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Raskin et al.

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[54] COMPUTER DISPLAY WITH TWO PART CURSOR FOR INDICATING LOCI OF OPERATION

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[22] Filed: Dec. 2, 1986

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 902,339, Aug. 29, 1986, abandoned.

[51] Int. Cl.⁴ G09G 3/02; G06F 3/14

[52] U.S. Cl. 340/709; 364/521; 364/900

[58] Field of Search ... 364/200 MS File, 900 MS File, 364/146, 171, 188-190, 521; 340/709, 710, 723, 724; 400/83

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Primary Examiner—Raulfe B. Zache

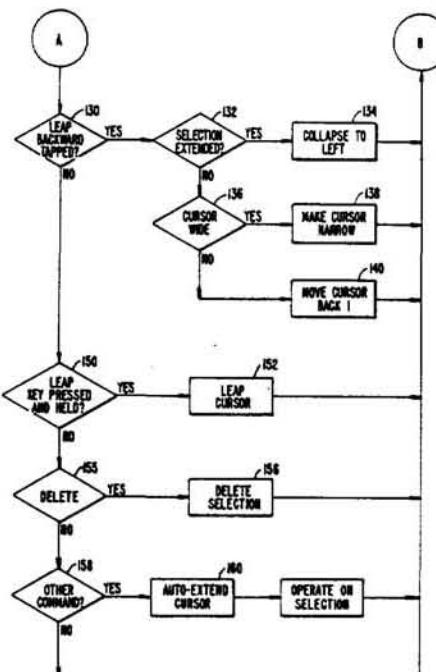
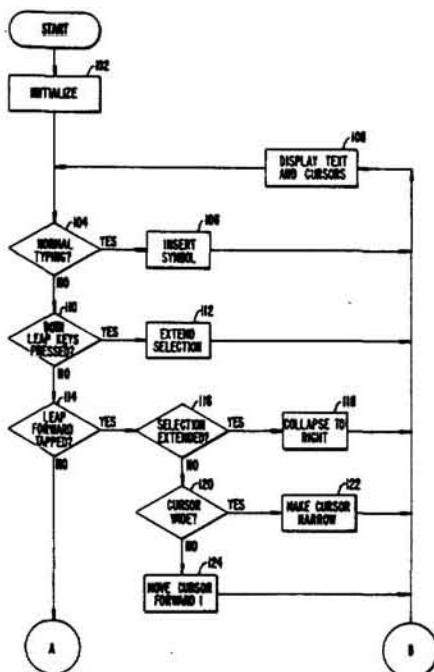
Assistant Examiner—Florin Munteanu

Attorney, Agent, or Firm—Townsend and Townsend

[57] ABSTRACT

A system for creating and modifying strings of symbols in a computer storage apparatus includes a two-part cursor for guiding the operator. One cursor part indicates the exact location where entered symbols will be inserted. A second cursor part highlights a selected substring which is the object of certain commands, such as the delete command. Internally, the system provides memory management techniques for inserting and deleting symbols in response to operator commands. The display, including the two-part cursor, is derived from the memory contents with the aid of pointers, tables, and state variables.

9 Claims, 8 Drawing Sheets



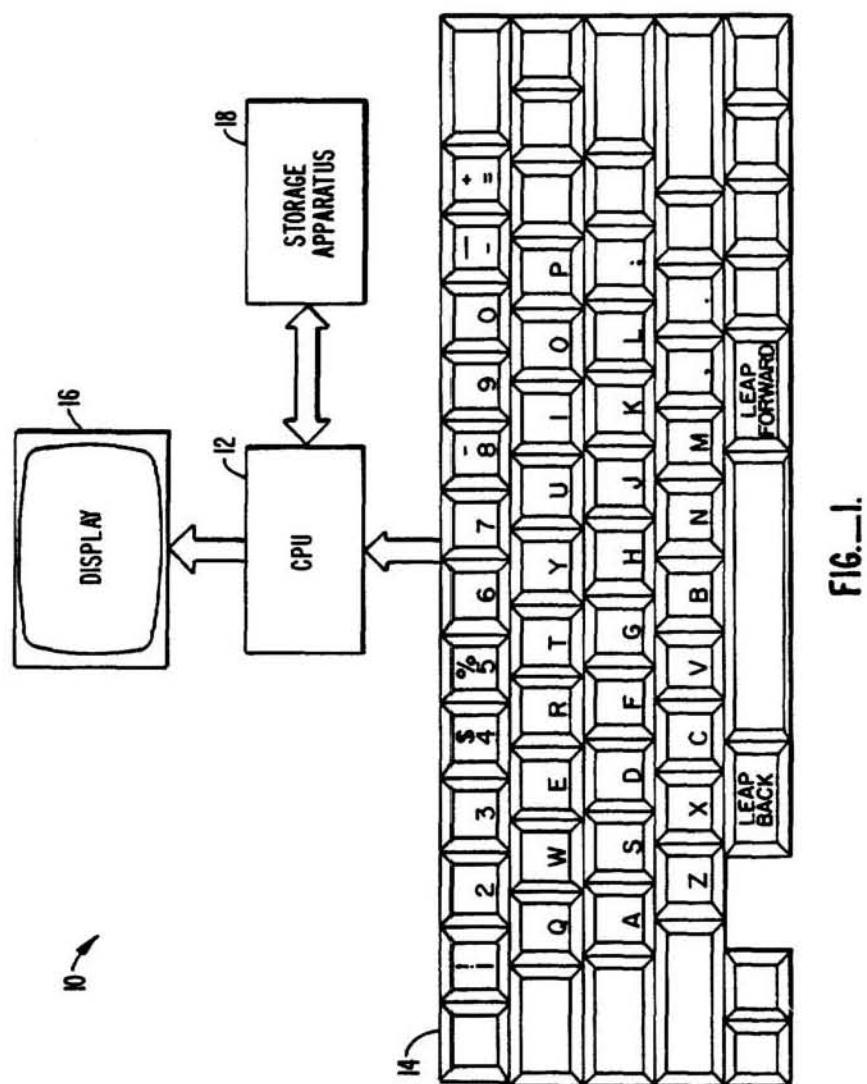


FIG.—1.

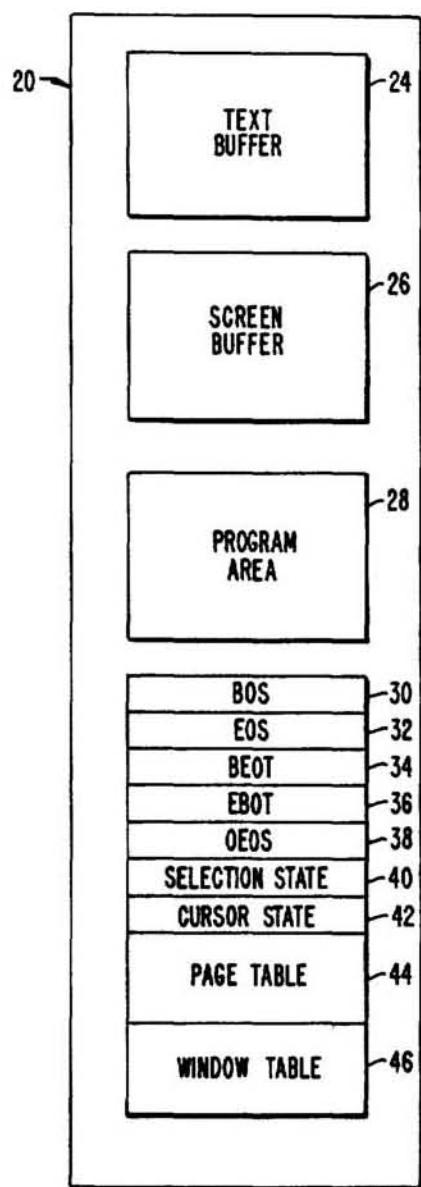


FIG. 2.

