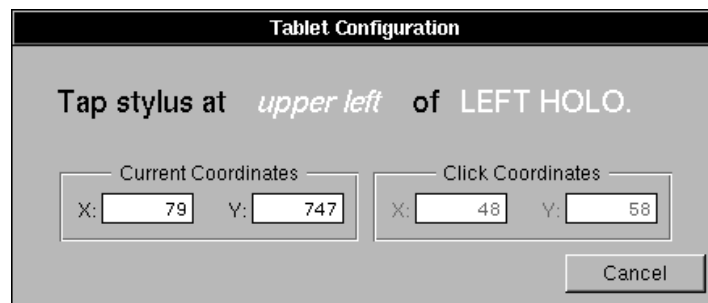
between the above two holo sets. More information on the use of these holophrast grooves appears in a subsequent section. Every document keeps a record of its currently active holo set.

## 2.9 Speech Mode

The *speech mode* soft function allows the user to toggle between speak and spell mode when selected. Spell mode spells everything that is selected in the tactile document display, while speak mode speaks everything selected. The system interaction line (SIL) is always in speak mode. Every document keeps its own record of the currently active speech mode.

## 2.10 Configuration

The *configure* soft function allows users to configure the tablet so it can be used with TouchNTalk. Since the textured surface may be removed and reattached at any time, there must be a way to tell TouchNTalk where on the tablet surface the various grooves are located in order for various gestures to be recognized. This is achieved by specifying the bounding box for every major area of the tablet. Specifying a bounding box involves clicking in the corner of each major area of the tablet as requested by the system. The configuration panel (shown in Figure 4) displays the same instructions as those spoken by the system.



Tablet Configuration

Tap stylus at *upper left* of LEFT HOLO.

Current Coordinates

X: 79 Y: 747

Click Coordinates

X: 48 Y: 58

Cancel

**Figure 4.** Configuration Panel

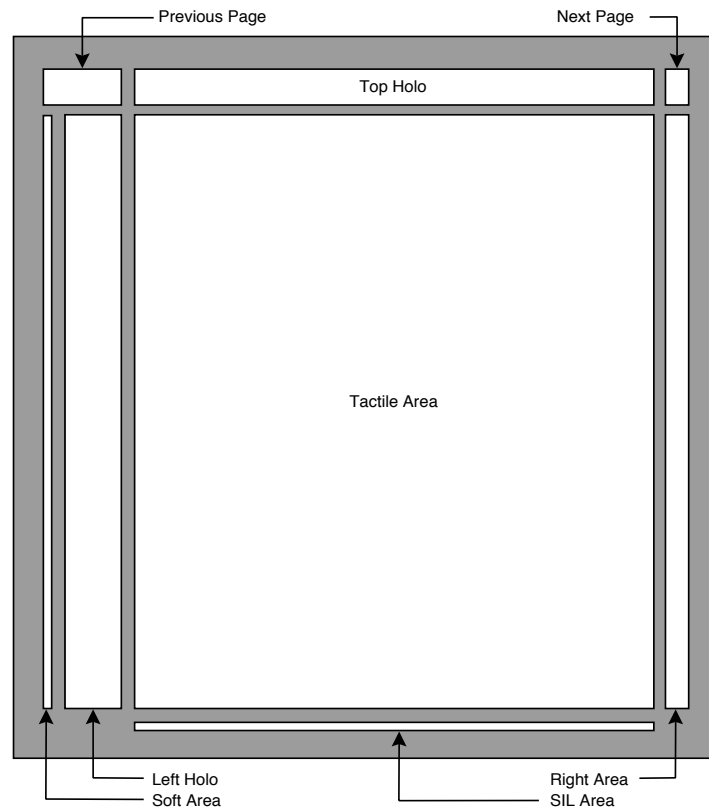
The system guides the user through the entire configuration process. The user only need follow the visual and/or spoken instructions and should know the names of the major areas of the textured pad as shown in Figure 5. The user can cancel the configuration process at any time by pressing the button on the barrel of the stylus. This process only needs to be done once, since the required bounding box information is saved to disk. When TouchNTalk is launched for the first time, tablet configuration will be invoked automatically.

## 3 Left Holophrasts

The vertical left holophrast grooves allow users to locate particular nodes of text. Moving the stylus or mouse within a holophrast groove will highlight a node when the stylus is adjacent the line at which the node begins or ends. A beep is emitted when the start of a node is encountered, and a lower pitched beep is emitted when the end of a node is encountered. If multiple nodes exist on a single line, the first node is highlighted. Clicking the stylus or mouse speaks the highlighted node. Subsequent clicks highlights the next node on the line and speaks it. Each click emits a



beep indicating a new node has been located. When no more nodes exist on the current line, a tone is generated indicating there are no more nodes. Subsequent clicks cycle through the nodes on the line again.



