Display Text Editor (DTE)

A text editor has been written for use with the GLANCE G display terminals on TSS-516. This editor is designed to demonstrate various techniques for displaying and controlling text on a graphic terminal. It makes extensive use of the eight special buttons located just below the CRT display.

The following special terms will be used in the description of the editor:

OCTET   The OCTET is the set of eight special control buttons mounted immediately beneath the CRT on GLANCE.

OVERLAY   An OVERLAY represents a set of CRT labels for the OCTET and also all of the things that may be accomplished when the buttons are so labeled. Hence, an OVERLAY is a mode of operation. For convenience, certain OVERLAYs have been defined as minor, others as major; a minor OVERLAY is essentially a submode of a major OVERLAY. The reason for the major/minor distinction is to aid the exposition.

COMCON   The bottom line of text on the CRT contains the OCTET labels. The line just above the label line has been called the COMCON line. The COMCON line contains various communication and control information that may be helpful to the user.

BUFFER   THE BUFFER is a special file that contains the text currently being edited and various editor parameters.
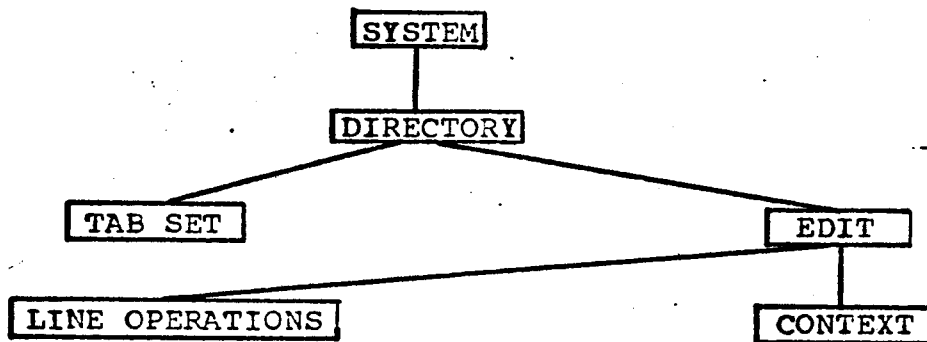
The file name for this buffer is ".DTEWB".

WINDOW   The WINDOW is the CRT area within which BUFFER text is displayed. The window is adjusted to the top of the screen, so there will be a gap between the WINDOW and the COMCON line. The WINDOW, COMCON line, and OCTET labels comprise the total screen area used by this editor.

OVERVIEW

The editor is structured by its major OVERLAYs, and the following description is also organized by major OVERLAYs. That structure may be represented as follows:

```
                        ┌────────┐
                        │ SYSTEM │
                        └────────┘
                             │
                      ┌───────────┐
                      │ DIRECTORY │
                      └───────────┘
                     ╱             ╲
            ┌─────────┐             ┌──────┐
            │ TAB SET │             │ EDIT │
            └─────────┘             └──────┘
                  ╲                      │
        ┌──────────────────┐        ┌─────────┐
        │ LINE OPERATIONS  │        │ CONTEXT │
        └──────────────────┘        └─────────┘
```

The user enters the editor from the SYSTEM level (SYS?) by typing DTE (CR). As shown above, he enters the DIRECTORY OVERLAY. This OVERLAY enables the user to read the contents of a file into the editor's BUFFER, write the BUFFER contents into a file, clear the BUFFER, and create or delete a file.

The user may select the TAB SET or EDIT OVERLAYs from the DIRECTORY OVERLAY. The TAB SET OVERLAY enables the user to clear and set tab stops in much the same manner as for a typewriter. The TAB SET OVERLAY also contains some WINDOW control functions which permit the user to change the viewing WINDOW size

and shape. Thus, the user may select a maximum WINDOW width of eighty (80) columns, which limits the number of WINDOW lines to not more than twenty-two (22); conversely, he may select a maximum WINDOW height of fifty (50) lines, which limits the WINDOW width to thirty-four (34) columns. Intermediate WINDOW shapes may be selected subject to a size constraint due to the display memory size; however, the WINDOW may be made smaller than maximum size, if desired.