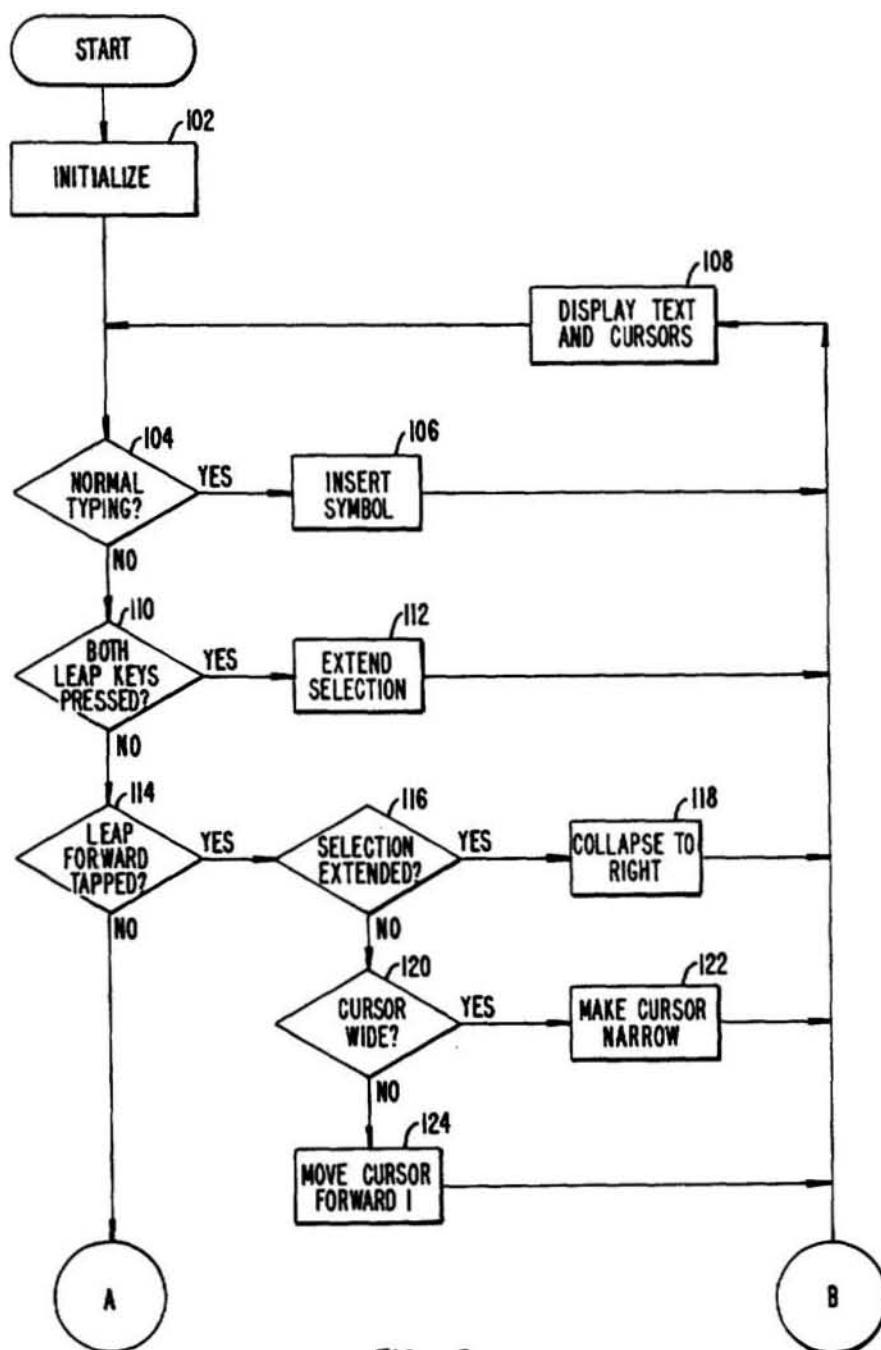


FIG. 3a.

| |
|----------|
| FIG. 3a. |
| FIG. 3b. |

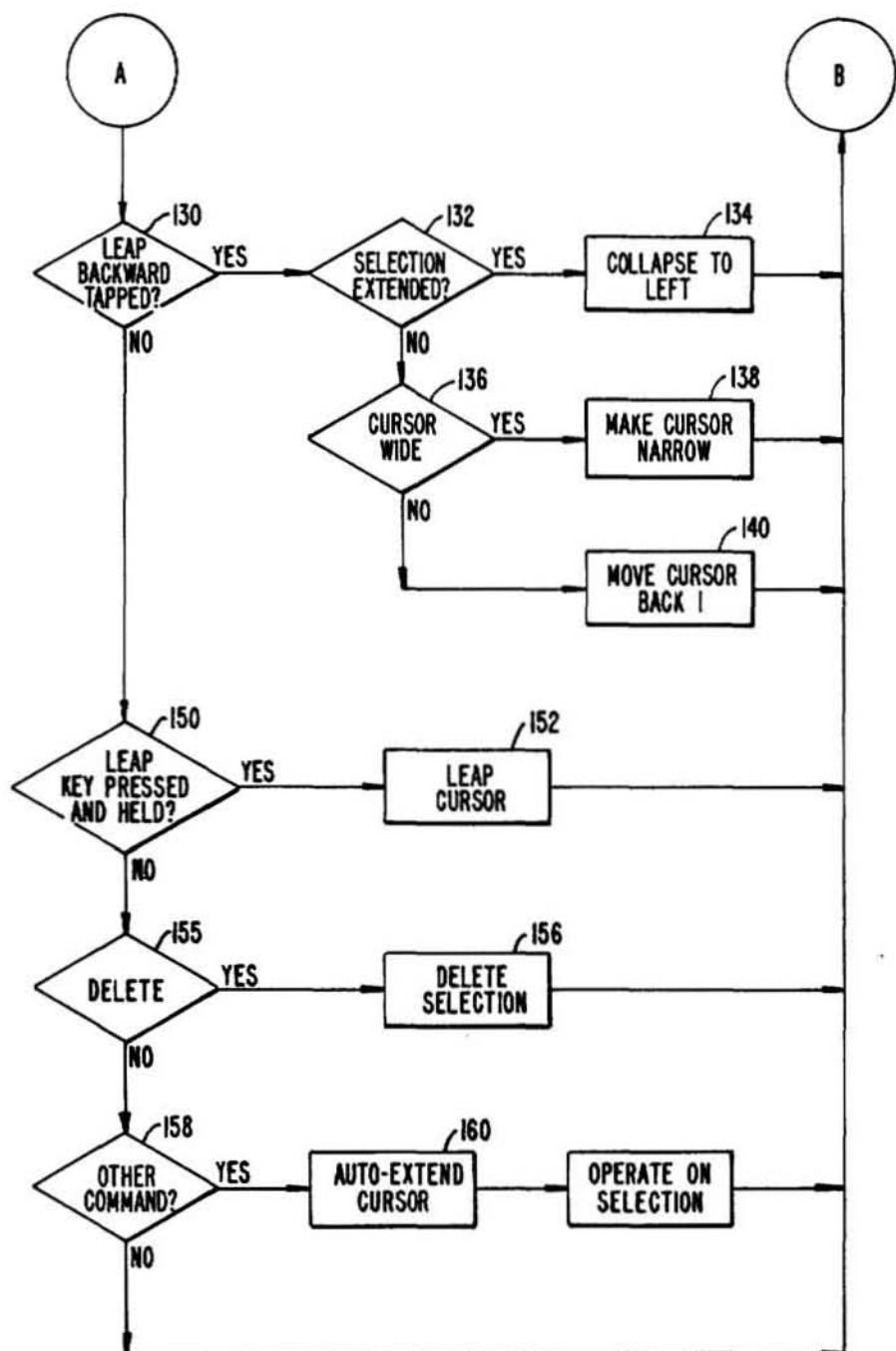
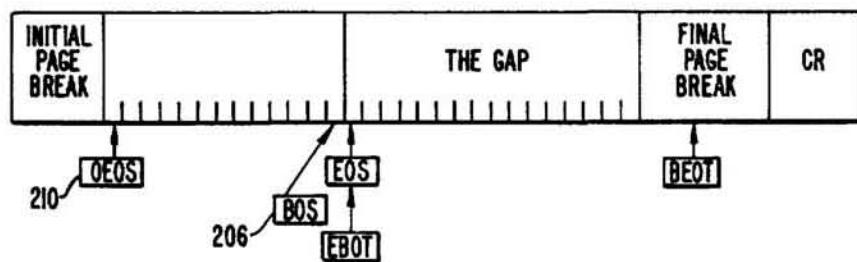
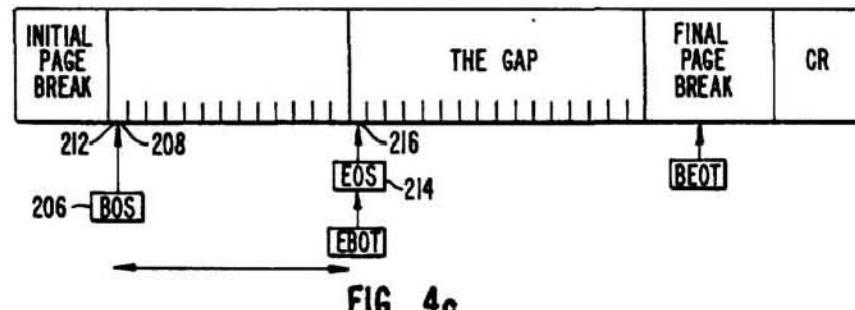
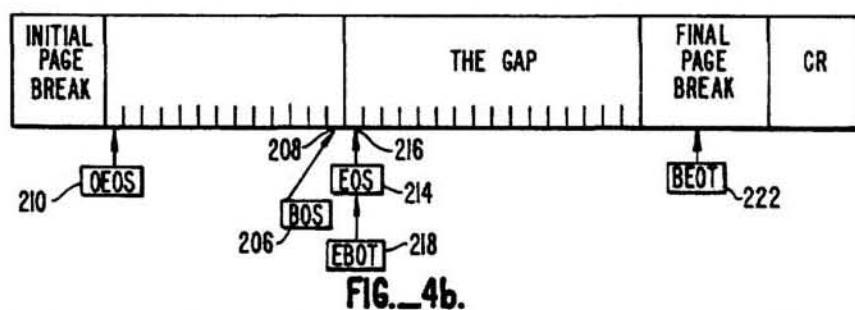
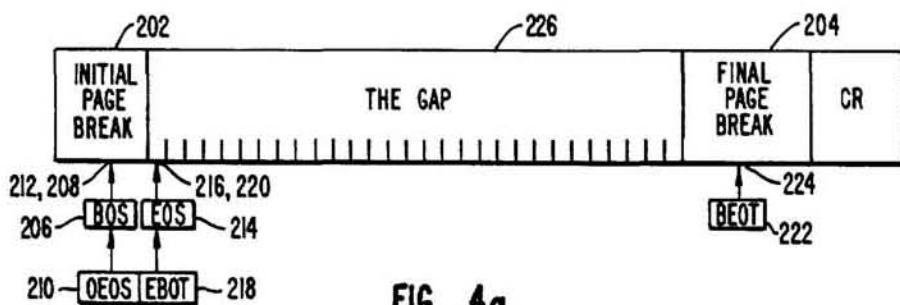


FIG.—3b.