**Figure 5.** Annotated Regions of Textured Pad

If the node crosses a page boundary, a message is displayed and spoken indicating this is the case. The message is spoken *after* the contents of the node have been spoken when the node spans the bottom of the current page. Conversely, the message is spoken *before* the contents of the node have been spoken when the node spans the top of the current page. If the highlighted node spans several lines, clicking anywhere adjacent the node will speak it. Double clicking in a left holophrast groove will cause the type of the holophrast (phrase, sentence, paragraph, etc.) to be spoken.

## 4 Page Turning

Selecting the previous page button in the upper left of the display will cause the previous page of the document to be displayed. The corresponding action for the stylus is a click in the upper left indented rectangle of the tablet. Selecting the next page button in the upper right of the display will cause the next page of the document to be displayed. The corresponding action for the stylus is a click stroke in the upper right indented rectangle of the tablet. A beep is emitted if turning the page is not possible due to being at the front or end of a document.

## 5 Locating Pages

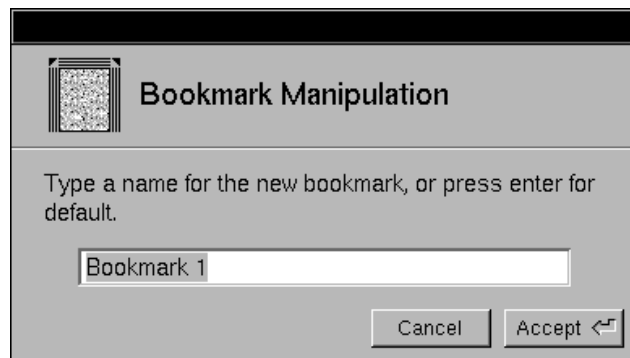
The topmost horizontal groove is the page locator groove. The groove acts as a page holophrast containing all the pages of the document. The leftmost side of the page locator groove represents page one, while the rightmost side of the groove represents the largest page number for the document. Moving the stylus or cursor within this groove will emit a tone which increases in pitch as the distance to the current page also increases. When a tone is no longer generated, the stylus or mouse is on the current page. Single clicking the stylus or cursor at this time will bring up the bookmark insertion panel (described in the next section). Single clicking anywhere else in the page locator groove will open the document to the associated page. The SIL will contain the current page number when a new page is activated, although it will not be spoken since the page locator tone will still be active.

## 6 Bookmark Management

Bookmark management involves handling the addition, removal, and location of bookmarks within a document. Clicking the stylus or mouse in the page locator groove (at the current page) will bring up a panel for bookmark management. The system is intelligent enough to know whether a bookmark is to be inserted, removed, or changed and will supply the user with the appropriate options (both visually and orally) based on the current circumstances.

### 6.1 Adding Bookmarks

When the bookmark panel for adding bookmarks appears, (shown in Figure 6) if a bookmark for the current page does not already exist, the possible options for adding a bookmark are displayed and spoken. Pressing the *enter* or *carriage return* key immediately accepts the default bookmark name. Otherwise, a custom bookmark name should be typed followed by a *carriage return*. The bookmark is then added for the current page. A message indicating the bookmark has been added is then displayed in the SIL and spoken.



**Figure 6.** Bookmark Addition Panel

## 6.2 Removing and Renaming Bookmarks

When the bookmark panel for removing or renaming bookmarks appears (shown in Figure 7) if a bookmark for the current page already exists, the possible options for removing or renaming the bookmark are displayed and spoken. Pressing the *carriage return* key immediately accepts the current bookmark name, leaving it unchanged. Pressing the *delete* key followed by a *carriage return* removes the bookmark from the current page. Otherwise, a name should be typed followed by a *carriage return* in order to change the name of the bookmark. In all cases a message is displayed in the SIL and spoken, indicating the final result.



**Figure 7.** Bookmark Removal and Renaming Panel

## 6.3 Locating Bookmarks

Locating bookmarks is an important part of bookmark management. The second groove from the top is the bookmark locator groove. This groove acts as a bookmark holophrast containing all the bookmarks in the document. Moving the stylus or cursor within this groove will emit a beep when a bookmark is located. Clicking at this location will speak the name of the bookmark. Double clicking at this location will open the document to the page of this bookmark. There are as many bookmark slots as there are pages in the document. If a bookmark does not exist for a particular page no beep is emitted.

# 7 Horizontal and Vertical Scrolling

To correctly understand scrolling behavior one should imagine a window being moved in the direction of the stylus or mouse for the current document page. This is consistent with how document scrolling devices work in traditional graphical user interfaces.

The horizontal window scroll groove is the third horizontal groove from the top. Moving the stylus or mouse in this groove will scroll the window horizontally by the number of columns moved in the appropriate direction. A message indicating how many columns scrolled is displayed and spoken when the stylus is raised out of the groove. If we were only able to scroll part of the amount, a message indicating the partial amount scrolled is displayed and spoken. Since scrolling is cumulative, we can therefore scroll left and right and the page will be scrolled the net amount. If the net amount is zero, a message indicating there was no scroll is spoken and displayed in the SIL.