The EDIT OVERLAY is the regular text editing mode. The user may enter characters from the keyboard to overwrite existing text or create new text. Most editing commands affect only the single character at the cursor location, although there are also a generalized line create and delete functions called BREAK and JOIN. Two other editing OVERLAYs may be called from EDIT: LINE OPERATIONS and CONTEXT.

The LINE OPERATIONS OVERLAY provides the ability to COPY, MOVE, or DELETE a block of lines. Thus, most of the apparatus in this OVERLAY is concerned with identifying a block of lines and the point to which it is to be moved.

The CONTEXT OVERLAY provides a context-editing capability so that the user may find a certain string of characters and, if desired, automatically replace it by another string. The context definition capability is slightly more elaborate than that provided by the "S" function in the "E" (teletype) editor, but it does not provide for the construction of "regular expressions" as in QED.

The assignment of control functions to the OCTET has been arranged so that the right-most button always "pops" control

back to the calling OVERLAY. Hence, if a malfunction causes the display to quit, and if pushing the keyboard BREAK button fails to restore the display, the user may escape to SYSTEM level by pushing this button one or more times. It should be noted that CONTROL C does not work in this program. The main "awkward" crash is a system error which puts control into the octal package with a messed-up display. If this happens, either X (CR) or CONTROL C should get the user back to SYSTEM level, but with a messed-up display, and then DTRSTR (CR) should clear up the display.

This editor is not designed to handle text that contains any ASCII control characters other than the CARRIAGE RETURN-LINE FEED pair at the end of each line. Thus, TAB and BACKSPACE are not allowed. When a file is read into the BUFFER, all control characters except LINE FEED are removed; when the BUFFER is written into a file, a CARRIAGE RETURN is inserted before each LINE FEED. In addition, all trailing blanks on each line are deleted. Any line which has been edited is truncated to eighty (80) characters maximum length (regardless of WINDOW width; that is a WINDOW narrower than eighty (80) columns truncates the display to WINDOW width but truncates the text to 80 columns). An attempt has been made to indicate lines longer that the WINDOW width by displaying a pound sign (#) at the end of each such line; unfortunately, implementation difficulties have so far made this feature unreliable.

Cursor control is somewhat hampered by the lack of a set of cursor control buttons. It would be desirable to have at least four special buttons (up - down - left - right) and perhaps

more. Due to this lack, horizontal cursor control has been assigned to the existing typewriter-like control buttons on the keyboard: CARRIAGE RETURN, BACKSPACE, SPACE BAR, and TAB. The only appropriately labeled button available for vertical motion is NEW LINE, so the cursor control set was expanded by using CONTROL K (up) and CONTROL L (down). One difficulty with using control characters on this particular keyboard is the fact that automatic REPEAT is controlled by a separate button; hence, it requires three fingers to REPEAT a CONTROL character.

The BUFFER (file .DTEWB) used by the editor is automatically created if the user does not have one. Because the BUFFER is a file, it survives most "crashes"; hence, the user is unlikely to lose much work in case of a failure. In addition to the text being edited, the BUFFER contains the following information:

Tab Stops

WINDOW size (columns and lines)

Name of latest file accessed in DIRECTORY OVERLAY

Context search and replacement text

The major OVERLAYs are described in more detail below.

DIRECTORY OVERLAY

In the DIRECTORY OVERLAY the WINDOW area is filled with the names of files in the user's directory. There is room for one hundred (100) names; if the directory exceeds this size, a warning comment will be display on the COMCON line. Each legal file name should consist of not more than fifteen (15) printing characters; the user will be unable to access files with illegal names.

The cursor in this OVERLAY is a fifteen-character box which may be used to select a file for one of the operations described below. Whenever this OVERLAY is entered, the cursor is placed over the last-remembered file name (if any). The user may move the cursor to another name by means of the following controls:

SPACE BAR   Move cursor right one name, if possible.