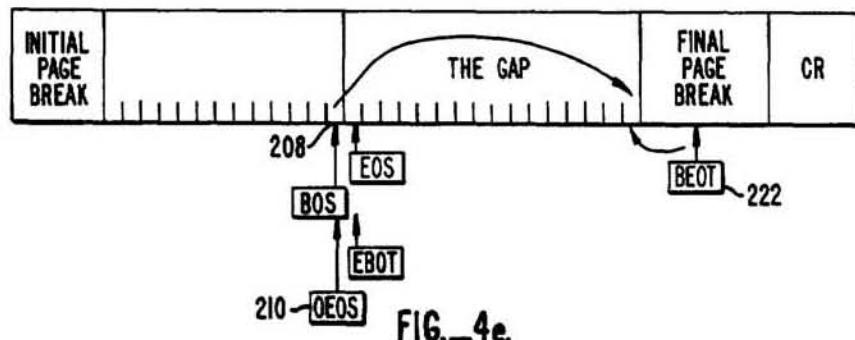


FIG._4e.

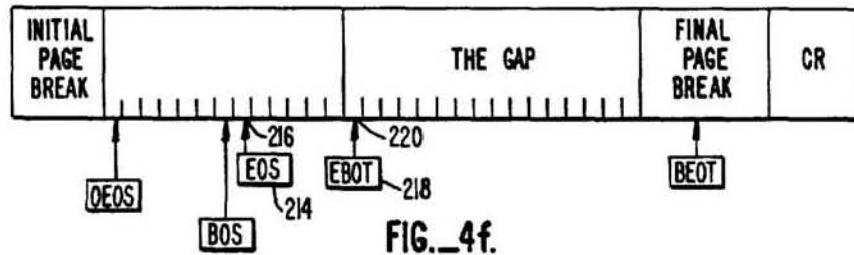


FIG._4f.

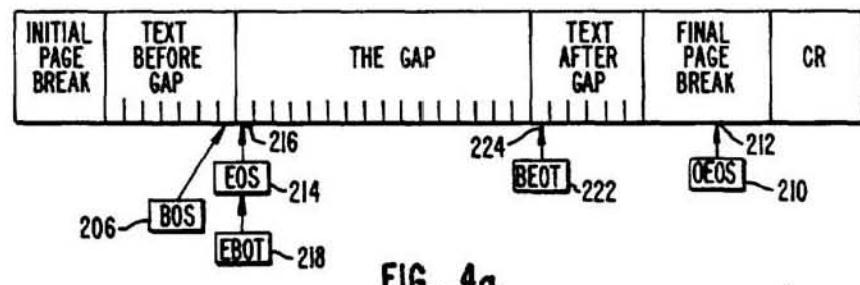


FIG._4g.

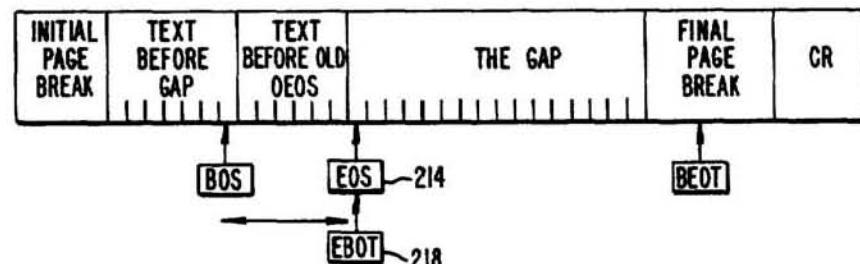


FIG._4h.

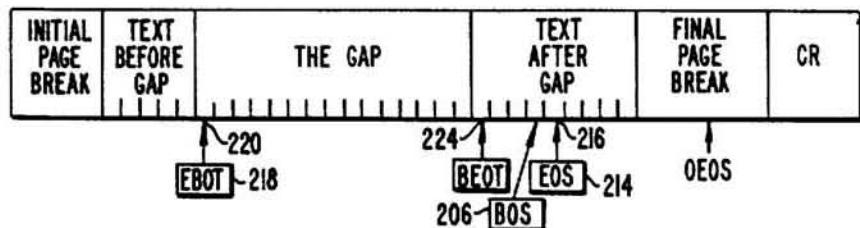


FIG. 4i.

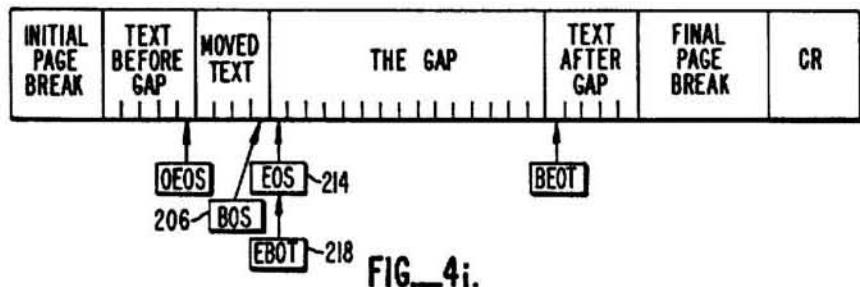


FIG. 4j.

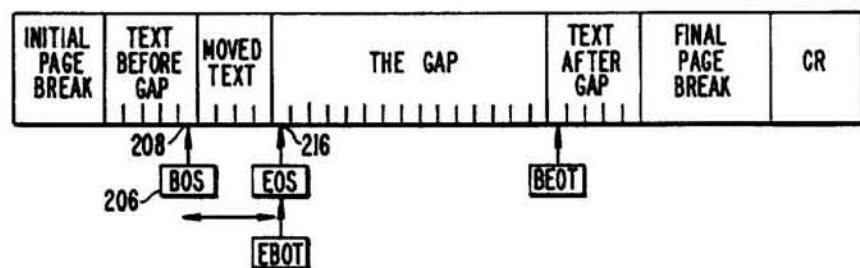


FIG. 4k.

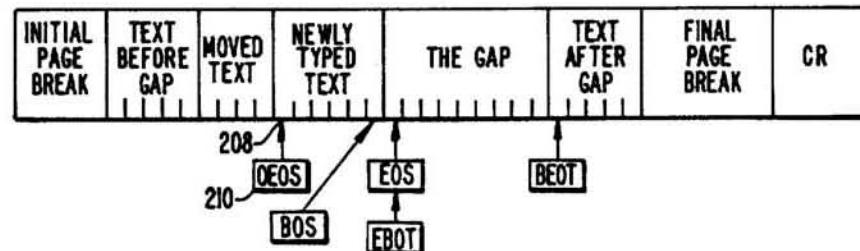


FIG. 4l.

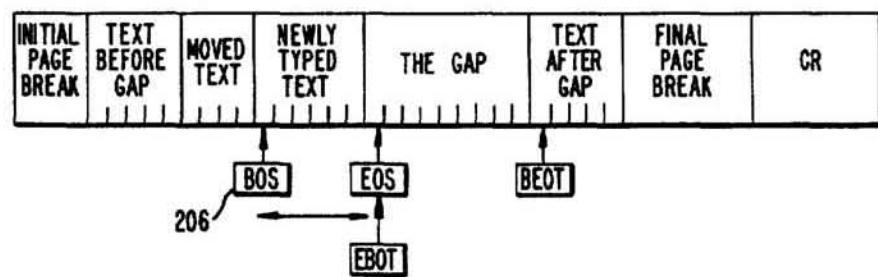


FIG._4m.

COMPUTER DISPLAY WITH AUTO-PART CURSOR FOR INDICATING LOCI OF OPERATION

CROSS-REFERENCE TO RELATED APPLICATION

This is a continuation-in-part of U.S. patent application No. 902,339, filed Aug. 29, 1986, now abandoned.

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BACKGROUND OF THE INVENTION

This invention relates generally to a method and apparatus for creating and modifying a string of symbols in computer storage apparatus and, in particular, it relates to a method and apparatus which utilizes a two-part cursor for constantly indicating the effect of certain operations on a string of symbols stored in a computer.

In certain computer applications, such as word processing, an operator enters selected symbols, such as, for example, alphanumeric characters, via a keyboard (or other entry means). The entered symbols are stored in the storage apparatus of the computer system where they become part of a string of symbols. The stored string of symbols defines a document which, through the inclusion of special page break and carriage return symbols, may be subdivided into pages and lines of text. All or part of the stored string of symbols is displayed on a display device as additional symbols are entered and stored. To aid the operator, a cursor is usually displayed to indicate the position in the string where the next entered symbol will be inserted.

In prior art systems the cursor sits on a particular character (typically as: (i) a flashing block surrounding or, (ii) an underline beneath or, (iii) a vertical bar to the right or left of the character being pointed to.). The function of the cursor is to indicate a locus or site where a user action, such as inserting or deleting characters, will take place. However, in certain computer applications, such as word processing, there are usually two such loci, namely (i) that character that will be replaced or displaced when a new character is typed and (ii) that character that will be erased when the backspace or delete key is typed. They are not, in general, the same character. This is based on mimicking the operation of a typewriter.

In prior art systems the user has had to remember a rule such as: the insertion will be to the right of the cursor and deleting will be to the left. Neophytes find having to learn such a rule confusing. Even experienced user have trouble remembering to whence the cursor should be moved in order to insert or delete a character into the midst of text. For example, to remove the letter "x" from "anxd" in most examples of prior art systems, the user has to remember to move the cursor not to the "x", but to the "d;" but on some systems the user would have to remember to move the cursor to the "n". On a very few systems the user would be able to do the obvious and move the cursor to the "x" but on those systems

the user has to aim "one off" for insertion rather than deletion so there is no overall benefit.

SUMMARY OF THE INVENTION

5 The method and apparatus of this invention provide a two-part cursor display which aids an operator in the creation and modification of a string of symbols. The two-part cursor serves to make explicit the exact loci of action of insert and delete operations. A first cursor part 10 (herein called the "blinker," which is differentiated from the highlight by flashing or through some other visual distinction) marks that position in the string where a newly typed or inserted symbol (or symbols in the case of the insertion of a number of symbols simultaneously) will appear. A second cursor part (herein called the "highlight") marks a symbol (or symbols) that will be the object of certain operations, and particularly of the delete operation.