The vertical window scroll groove is the right most vertical groove on the display. All that applies to the horizontal scroll groove also applies to the vertical scroll groove, except we scroll in the upwards and downwards directions, indicating the number of lines actually scrolled.

## 8 Cursor Location

There are currently three *cursors* in TouchNTalk, the user cursor, the system cursor, and the mark. The user cursor appears at the current location of the stylus or mouse within the tactile document display or SIL. This cursor is for the benefit of the sighted user allowing him/her to see where in the tactile document display or SIL the visually impaired user is working.

The system cursor location is remembered by the system as its last marked working location. The system cursor will also be used as the location at which text entry will occur when an editing facility is in place.

The mark is used for remembering the previous system cursor location when the system cursor is moved to another location. The system cursor can be moved to the location of the user cursor by double clicking the stylus or mouse in the tactile document display. In addition, the mark is then moved to the old location of the system cursor. The mark therefore follows the system cursor as it is moved to new locations.

The vertical groove at the right side of the display closest to the tactile document display is the system cursor locator, and serves to locate the system cursor. Moving the stylus or cursor within this groove will emit a tone which increases in pitch as the distance to the line containing the system cursor also increases. When a tone is no longer generated, the stylus or mouse is adjacent the line containing the system cursor. If the tone cannot be silenced, then the system cursor is not currently visible. Clicking anywhere in the cursor locator groove will bring up the page with the system cursor centered in the display so that it is visible.

Once the line containing the system cursor has been located as described above, double clicking at the current location in the cursor locator groove places TouchNTalk into *cursor location mode*. The user may now locate the exact position of the system cursor by moving out of the cursor locator groove into the adjacent horizontal groove in the tactile document display. Since TouchNTalk is now in cursor location mode, moving along the horizontal groove in the tactile document display functions similar to the cursor locator groove. A tone is emitted, increasing in pitch as the distance to the column containing the system cursor also increases. When a tone is no longer generated, the stylus or mouse is in the exact location of the system cursor. Clicking the stylus swaps the system cursor and the mark, and is useful when the user wishes to locate the mark. Since only the system cursor can be located, swapping the system cursor and mark provides us with a consistent method for locating the mark. Lifting the stylus clear of the tablet, or moving into another groove while in cursor location mode, returns TouchNTalk into normal browsing mode.

## 9 Tactile Document Display

The tactile document display includes all horizontal grooves below the topmost 3 lines and above the bottommost line. The area covered by these grooves is the document viewing area. Moving the stylus or mouse in this area speaks the textual elements encountered according to the soft function speech mode previously discussed. Words, characters, and whitespace are

considered to be the basic textual elements.

When whitespace is encountered a beep is emitted. Single clicking repeats the last spoken textual element encountered, whether it is a word or whitespace. Double clicking moves the system cursor to the location of the stylus or mouse where the user cursor currently resides and a message indicating the new position of the system cursor is displayed and spoken. This does not apply when control documents such as selecting windows or opening documents are active since double clicking is then used to select the desired item.

## 10 System Interaction Line

The system interaction line (SIL) is the bottommost horizontal groove on the display. All system messages are sent to the SIL to be displayed and spoken. In addition, the SIL always contains the most recent system message. Moving the cursor or stylus in the SIL speaks the textual elements encountered in the same fashion as in the tactile document display area. The system messages spoken and sent to the SIL are at a slightly lower pitch than normal browsing speech to allow the user to distinguish between the two types of speech. Single clicking in the SIL repeats the last spoken textual element encountered, whether it is a word or whitespace. Double clicking in the SIL speaks its entire contents. Since there is no vertical or horizontal scrolling behavior for the SIL, double clicking is the only way to read all of the text if the last system message sent is sufficiently long as to be truncated at the end of the groove.

## 11 Document Publishing

Document publishing involves the process of breaking up ascii text document into various nodes which allows the document to be examined within TouchNTalk. There are currently two document publishing methods available. The first method is completely transparent to the user and occurs when the user opens any ascii text file from within TouchNTalk. The ascii text file is loaded and published for immediate browsing.

The second method is through the command line utility *publish*. This utility takes as arguments an optional line wrapping length specification, an optional tabstop specification, and the name of the ascii text file to publish. The utility generates a published version of the ascii text file and places the new file in the current directory under the same name as the original file with a *.tnt* extension appended. The line wrapping length specification allows the user to specify the maximum allowable line length in a document. This can be useful in cases where a document has running paragraphs or other characteristics that would normally make viewing difficult. The main reason for the optional tabstop specification is to allow the user to specify how tabs should be converted to spaces. This feature is necessary in order to simplify problems associated with accurate selection of textual elements within the tactile document display. If the user does not supply a tabstop specification, a common tabstop specification is used by default. The primary advantage in using the command line utility to pre-publish a set of ascii text files is a reduced load time for the resulting documents. This is especially true for extremely large ascii text files.

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