TAB   Move cursor to right-most name on this line.

BACK SPACE   Move cursor left one name, if possible.

CARRIAGE   Move cursor to left-most name on this line.
  RETURN

CONTROL K   Move cursor up one name, if possible.

CONTROL L   Move cursor down one name, if possible.

NEW LINE   Perform CARRIAGE RETURN then CONTROL L.

The OCTET labels and functions are as follows:

CREATE   Create a new file. Control passes to a minor OVERLAY which enables the user to enter the name of the new file on the COMCON line. The name is restricted to one to fifteen characters, each of which must be from the set of the alphabet (lower case is automatically converted to upper case), the ten digits, asterisk (*), and period (.). Control is effected by three OCTET buttons:

        ERASE   Clear name.

        BACK UP   Erase last character.

        OK   · Enter the name in the directory and create the file. However, if the name is null (0 characters), OK is just an escape back to DIRECTORY OVERLAY.

DELETE   Delete the selected file. Control passes to a minor OVERLAY with two OCTET buttons labeled YES and NO, thus giving the user a second chance.

WRITE   Write the contents of the BUFFER into the selected file, replacing the previous contents of that file. Control passes to a minor OVERLAY with three OCTET buttons labeled:

    WRITE   Write file but do not change BUFFER contents.

    WRT&CLR   Write file, then clear BUFFER of text.

    NO   Escape.

READ   Read contents of selected file into BUFFER. Control passes to a minor OVERLAY with three OCTET buttons:

    READ   Replace BUFFER contents.

    APPEND   Append file contents to end of BUFFER.

    NO   Escape.

CLEAR WB Clear BUFFER of text. Control passes to a minor OVERLAY with two OCTET buttons labeled YES and NO.

SET TABS Go to TAB SET OVERLAY.

EDIT   Go to EDIT OVERLAY.

DONE   Return to caller (SYSTEM).

TAB SET OVERLAY

This OVERLAY enables the user to set tab stops and WINDOW shape. The WINDOW area of the CRT is blank except for the cursor. The cursor may be moved around with keyboard control buttons, as in the DIRECTORY and EDIT OVERLAYs. See the list in the Overview (also listed in DIRECTORY section). The cursor line and column numbers are displayed on the COMCON line. The OCTET

functions are given below. The first four commands change the text WINDOW. At the completion of one of these WINDOW alterations, the cursor is placed at the lower right corner of the resulting WINDOW; hence, the WINDOW size can be directly read from the COMCON line.

SHORTER   Decrease WINDOW height by one line. WINDOW width is not affected.

TALLER   Increase WINDOW height by one line. WINDOW width may be reduced if necessary because of limited display memory size. Maximum WINDOW height is fifty (50) lines.

NARROWER   Decrease WINDOW width by two columns. Window height is not affected.

WIDER   Increase WINDOW width by two columns. WINDOW height may be reduced if necessary. Maximum WINDOW width is eighty (80) columns.

CLEAR TABS   Clear (reset) all tab stops.

RESET TAB   Clear tab stop at cursor column (if any).

SET TAB   Set tab stop at cursor column.

DONE   Return to DIRECTORY OVERLAY.

EDIT OVERLAY

EDIT is the main text editing OVERLAY. Normal editing is by replacement, that is, a printing character replaces the character currently at the cursor position, and the cursor is then moved one column right. Since the SPACE BAR has been preempted for cursor control, the DELETE button has been assigned to delete the character at the cursor.

The cursor is moved by the same set of buttons as mentioned in the Overview and also in the DIRECTORY description. One minor difference in operation is that the cursor is permitted to move one column right of the WINDOW or one line below the existing text. Text cannot be entered in the column to the right of the WINDOW, but if text is entered or other editing operations are performed on the line below the existing BUFFER text, a new line will automatically be appended to the BUFFER. Another difference in operation is that vertical cursor motion may be used to scroll the text; that is, if the user attempts to drive the cursor above or below the WINDOW, the text will be scrolled in such a manner that the cursor can reach the off-WINDOW line, if such a line exists. Finally, the cursor line number indicated on the COMCON line is relative to the text in the BUFFER, not the WINDOW.