15 This relieves the operator from having to remember the confusing rules normally associated with the loci of action for cursor operation.

20 In a preferred embodiment, when the two-part cursor is moved to a particular character, either by a command, or via some device such as a joystick or mouse, or by some other method, the two parts both visually and functionally can "coalesce" onto a single character which then can either be deleted or can indicate the site where further characters will be inserted. Thus, to use our former example, to delete the "x" from "anxd" with the two-part cursor the user has to move the cursor to the obvious position, namely the "x". But because both parts of the two-part cursor coalesced when the cursor was moved, the user can also insert a character at that location. That is, on neither insertion nor deletion does the user have to move the cursor to a character that is "one off" from the desired location. The operator is able to concentrate on entering and deleting the desired symbols to create a stored string of symbols.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a block diagram of an embodiment of a computing system for practicing the invention.

FIG. 2 is a block diagram illustrating the contents of the storage apparatus of the embodiment of FIG. 1.

FIG. 3 is composite of FIGS. 3a and 3b which show a flow chart of the method of the preferred embodiment.

FIGS. 4(a)-4(m) illustrate the contents of the text buffer of FIG. 2 during the operations shown in FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a block diagram illustrating one embodiment of a computer system for practicing the invention. The system 10 includes a central processing unit (CPU) 12 coupled to a keyboard 14, a display unit 16, and storage apparatus 18. Storage apparatus 18 may include external memory (such as a disk subsystem) as well as internal memory. Keyboard 14 is adapted for transmitting various distinguishable types of signals to CPU 12 by means well-known in the art. For example, keyboard 14 includes standard alphanumeric symbol keys for normal typing. Activation of one of these keys causes the transmission to CPU 12 of signals coded by standard means (such as ASCII) to unambiguously identify a particular symbol. Keyboard 14 also includes two special "leap" keys at opposite ends of the space bar. One

leap key is designated the leap backward key; the other is designated the leap forward key. These keys are connected to the CPU in such a way that the states in which either may be at any time (up or down) may be detected independently of the states of the other keys on the keyboard. The signals transmitted by activation (depression) of the leap keys can be differentiated to determine whether either key or both keys are activated, and for how long.

FIG. 2 is a block diagram illustrating the general organization of the internal memory 20 of storage apparatus 18. It will be understood that the precise storage location of the contents of the illustrated memory contents may vary over time, depending on the operation of the particular computer. Some or all of the contents may be "swapped" to and from an external storage device and/or may occupy different locations in internal memory at different times. For purposes of the invention, it is only important that the memory locations of the contents of these blocks are addressable by CPU 12 at any particular time.

Referring now to FIG. 2, the contents of memory 20 include a text buffer 24 for storing a string of encoded symbols, a screen buffer 26 for storing encoded symbols for display on the display device, and program area 28 for storing all or part of an applications program. In this embodiment, the method of the invention is implemented by the execution (by the CPU) of application program instructions which control the contents of text buffer 24 and screen buffer 26. The application program uses certain other addressable memory locations, including at least five pointers 30, 32, 34, 36, 38, two state variables 40, 42, and two tables 44, 46, the function and contents of each of which will be described below.

The preferred embodiment of the method of this invention will now be described in terms of the operation of the application program on text buffer 24 and screen buffer 26, in response to signals from keyboard 14. The contents of screen buffer 26 are displayed on the display device in a manner directly corresponding to the organization of the screen buffer. References to the displaying of symbols will therefore be understood to mean moving symbols to appropriate locations in the screen buffer.

FIGS. 3a and 3b show a flow chart illustrating a preferred embodiment of the method of this invention. FIGS. 4a-4f conceptually illustrate the contents of text buffer 24 after the operations shown in FIGS. 3a and 3b.

Referring to FIG. 3a, the method begins at block 102 by initializing the system. As shown in FIG. 4a, the text buffer is initialized by inserting a one byte initial page break indicator 202 at the beginning (low-address) part of the text buffer and a one byte final page break indicator 204 at the end of the text buffer. Page breaks serve to divide the text buffer into pages of symbols; no symbols are stored before the initial page break or after the final page break.

Five pointers are shown conceptually in FIGS. 4a-4m. These pointers are implemented by storing text buffer addresses in pointer storage locations 30, 32, 34, 36, 38 (FIG. 2) in memory 20. Referring to FIG. 4(a), the pointers are shown after initialization. A BOS (beginning of selection) pointer 206 points to BOS location 208, and an EOS (old end of selection) pointer 210 points to EOS location 212. BOS pointer 206 and EOS pointer 210 are both initialized to point to initial page break 202. An EOS (end-of-selection) pointer 214 points to EOS location 216 and an EBOT (end of begin-

ning of text) pointer 218 points to EBOT location 220. EOS pointer 214 and EBOT pointer 218 are initialized to point to the first storage location after initial page break 202. A BEOT (beginning of end of text) pointer 222 points to BEOT location 224 and is initialized to point to the final page break 204.

The region 226 of the text buffer beginning at EOS 216 and ending at the last symbol storage location before BEOT 222 is called the Gap. No active text is stored in the Gap; that is, the symbols which are stored in the Gap are not considered part of the string of symbols being constructed. The region from BOS 208 to EOS 216 is called the Selection. The Selection identifies a substring of symbol which, as will be seen, is used as the object to be operated on by certain commands.

At block 104 of FIG. 3a, a test is performed to determine whether the signals received from the keyboard represent normal typing. In this embodiment, normal typing means the activation of one of the alpha-numeric keys. If the signals from the keyboard indicate normal typing, the signals identify a specific symbol (for example, in ASCII) and the identified symbol is stored (block 106) in the text buffer. FIG. 4(b) shows the text buffer after several symbols have been stored. Each symbol is inserted in the text buffer at EOS 216, the first location in the Gap. After each symbol is stored at EOS, EOS pointer 214 is incremented by one symbol length to point to the next symbol storage location. In this embodiment, the symbol length is one byte, which is one addressable storage location; adjacent storage locations therefore have consecutive addresses.

In response to normal typing, EBOT pointer 218 is also incremented by one to point to the new first storage location in the Gap. After incrementing EOS pointer 214, BOS pointer 206 is assigned the address of the symbol storage location 208 preceding EOS.

When normal typing begins after initialization, OEOS pointer 210 is assigned the first value of BOS 208, and keeps this value as long as normal typing continues. This is the location of the first symbol entered.

The Selection is defined by the region from BOS 208 to EOS 216. During normal typing, the Selection therefore consists of the last symbol typed (no active symbol being stored at EOS).

On the display device of this embodiment, the symbols are displayed as they are entered from the keyboard and inserted in the text buffer. According to the invention, a two-part cursor is also displayed (block 108). The two parts of the cursor will be referred to as the blinker and the highlight.

The blinker indicates the position in the substring (corresponding to EOS) where the next typed symbol will be inserted. In some displays (e.g. bit-mapped) the blinker may appear between two symbols to indicate precisely where the insertion will take place; in other displays (e.g. character oriented) the blinker appears over a character (or page break symbol) and the left edge of the blinker indicates the insertion location. The embodiment described herein uses a character-oriented display.

The highlight indicates the Selection. The Selection is made obvious (and distinguished from the blinker) by reverse video, color, or other conventional techniques. During normal typing, the last symbol entered is highlighted and the blinker is on the next character or page break symbol.

At block 110 of the flow chart of FIG. 3a, the signals from the keyboard are tested to determine whether both

leap keys are depressed. In this embodiment, the system responds to this action by extending the Selection (block 112). The Selection is considered to be extended when it consists of more than one character. FIG. 4c illustrates the selection extension operation when it is performed after initialization and normal typing. BOS pointer 206 is moved to EOS location 212, by copying the address in EOS pointer 210 to BOS pointer 206. EOS pointer 210 becomes undefined. The Selection is thereby extended to the entire region from BOS 208 to EOS 216, to include all symbols entered since initialization. On the display, the part of the Selection which displayed is highlighted. (As will be seen below, the Selection extension operation always results in the selection of a well-defined, predictable substring; the selection of all symbols entered since initialization is limited to the present example, where only normal typing has been performed since initialization.) When the Selection is extended, one of the aforementioned state variables, Selection state variable 40, is set to indicate this fact.

Returning to the flow chart of FIG. 3, at block 114, the signals from the keyboard are tested to determine whether the leap forward key is tapped. The system responds to this signal in different ways, depending on the state of the two-part cursor. At block 116, the system tests the Selection state variable 40 to determine whether the Selection is presently extended. If it is, then at block 118 the Selection is "collapsed", i.e., restored to an unextended condition, wherein the Selection is one symbol. In this case, the Selection is collapsed (FIG. 4d) to the right end of the Selection by moving BOS pointer 206 to the last location before the Gap (by assigning the address EOS-1 to BOS pointer 206). EOS pointer 210 saves the old value of BOS.

If the Selection is not extended when the leap forward key is tapped, then, at block 120, a test is made to determine whether the cursor is "wide." The two-part cursor of this invention is referred to as wide when the blinker follows the highlight by one character or symbol on the display (i.e., when the insertion location indicated by the left edge of the blinker immediately follows the highlighted character). The cursor is referred to as narrow when the blinker and the highlight are on the same character or symbol on the display (i.e., when the insertion location indicated by the left edge of the blinker immediately precedes the highlight). The second state variable, cursor state variable 42, is maintained to indicate a wide or narrow cursor.

If the Selection is not extended, and the cursor is wide when the leap forward key is tapped, then the cursor is made narrow (block 122) by moving the Selection and highlight forward one character and modifying cursor state variable 42. In the text buffer, if there is a symbol stored at BEOT 224 (other than the final page break symbol), this symbol is moved to EOS 216, and EOS pointer 214, EBOT pointer 218, BOS pointer 206, and BEOT pointer 222 are all incremented by one.

When the cursor is narrow, the blinker is displayed over the symbol stored at BOS to indicate that insertions will be made before this symbol. When the cursor is not narrow, the blinker is displayed over the symbol, if any, stored at BEOT.

The effect of normal typing when the cursor is narrow is shown in FIG. 4(e). BEOT pointer 222 is decremented by one, the symbol stored at BOS 208 is moved to new BEOT 224, and the typed symbol is inserted at BOS 208. EOS pointer 210 saves the value of BOS

location 208. The cursor is changed to wide and the cursor state variable is updated.

If the leap forward key is tapped and the Selection is not extended and the cursor is already narrow, than, at block 124, the narrow cursor is moved forward one symbol (unless it is already on the final page break). In the text buffer, if there is a symbol stored at BEOT 224, it is moved to EOS 216, and EOS pointer 218, BOS pointer 206, and BEOT pointer 222 are all incremented by one.

Referring to FIG. 3b, if the signals from the keyboard indicate that the leap backward key is tapped (tested at block 130), the Selection state variable is tested (at block 132) to determine whether the Selection is extended. If it is, then at block 134 the Selection is collapsed to the beginning of the Selection. In the text buffer, all symbols stored from BOS+1 to EOS are moved to the new BEOT, effectively moving the Gap. The new BEOT address is calculated as: BEOT=old BEOT-(EBOT-EOS). EOS pointer 214 and EBOT pointer 218 are then modified to point to the location BOS+1, making it the first location of the Gap. The cursor is made narrow and the blinker is at the symbol stored on BOS.

If the Selection is not extended when the leap backward key is tapped, the cursor state variable is tested at block 136 to determine whether the cursor is wide. If the cursor is wide, it is made narrow at block 138 by modifying the second state variable, causing the blinker to be moved to the symbol stored at BOS, effectively moving the blinker over the highlighted Selection.

If the leap backward key is tapped and the Selection is not extended and the cursor is narrow, then, at block 140, the narrow cursor is moved back one character (unless it is already on the initial page break). Any symbol stored at BOS is moved to after the Gap, and BOS pointer 206, EOS pointer 214, EBOT pointer 218 and BEOT pointer 222 are all decremented by one.

If the narrow cursor is on the initial page break after it is collapsed to the beginning of the Selection, it is changed to a wide cursor, because no symbols can be inserted before the initial page break.

If the signals from the keyboard indicate that either leap key is pressed and held (block 150), this is interpreted as a request to move the two-part cursor to a specific location. The move may be a content-based move in which the user specifies a substring in the text buffer (and possibly not on the display). The substring is located and displayed with a narrow cursor on the first symbol of the substring. A content-based cursor moving function ("leaping") is explained in detail in co-pending U.S. patent application serial No. 605,448, assigned to the assignee of the present application, the disclosure of which is hereby incorporated by reference. While the method of moving the cursor described therein is used in the preferred embodiment of the present invention, it will be understood that other conventional methods, such as cursor control keys, joy sticks, or "find" commands could be used with the present invention.

FIG. 4(f) shows the text buffer during a leap backwards, where the text buffer before the leap is as shown in FIG. 4(d). BOS pointer 206 points to the location leaped to, EOS pointer 214 points to the next location, and EBOT pointer 218 temporarily stays at the previous EOS location at the beginning of the Gap. The other pointers are not moved. FIG. 4(g) shows the text buffer and pointers after the leap operation is completed. All active text from new EOS 216 to old EBOT 220 is

moved to new BEOT 224, effectively moving the Gap up to the new EOS. EBOT pointer 218 is then set to the new EOS address 216, OEOS pointer 210 is set to the old value of BEOT, and BEOT pointer 222 is set to the new start of text after the Gap. The new BEOT address is calculated as BEOT=old BEOT-(old EBOT-new EOS). After leaping, the cursor state variable is set to narrow and the blinker is on the symbol stored at BOS.

In an alternative embodiment, a "dragging" feature is provided. If the Selection is extended when the cursor movement (leap) function is invoked, the Selection is "dragged" to the target location and inserted there.

A second example of extending the Selection will now illustrate the effect of this operation when it is invoked immediately after a leap. The extension operation will result in the Selection being extended to the region bounded by the highlight before the leap and the highlight after the leap. FIG. 4(h) shows the effect of the extension operation when it is performed after the backward leap which results in the text buffer of 4(g). The symbols from BEOT to OEOS-1 are moved to EOS 216, effectively moving the Gap to where it was in FIG. 4(f). EOS pointer 214 and EBOT pointer 218 are updated to point to the start of the new Gap. BEOT pointer 224 is assigned the value of OEOS. The Selection extends from BOS to EOS and the blinker is at the character stored at BEOT.

FIG. 4(i) shows the text buffer during the leap forward operation. BOS pointer 206 points to the target location of the leap and EOS pointer 214 points to the next location. EBOT pointer 218 temporarily saves the old value of EOS. FIG. 4(j) shows the text buffer after completion of the leap forward. The symbols from old BEOT 224 to new BOS 206 are moved to the Gap at old EBOT 220; new EBOT pointer 218 and EOS pointer 214 are then set to: old EBOT+(new EOS-old BEOT). BOS pointer 206 is set to EOS minus 1 and OEOS pointer 210 is set to the old value of EBOT minus 1. It is seen that OEOS pointer 210 maintains the address of the location which was highlighted before the leap. The cursor is narrow and the blinker is at BOS.

If the Selection is now extended after the leap forward, the text buffer is as shown in 4(k). BOS pointer 206 is assigned the value of OEOS. The Selection extends from BOS 208 to EOS 216.

As illustrated in these examples of selection extension, if OEOS is greater than BOS, then the BEOT pointer is moved to OEOS, and the EOS pointer is moved to the beginning of the new Gap (after accounting for text moves). If OEOS is less than BOS, then the BOS pointer is moved to OEOS. Extending the Selection immediately after a leap results in the Selection being bounded by the Selection before the leap and the Selection after the leap. Extending the Selection after normal typing results in a Selection consisting of all symbols typed since the last leap.

FIG. 4(l) shows the text buffer and pointers when normal typing follows the leap operation shown in FIG. 4(j). The cursor is always narrow after a leap. When typing begins, the first symbol is entered at BOS 208 (because the cursor is narrow) and OEOS pointer 210 saves the value of BOS 208. If both leap keys are pressed, the Selection is extended by assigning the value of OEOS to BOS pointer 206, resulting in the extended Selection shown in FIG. 4(m), wherein all symbols entered since the last leap are selected.

The Selection may advantageously be used as the object for certain commands, such as print requests and

delete requests. Referring to FIG. 3b, if the signals from the keyboard indicate a delete request (block 155) then the Selection is deleted. The delete operation (block 156) works as follows: When the cursor is wide, and the Selection is not extended, BOS pointer 206, EBOT pointer 218, and EOS pointer 214 are all decremented by one, effectively deleting the highlighted symbol by moving the Gap. If the Selection is extended, EOS pointer 214 and EBOT pointer 218 are assigned the address of BOS 208 and BOS pointer 206 is assigned the address of EOS-1. When the cursor is narrow, the symbol stored at BEOT 224 is moved to BOS 208, and BEOT pointer 222 is incremented by one. It will be noted that, when the cursor is wide (as it is during normal typing), successive deletions work to the left; when the cursor is narrow (as it is after it is moved, or leaped), successive deletions proceed to the right. This is consistent with the usual intentions of the operator.

Other commands that can operate on the Selection include "CALC" and "SEND." The "CALC" command takes the Selection and executes it as a program. It may, for example, send the Selection to the system's BASIC interpreter, where the program is interpreted and executed. The output of the program is then inserted at the gap and the Selection is deleted. The "SEND" command invokes telecommunications features and transmits the Selection to a remote location, such as another computer. A "RECEIVE" function may also be provided, with a message being received via telecommunications and inserted either at EOS (if there has not been any typing since the last leap) or OEOS (if there has been typing since the last leap).

In the preferred embodiment, certain commands which operate on the Selection (block 158) will automatically extend the Selection (block 160) if they are invoked when the Selection is not extended. For example, if the print command is received and the Selection is unextended, the system assumes that the user does not intend to print only one symbol. The system therefore extends the Selection in the same manner it would if both leap keys were pressed, and then it prints the extended Selection. Other commands, such as delete, do not cause automatic extension.

The tables 44 and 46 (FIG. 2) will now be explained so that the display operation may be fully understood. Page table 42 contains one entry for each page of text. Each entry on page table 44 contains a pointer and a line number. The pointer contains an address in the text buffer of the start of each page of text. The line number is the line number of the start of that page, counting from the beginning of the text. Pages can start either because there are enough symbols to fill a page or because the user entered a page break signal. After a leap operation, the page table is recalculated from the text buffer so that all of the pointers refer to the start of each page. This is necessary because the Gap may have been moved by the leap operation. It is not necessary to actually recalculate all page table entries, but only to adjust the pointer values based on how far the Gap has moved. Normal typing can also require updating of the page table from the cursor's page to the final page.

Window table 46 consists of one entry for each line on the display. Each entry contains: a pointer to the text buffer at the location of the beginning of the line; the line number on the page; and the page number in the text.