The OCTET functions are described next:

STET   Restore the line on which the cursor rests to the state it was in before the cursor moved to it. This "undoes" any "recent" editing on that line.

REMOVE   Remove the character at the cursor and close up the gap.

INSERT   Push aside the text at the cursor and insert a space. The character at column 80 is lost.

JOIN   This is a generalized line deletion. The line fragment starting at the cursor is replace by the following line, and succeeding lines are moved up. If the combined line exceeds eighty (80) characters in length, characters beyond column 80 are lost. Notice that if

the cursor is placed at the left edge (column 1), the cursor line is simply deleted.

BREAK   This is a generalized line insertion. The part of the line starting at the cursor is moved to the start of the following line, and following text is pushed down to make room for it.

LINE OPS Go to LINE OPERATIONS OVERLAY.

CONTEXT   Go to CONTEXT editor OVERLAY.

CONTROL   Return to DIRECTORY OVERLAY.

LINE OPERATIONS OVERLAY

The LINE OPERATIONS OVERLAY provides the user with the abilities to copy, move, or delete a block of lines and to jump rapidly from one part of a long file to another part. In essence, the user defines a block of lines by its beginning and ending, indicates an insertion point, and then selects the desired editing function.

The cursor in this OVERLAY is a long horizontal bar which separates two lines of text. This cursor form was chosen because the line of text is the basic unit for editing in this mode. The cursor bar has a downward "hook" at the left margin to indicate that it is the number of the line below the cursor bar that is displayed on the COMCON line. Only vertical cursor control buttons on the keyboard are active in this OVERLAY:

CONTROL K   Move cursor up one line; scroll text
              if necessary.

CONTROL L   Move cursor down one line; scroll text if
              necessary.

NEW LINE   Same as CONTROL L.

          The initial OCTET OVERLAY has two functions: jump the cursor quickly through the BUFFER, and mark the block and insertion point for an edit function:

REV DIR[d] Reverse the direction of motion caused by the next

          three buttons. The current direction is specified by

          the "d" symbol in brackets, where

              d = "+" means forward motion,

              d = "-" means backward motion.

1 SCREEN   Move cursor and window forward or backward one

          screenful of lines (number of lines in window). If

          end of BUFFER is reached, reverse direction.

4 SCRNS   Move cursor and window forward or backward four

          screenfuls of lines. If end of BUFFER is reached,

          reverse direction.

END/BEGIN   Move cursor and window forward to end or backward to

          beginning of BUFFER and reverse direction.

B.O.B.   Mark the Beginning Of a Block of lines for an edit

          function. The cursor bar is placed immediately above

          the first line of the block, so that the line number

          is that of the first line of the block. The selected

          line number is written on the COMCON line following

          the label "BEGINNING OF BLOCK".

L.A.B.   Mark the Line After a Block of lines for an edit

          function. The cursor bar is placed immediately below

          the last line of the block, so that the line number

          belongs to the first line after the block. The

          selected line number is written on the COMCON line

following the label "LINE AFTER BLOCK".

INSERT   Mark the block insertion point (which is arbitrary if the func
          is to be DELETE). The cursor bar is placed between
          the two lines where the block is to be inserted, so
          the line number belongs to the line just below the
          insertion point. The selected line number is written
          on the COMCON line following the label "INSERT BLOCK
          BEFORE".

EDIT   Return to EDIT OVERLAY.

          The B.O.B., L.A.B., and INSERT markers may be selected
in any order and reselected, if desired, to move a previously
selected marker elsewhere. Furthermore, the program will prevent
an illegal selection, such as L.A.B. not below B.O.B. or INSERT
within the block. Once all three markers have been selected, the
following minor OVERLAY of the OCTET is called (all other buttons
are then ignored):

DELETE   Deleted all lines within the selected block. (The
          INSERT marker is ignored.)