The content-based leap operation can result in the blinker being moved to a part of text buffer which is not

yet displayed on the display. To display the leaped-to text, the page table is searched to find which page contains the EOS. The address value EOS is compared to the page pointers in the page table until a page pointer having an address greater than EOS is found, identifying the previous page as the page containing EOS. The end of the Selection (EOS) is to be displayed in the middle of the display. Assuming an embodiment with 24 lines per display screen, the page table is traversed backward until a page is located which at least 12 lines before EOS. The start of the 11 lines preceding the line with EOS, the start of the line with EOS, and the 12 lines after EOS are then located. The line start pointers,

line numbers, and page numbers of these 24 lines are stored in the window table. The display routine then moves these 24 lines of text to the screen buffer for display on the display screen. When BOS is encountered, all symbols from BOS to EOS are highlighted.

In the preferred embodiment, the method of this invention is performed on an Apple IIe computer operating under control of the FORTH program attached as Appendix 1 to this application.

The foregoing explanation of the preferred embodiment is intended to illustrate the invention rather than limit it. The scope of the invention may be ascertained from the appended claims.

APPENDIX 1

19

| | |
|--|--|
| 0 (DECOMPILER) HEX | 0 Decompiler for Lyon's Forth |
| 1 | 1 |
| 2 : .NAME 2+ NFA ID. : | 2 |
| 3 | 3 |
| 4 : .N (ADDR CFA -- FLAG) 2+ >R | 4 |
| 5 R ' BRANCH = R ' OBRANCH = OR | 5 |
| 6 R ' (+LOOP) = OR R ' (LOOP) = OR | 6 |
| 7 DUP IF CR ENDIF | 7 |
| 8 R ' LIT = 0= R ' CLIT = 0= AND | 8 |
| 9 IF R 2- .NAME ENDIF | 9 |
| 10 R ' LIT = OR | 10 |
| 11 IF 2+ DUP @ . 0 | 11 |
| 12 ELSE R ' CLIT = | 12 |
| 13 IF 2+ DUP C@ . 1- 0 | 13 |
| 14 ELSE R ' (.) = | 14 |
| 15 IF 2+ COUNT 2DUP TYPE + 2- 0 | 15 |
| 16 22 EMIT SPACE | 16 |
| 17 ELSE R ' ;S = | 17 |
| 18 ENDIF ENDIF ENDIF R> DROP ; | 18 |
| 19 | 19 |
| 20 : SEE [COMPILE] ' 2- | 20 |
| 21 BEGIN 2+ DUP @ .N | 21 |
| 22 UNTIL DROP CR ; | 22 |
| 23 | 23 |
| scr # 20 | |
| 0 (metacompiler load block) | 0 (metacompiler load block) |
| 1 | 1 |
| 2 FIRST B/BUF + 4 + DUP ' FIRST ! PREV ! | 2 FIRST B/BUF + 4 + DUP ' FIRST ! PREV ! |
| 3 | 3 |
| 4 DECIMAL 56 LOAD (printer aids) | 4 DECIMAL 56 LOAD (printer aids) |
| 5 (DECIMAL 57 58 THRU (listing stuff) | 5 (DECIMAL 57 58 THRU (listing stuff) |
| 6 1 PRINTING ! (begin printer) | 6 1 PRINTING ! (begin printer) |
| 7 DECIMAL 22 54 THRU (trans-compiler) | 7 DECIMAL 22 54 THRU (trans-compiler) |
| 8 DECIMAL 21 LOAD (Edde source) | 8 DECIMAL 21 LOAD (Edde source) |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

21
 0 (EDDE source load block) HEX
 1
 2 LPON? HERE OLDDP ! AIM DP ! (heading)
 3 CR ." There are " . ." tokens."
 4 CR CR OLDDP @ U. ." top of Lyon's"
 5 CR AIM U. ." beginning of bank 2" CR
 6 AIM 4000 0 FILL (clean compile space)
 7 0 NAMED ! (begin table on left)
 8
 9 DECIMAL 60 109 THRU
 10
 11 TKTABLE DUP 200 + DP ! ' AIM !
 12 0 NAMED !
 13
 14 DECIMAL 110 279 THRU
 15
 16 HEX CR CR HERE ADR U. ." end of bank 1"
 17 OLDDP @ DP ! (footing)
 18
 19 DECIMAL 280 LOAD DECIMAL
 20
 21
 22 BELL LPDONE
 23

0 (load screen for EDDE)
 1
 2 LPON? HERE OLDDP ! AIM DP ! (heading)
 3 CR ." There are " . ." tokens."
 4 CR CR OLDDP @ U. ." top of Lyon's"
 5 CR AIM U. ." beginning of bank 2" CR
 6 AIM 4000 0 FILL (clean compile space)
 7 0 NAMED ! (begin table on left)
 8
 9 DECIMAL 60 109 THRU (bank 2 routines)
 10
 11 TKTABLE DUP 200 + DP ! ' AIM !
 12 0 NAMED !
 13
 14 DECIMAL 110 279 THRU
 15
 16 HEX CR CR HERE ADR U. ." end of bank 1"
 17 OLDDP @ DP ! (footing)
 18
 19 DECIMAL 280 LOAD DECIMAL (set vectors)
 20
 21 BELL LPDONE
 22
 23

scr # 22
 0 (CONSTANTS NAME VAR ADR) HEX
 1 : CON CONSTANT ; (for brevity)
 2
 3 5A00 CON AIM 6A00 CON TKTABLE
 4 800 CON RAM 1200 CON LOMEM
 5 15A0 CON HIMEM 15C0 CON RTABLE
 6 1600 CON BOV B3E0 CON EOF
 7 D000 CON ROM BC00 CON SCREEN
 8
 9 VARIABLE OLDDP VARIABLE TOKENS
 10 VARIABLE BOUND VARIABLE RES
 11
 12 : NAME HERE TOKENS @ DUP CONSTANT 0 ,
 13 ?CR 3 .R 2 SPACES ID. 6 SPACES
 14 1 TOKENS +! ;
 15 : ADR AIM - ROM + ;
 16 : -ADR ROM - AIM + ;
 17 : VAR TOKENS @ CONSTANT 2 TOKENS +! ;
 18
 19 01 CON del 1D CON cr
 20 1B CON tab 1C CON ff
 21 24 CON CH FF CON SSAV
 22 FB CON ASAVAL FC CON PSAV
 23 FD CON XSAVAL FE CON YSAV

0 (CONSTANTS NAME VAR ADR) HEX
 1 AKA defined for brevity.
 2 AIM compiled Swyft TKTABLE token table
 3 RAM variables/tables RTABLE ram table
 4 LOMEM,HIMEM basic
 5 BOV begin cut EOF end of text area
 6 ROM Swyft target SCREEN
 7 OLDDP old DP TOKENS next token #
 8 BOUND limits word length to y-reg range
 9 RES used by initialization
 10
 11 NAME associates a token with a word and
 12 reserves space for an address.
 13 T: later resolves this address to
 14 point to beginning of definition and
 15 compiles tokens of resolved words.
 16 ADR gives equivalent adr in ROM
 17 -ADR gives equivalent adr at AIM
 18 VAR associates a token with a word
 19
 20 key assignments.
 21 CH cursor position SSAV status register
 22 ASAVAL accumulator PSAV processor reg
 23 XSAVAL x register YSAV y register

23
 0 (PAGED VARIABLES) HEX
 1
 2 ASSEMBLER DEFINITIONS
 3 50 CONSTANT X0 (TWO BYTE TEMPS)
 4 52 CONSTANT X1
 5 54 CONSTANT X2
 6 56 CONSTANT X3
 7 58 CONSTANT X4
 8 5A CONSTANT X5
 9 5C CONSTANT Y0 (ONE BYTE TEMPS)

0 (PAGED VARIABLES) HEX
 1 two byte assembler temporaries:
 2 X0,X0+1
 3 X1,X1+1
 4 X2,X2+1
 5 X3,X3+1
 6 X4,X4+1
 7 X5,X5+1
 8 one byte assembler temporaries:
 9 Y0

```

10 5D CONSTANT Y1
11 5E CONSTANT Y2
12 5F CONSTANT WC      ( WRAP COUNT )
13 60 CONSTANT WR      ( WRAP ADDRESS )
14 62 CONSTANT VB      ( VARIABLE ADDRESS )
15 64 CONSTANT TSTAT   ( XMIT STATUS )
16 65 CONSTANT RSTAT   ( RCEV STATUS )
17 66 CONSTANT XSAVE
18 67 CONSTANT YSAVE
19 68 CONSTANT SSAVE
20 69 CONSTANT IP
21 6B CONSTANT NEXT
22 A0 CONSTANT SPO
23 FORTH DEFINITIONS

```

```

10 Y1
11 Y2
12 other temporaries:
13 WC,WR wrap address and count of line to
14 wrap. answer left in page table, e.g.
15 VB variable address used by TO.
16 TSTAT transmit status used by .INTERRUPT
17 RSTAT receive status used by .INTERRUPT
18 XSAVE x-reg temporary storage.
19 YSAVE y-reg temporary storage.
20 SSAVE status reg temporary storage.
21 IP forth interpretive pointer.
22 NEXT forth next (within word) pointer.
23 SPO forth stack.

```

```

scr # 24
0 ( PASS 1 )
1
2 VOCABULARY SOURCE IMMEDIATE
3 SOURCE DEFINITIONS
4
5 -99 TOKENS ! ( FRAGs use in code only )
6
7 NAME .NEST ( begins T: words )
8 NAME .XLAT ( keyboard lookup table )
9 NAME .DISPO ( address of display lines)
10 NAME .DISP1
11 NAME .SCRO ( auxiliary display )
12 NAME .SCR1
13 NAME .MSGO      NAME XYNEXT
14 NAME .QUE       NAME YNEXT
15 NAME .ON        NAME .ON/OFF
16 NAME .SCR        NAME .CURSOR
17 NAME .PRINT     NAME .DEFAULT
18 NAME .CH>F     NAME .B>F
19 NAME .INTERRUPT NAME .RECEIVE
20 NAME .LTABLE    NAME .USINGLE
21 NAME .RESET     NAME .MOVE-VARS
22 NAME .MON       NAME .40COL
23 NAME .STARTU    NAME .ENDU
25
0 ( SOURCE )
1
2 NAME .LEMIT2    NAME D.LEMIT2
3 NAME .NEWDISK   NAME D.ZPMOVE
4 NAME .CDISK     NAME D.CDISK
5 NAME .AUX       NAME D.AUX
6 NAME .MAIN      NAME D.MAIN
7 NAME .XNEXT     NAME D.XNEXT
8 NAME .MONITOR   NAME D.MONITOR
9 NAME .B/F       NAME D.B/F
10 NAME .D444      NAME D.D444
11 NAME .CH/F     NAME D.CH/F
12 NAME .XFER      NAME D.XFER
13 NAME .RTS       NAME D.RTS
14 NAME .LEMIT     NAME D.LEMIT
15 NAME .START     NAME D.START
16 NAME .BOOT      NAME D.BOOT
17
18 NAME *100US    NAME .SERIAL#
19 NAME ONDL      NAME OFFDL
20 NAME DL12      NAME WB30

```

```

0 ( PASS 1 )
1
2 negative tokens prevent tokenization
3 into token table; used for FRAG
4 machine code
5
6 the following are all NAME definitions:
7 .NEST ( begins T: words )
8 .XLAT ( keyboard lookup table )
9 .DISPO ( address of display lines)
10 .DISP1
11 .SCRO ( auxiliary display )
12 .SCR1
13 .MSGO      XYNEXT
14 .QUE       YNEXT
15 .ON        .ON/OFF
16 .SCR        .CURSOR
17 .PRINT     .DEFAULT
18 .CH>F     .B>F
19 .INTERRUPT .RECEIVE
20 .LTABLE    .USINGLE
21 .RESET     .MOVE-VARS
22 .MON       .40COL
23 .STARTU    .ENDU
0 ( SOURCE )
1 disk version routines:
2 .LEMIT2      D.LEMIT2
3 .NEWDISK    D.ZPMOVE
4 .CDISK      D.CDISK
5 .AUX        D.AUX
6 .MAIN       D.MAIN
7 .XNEXT      D.XNEXT
8 .MONITOR    D.MONITOR
9 .B/F        D.B/F
10 .D444      D.D444
11 .CH/F      D.CH/F
12 .XFER      D.XFER
13 .RTS       D.RTS
14 .LEMIT     D.LEMIT
15 .START     D.START
16 .BOOT      D.BOOT
17 disk operations:
18 *100US     .SERIAL#
19 ONDL      OFFDL
20 DL12      WB30

```

```

21 NAME PHSW      NAME PHSW2
22 NAME .SWYFT    NAME .SENDSWYFT
23 NAME .WRAP     NAME BMP

```

```

21 PHSW          PHSW2
22 .SWYFT        .SENDSWYFT
23 .WRAP         BMP

```

scr # 26

```

0 ( SOURCE DEFINITIONS )
1
2 ( bank2 routines )
3 NAME BOOT1      NAME MATCH
4 NAME 2.REVERSE  NAME 2.TOBUFF
5 NAME 2.ADJUST   NAME 2.?APPLE
6 NAME 2.SEEK>    NAME 2.?EDDE
7 NAME 2.SEEK<    NAME 2.CHECKSUM
8 NAME 2.CMOVE2   NAME 2.?UPDATE
9 NAME 2.<SEEK>   NAME 2.ENDWRAP
10 NAME 2.<WRITE>  NAME 2.PRESET
11 NAME 2.4COL    NAME 2.ABOOT
12 NAME 2.MON     12 2.MON
13 NAME 2.<READ>  NAME 2.NUDGE
14 NAME 2.WRITEDO NAME 2.PAGEPRINT
15 NAME 2.SHOWPAGE NAME .DECIMATE
16 NAME 2.SERIAL#  NAME 2.8M
17 NAME 2.V        NAME 2.8K
18 NAME 2.?X       NAME 2.QUE
19 NAME 2.SETMODEM NAME 2.CONTROL
20 NAME 2.HARDPAGE NAME 2.SOFTPAGE
21 NAME 2.STOP?    NAME 2.INCPAGES
22 NAME end_of_bank2
23

```

0 (SOURCE DEFINITIONS)

```

1
2 bank 2 routines:
3 BOOT1      MATCH
4 2.REVERSE  2.TOBUFF
5 2.ADJUST   2.?APPLE
6 2.SEEK>    2.?EDDE
7 2.SEEK<    2.CHECKSUM
8 2.CMOVE2   2.?UPDATE
9 2.<SEEK>   2.ENDWRAP
10 2.<WRITE>  2.PRESET
11 2.4COL    2.ABOOT
12 2.MON
13 2.<READ>  2.NUDGE
14 2.WRITEDO 2.PAGEPRINT
15 2.SHOWPAGE .DECIMATE
16 2.SERIAL#  2.8M
17 2.V        2.8K
18 2.?X       2.QUE
19 2.SETMODEM 2.CONTROL
20 2.HARDPAGE 2.SOFTPAGE
21 2.STOP?    2.INCPAGES
22 end_of_bank2
23

```

27

```

0 ( SOURCE DEFINITIONS )
1
2 ( tokenized words called by T: words )
3
4 LPON? CR 0 TOKENS !
5
6 NAME .BLIT      ( 0 )
7 NAME .2BYTERS   ( 1, not yet required )
8 NAME .LIT       ( 2 )
9 NAME .BRAN      ( 3 )
10 NAME .OBRAN     ( 4 )
11 NAME .DO        ( 5 )
12 NAME .LOOP      ( 6 )
13 NAME EXIT      ( 7 )
14 NAME .VARIAB   ( must be token # 8 )
15 NAME .+LOOP     ( 9 )
16 NAME .LEAVE     ( A )
17
18
19
20
21
22
23

```

```

0 ( SOURCE DEFINITIONS )
1 beginning of tokenization at TTKTABLE.
2 NAME creates token table and saves a
3 space for an address;
4 T: later places address in TTKTABLE
5 which points to code for a word's
6 definition.
7
8 TOKEN : NAME:
9 0      .BLIT
10 1     .2BYTERS
11 2     .LIT
12 3     .BRAN
13 4     .OBRAN
14 5     .DO
15 6     .LOOP
16 7     EXIT
17 8     .VARIAB must be token 8
18 because 8 is used as the
19 high byte address for
20 variable table ($0800)
21 9     .EXITLOOP
22 A     .+LOOP
23 B     .LEAVE

```

scr # 28

```

0 ( SOURCE DEFINITIONS )
1
2 NAME DUP      NAME 2DUP
3 NAME ?DUP     NAME DROP
4 NAME ROT      NAME OVER

```

0 (SOURCE DEFINITIONS)

```

1
2 tokenization of metacompiled FORTH:
3 DUP        2DUP
4 ?DUP      DROP

```

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17

5 NAME SWAP
 6 NAME R>
 7 NAME >R
 8
 9 NAME @
 10 NAME !
 11 NAME +!
 12
 13 NAME NEGATE
 14 NAME AND
 15 NAME XOR
 16
 17
 18
 19
 20
 21
 22
 23

29

0 (SOURCE)
 1
 2 NAME -1
 3 NAME 1
 4 NAME +
 5
 6 NAME 1+
 7 NAME 2*
 8 NAME =
 9 NAME U<
 10 NAME UM/MOD
 11 NAME UMAX
 12
 13 NAME CMOVE
 14 NAME FILL
 15 NAME NOOP
 16
 17 NAME TO
 18 NAME ADDR
 19
 20 NAME MS
 21
 22
 23

18

NAME SWAB
 NAME R@
 NAME I
 NAME C@
 NAME C!
 NAME ABS
 NAME OR
 NAME XOR
 17
 18
 19
 20
 21
 22
 23

0 (SOURCE)
 1
 2 tokenization of metacompiled FORTH
 3 -1 0
 4 1 2
 5 + -
 6
 7 1+ 1-
 8 2* U2/
 9 = 0=
 10 U< 0<
 11 UM/MOD UMIN
 12 UMAX OMAX
 13
 14 CMOVE CMOVE>
 15 FILL
 16 NOOP BEEP
 17
 18 TO +TO
 19 ADDR
 20
 21 MS
 22
 23

scr # 30

0 (SOURCE)
 1
 2 NAME WR!
 3 NAME WC@
 4 NAME LEXLEN
 5
 6 NAME BOW
 7 NAME LOCLIN
 8 NAME SEL
 9
 10 NAME DOPAGING
 11 NAME FIXTABLE
 12 NAME PAGEWRAP
 13
 14 NAME PREALIGN
 15 NAME INCPAGES

0 (SOURCE)
 1
 2 tokenization of Swyft:
 3 WR! WR@
 4 WC@ ROM?
 5 LEXLEN TOPLINE
 6
 7 BOW
 8 LOCLIN LOCCHR
 9 SEL ?COLLAPSE
 10
 11 DOPAGING NEXTPAGE
 12 FIXTABLE NOTMATCH?
 13 PAGEWRAP SAVEPAGE
 14
 15 PREALIGN +ALIGN

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19

16 NAME ENDFORM
17 NAME ?ONPAGE
18 NAME ?MORETEXT
19 NAME STOP?
20
21
22 NAME HARDPAGE
23 NAME SOFTPAGE
31
0 (SOURCE)
1
2 NAME WRAP
3 NAME AFTERGAP
4
5 NAME SHOWLINE
6 NAME PRESET
7 NAME ADJUST
8 NAME ENDWINDOW
9 NAME ENDSCREEN?
10 NAME NEWND
11
12 NAME FRESH
13 NAME REFRESHER
14 NAME SHOWMARK
15 NAME RESHOW
16
17
18
19
20
21
22
23.