MOVE   Move the selected block to the insertion point; delete
          the original copy of the block.

COPY   Copy the selected block to the insertion point; do not
          disturb the original block.

ESCAPE   Return to the major OVERLAY without disturbing the
          text.

In any case, after execution of any one of the above four func-
tions, control returns automatically to the major OVERLAY and the
three markers are cleared.

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CONTEXT OVERLAY

The CONTEXT OVERLAY enables the user to search for a particular text string and also to automatically replace each matched string with another string. The context and replacement strings are displayed on the COMCON line in the following format:

context || replacement ||

That is, the context string used for a search is contained between the start of the COMCON line and the first ||; the replacement string is contained between the two ||'s. These strings may contain the normal printing characters, spaces, and the following special control characters:

⊣ Match the beginning of a line. If this character is used at all, it must be the first character of the context string.

⊢ Match the end of a line. If this character is used at all, it must be the last character of the context string.

■ Match any character. This omni-match character may be used in the context string but not in the replacement string.

⁚ Repeat the previous character any number of times, including zero. If a match is made, it will contain the fewest possible repetitions of the previous character. This indefinite repeat character is only used in the context string, where it must be preceded by a regular printing character, space, or ■.

◇ Insert the matched text. This character may only be used in the replacement string, where it causes the particular matched text to be inserted during a replacement operation.

Notice that context cannot be matched across line boundaries.

Furthermore, no line of text has trailing blanks; the end of line (matched by ⊢) immediately follows the last nonblank character. Upper and lower case characters always match. Replacement is aborted if the resulting line would contain more than eighty (80) characters. If a replacement results in a line having trailing blanks, the trailing blanks are removed.

The CONTEXT OVERLAY responds only to the following OCTET buttons:

TOP Move cursor to the top (first character of first line) of the BUFFER.

FIND Scan forward from the current cursor position to the first context match. The cursor is placed at the start of this match. Consecutive pushes of FIND cause the cursor to advance one character before the search begins; otherwise, the cursor work "stick" at the last match.

REPLACE Replace matched text that starts at the current cursor position. If text starting at the current cursor position does not match, then there is no replacement. After replacement, the cursor is positioned to the first character following the replacement text.

FIRST Replace the first instance of matched text on each line within the BUFFER.

ALL Replace each instance of matched text within the BUFFER, from top to bottom.

ALTER Go to a minor OVERLAY that enables the user to edit the context and replacement strings.

EDIT Return to EDIT OVERLAY.

The ALTER minor OVERLAY places the cursor on the COMCON line and enables the user to type new text into the context and replacement strings. Certain mistakes are automatically prevented, such as deleting a separator (||), but the user should be careful to avoid logical errors.

As in EDIT OVERLAY, a printing character replaces the character at the cursor, unless the latter character is ||, in which case, if the COMCON line contains fewer than eighty (80) characters, the text from the cursor to the right is moved right one column and the new character is inserted at the cursor. The DELETE button is used to delete a character (replace it with a space). The special context control characters available on the OCTET (see below) are treated just like printing characters during editing.

The cursor is controlled by the following keyboard buttons:

SPACE BAR   Move cursor right one column unless it is over the right-most ||.

TAB   Move cursor right to next ||, if any.

BACKSPACE   Move cursor left one column unless it is over the first character of the line.

CARRIAGE RETURN   Move cursor to first character of the line.

The OCTET buttons cause the following actions:

REMOVE   Remove character at cursor and close up gap, unless character is ||.

INSERT   Insert space at cursor and push text apart one column, unless the COMCON line contains eighty (80) characters.

TEXT ◇   Type "◇" (matched text) at cursor.

BEGIN ⊣   Type "⊣" (beginning of line) at cursor.

END ⊢   Type "⊢" (end of line) at cursor.

ANY ■   Type "■" (match any character) at cursor.

REPEAT ::   Type "::" (indefinite repeat) at cursor.

DONE   Return to CONTEXT major OVERLAY.

Happy editing! The author would like to hear users' comments, even though the probability of making additions or changes is small.