20

NAME <ENDFORM>
NAME FIXEND
NAME <ENDWRAP>
NAME SETLINE
NAME ?UPDATE
NAME TOBUFF
NAME ?SCROLL
NAME SHOWPAGE
NAME REWINDOW
NAME REFRESH
NAME SHOW
NAME NEWMARK
NAME OLDSHOW
NAME SIGNON
NAME CLEAR
NAME AUXIL
NAME ?LBLINK
NAME OFF
NAME @K
NAME ?A
NAME ?S
NAME FLUSH
NAME MEMIT
NAME ?LE
NAME MAPPEND
NAME ?RECFULL
NAME INCPAGES
NAME ENDFORM
NAME ?ONPAGE
NAME ?MORETEXT
NAME STOP?
0 (SOURCE)
1
2 tokenization of Swyft:
3 WRAP
4 AFTERGAP
5
6 SHOWLINE
7 PRESET
8 ADJUST
9 ENDWINDOW
10 ENDSCREEN?
11 NEWND
12
13 FRESH
14 REFRESHER
15 SHOWMARK
16 RESHOW
17
18
19
20
21
22
23

cr # 32

0 (SOURCE) HEX
1
2 NAME SETDISP
3 NAME MSGO
4 NAME SCROLL
5 NAME DISP
6 NAME ?BLINK
7 NAME ON
8
9 NAME QUE
10 NAME ?K
11 NAME ?E
12 NAME ?X
13 NAME ?D
14
15 NAME SETMODEM
16 NAME ?M
17 NAME CONTROL
18 NAME ?SEND
19
20
21
22
23

D (SOURCE) HEX
1
2 tokenization of Swyft:
3 SETDISP
4 MSGO
5 SCROLL
6 DISP
7 ?BLINK
8 ON
9
10 QUE
11 ?K
12 ?E
13 ?X
14 ?D
15
16 SETMODEM
17 ?M
18 CONTROL
19 ?SEND
20
21
22
23

33

| | | |
|--------------------|-----------------|--------------------------|
| 0 (SOURCE) HEX | | 0 (SOURCE) HEX |
| 1 | | 1 tokenization of Swyft: |
| 2 NAME PRINT | NAME SETPRINTER | 2 PRINT SETPRINTER |
| 3 NAME LEMIT | NAME LTYPE | 3 LEMIT LTYPE |
| 4 NAME LCR | NAME LCRS | 4 LCR LCRS |
| 5 NAME PAGEPRINT | NAME ENDPAGE | 5 PAGEPRINT ENDPAGE |
| 6 NAME LMARGIN | NAME ULEMIT | 6 LMARGINS ULEMIT |
| 7 NAME ENDU | NAME STARTU | 7 ENDU STARTU |
| 8 | | 8 |
| 9 NAME REVERSE | | 9 REVERSE |
| 10 NAME SEEK> | NAME SEEK< | 10 SEEK> SEEK< |
| 11 NAME FLIP/TRIM | NAME FLIP | 11 FLIP/TRIM FLIP |
| 12 NAME ?LEXXED | | 12 ?LEXXED |
| 13 NAME RENCUR | NAME LEXCUR | 13 RENCUR LEXCUR |
| 14 NAME DEL | NAME [SEARCH] | 14 DEL [SEARCH] |
| 15 NAME SEARCH | NAME <SEARCH> | 15 SEARCH <SEARCH> |
| 16 NAME REP | NAME EXPAND | 16 REP EXPAND |
| 17 NAME AUTOEXTEND | | 17 AUTOEXTEND |
| 18 NAME LEX | NAME REX | 18 LEX REX |
| 19 NAME LXX | NAME RXX | 19 LXX RXX |
| 20 NAME PRELEX | NAME POSTLEX | 20 PRELEX POSTLEX |
| 21 NAME LEXREX | NAME OUTLEX | 21 LEXREX OUTLEX |
| 22 NAME MOVE-GAP | | 22 MOVE-GAP |
| 23 NAME CREEPSHOW | NAME CREEPER | 23 CREEPSHOW CREEPER |

SCR # 34

| | | |
|------------------------|---------------------|---------------------------------|
| 0 (SOURCE) HEX | | 0 (SOURCE) HEX |
| 1 | | 1 |
| 2 NAME BASIC | | 2 tokenization of BASIC words: |
| 3 | | 3 BASIC |
| 4 NAME TOBASIC | NAME TOINPUT | 4 |
| 5 NAME APPEND | NAME F>B | 5 TOBASIC TOINPUT |
| 6 NAME VALIDATE | NAME START | 6 APPEND F>B |
| 7 NAME INITBASIC | | 7 VALIDATE START |
| 8 NAME DEFVARS | NAME RESETVARS | 8 INITBASIC |
| 9 NAME BEFORE | NAME AFTER | 9 DEFVARS RESETVARS |
| 10 NAME ?MOVETEXT | NAME MOVETEXT | 10 BEFORE AFTER |
| 11 NAME WIDTHCHANGE | | 11 MARGIN-CHANGES CHECKCHANGES |
| 12 NAME MARGIN-CHANGES | NAME CHECKCHANGES | 12 SAVESTRINGS LOADSTRINGS |
| 13 NAME SAVESTRINGS | NAME LOADSTRINGS | 13 SAVES LOADS |
| 14 NAME SAVE\$ | NAME LOAD\$ | 14 V@ V! |
| 15 NAME V@ | NAME V! | 15 V |
| 16 NAME V | | 16 FRAGMENTS |
| 17 NAME FRAGMENTS | | 17 ROM-FRAGMENTS DISK-FRAGMENTS |
| 18 NAME ROM-FRAGMENTS | NAME DISK-FRAGMENTS | 18 |
| 19 | | 19 |
| 20 | | 20 |
| 21 | | 21 |
| 22 | | 22 |
| 23 | | 23 |

35

| | | |
|-----------------|--------------|------------------------------------|
| 0 (SOURCE) | | 0 (SOURCE) |
| 1 | | 1 |
| 2 NAME LOAD | NAME SAVE | 2 tokenization of disk operations: |
| 3 NAME DRAG | NAME GET | 3 LOAD SAVE |
| 4 NAME BOOT | | 4 DRAG GET |
| 5 | | 5 BOOT |
| 6 NAME DISKON | NAME PROT? | 6 |
| 7 NAME ?EDDE | NAME ?APPLE | 7 DISKON PROT? |
| 8 NAME ACT | NAME DEACT | 8 ?EDDE ?APPLE |
| 9 NAME CHECKSUM | NAME SERIAL# | 9 ACT DEACT |

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23

| | | |
|-------------------|--------------|--------------|
| 10 NAME RECAL | | 10 CHECKSUM |
| 11 NAME <SEEK> | NAME SEEK | 11 RECAL |
| 12 NAME <READ> | NAME READ | 12 <SEEK> |
| 13 NAME <WRITE> | NAME WRITE | 13 <READ> |
| 14 NAME OLDLOAD | NAME <LOAD> | 14 <WRITE> |
| 15 NAME WRITES | NAME WRITED0 | 15 OLDLOAD |
| 16 NAME APPLEDISK | NAME ABOOT | 16 WRITES |
| 17 NAME .40COL | NAME .MON | 17 APPLEDISK |
| 18 | | 18 .40COL |
| 19 | | 19 |
| 20 | | 20 |
| 21 | | 21 |
| 22 | | 22 |
| 23 | | 23 |

24

| SERIAL# |
|---------|
| SEEK |
| READ |
| WRITE |
| <LOAD> |
| WRITED0 |
| ABOOT |
| .MON |

scr # 36

| | |
|-------------------------------------|---|
| 0 (SOURCE) HEX | 0 (SOURCE) |
| 1 | 1 |
| 2 NAME MAIN | NAME LOOKUP |
| 3 NAME COLD | NAME WARM |
| 4 NAME INIT | NAME <INIT> |
| 5 NAME RAMKEYS | NAME ?RAMKEYS |
| 6 | 6 |
| 7 NAME DELETE | NAME CUT |
| 8 NAME <ENTER> | NAME NEWPAGES |
| 9 | 9 |
| 10 NAME BUG | NAME RP! |
| 11 | 11 |
| 12 NAME ENTER | NAME PASTE |
| 13 NAME TAB | NAME RESET |
| 14 NAME DISK | NAME SEND |
| 15 | 15 |
| 16 | 16 storing a 0 in the lfa of the first |
| 17 | 17 definition of SOURCE vocabulary limits |
| 18 | 18 vocabulary searches to SOURCE |
| 19 | 19 |
| 20 | 20 the value in tokens represents the |
| 21 | 21 actual number of tokens placed into |
| 22 | 22 the table |
| 23 | 23 |
| 37 | |
| 0 (END OF SOURCE DEFINITIONS) HEX | 0 |
| 1 | 1 |
| 2 00 ' .NEST LFA | 2 |
| 3 FORTH DEFINITIONS | 3 |
| 4 ! | 4 |
| 5 | 5 |
| 6 LPDONE TOKENS @ | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |

21
22
2321
22
23

scr # 38

| | | |
|-------------------------|--------------|---|
| 0 (VARIABLES) | | 0 (VARIABLES) |
| 1 ASSEMBLER DEFINITIONS | 800 TOKENS ! | 1 beginning of variables at RAM (\$0800). |
| 2 (800) VAR ORIGIN | 808 TOKENS ! | 2 ORIGIN |
| 3 (808) VAR BOT | | 3 BOT beginning of text. |
| 4 (80A) VAR BEOT | | 4 BEOT beginning of end of text. |
| 5 (80C) VAR EBOT | | 5 EBOT end of beginning of text. |
| 6 (80E) VAR EOT | | 6 EOT end of text. |
| 7 (810) VAR BOS | | 7 BOS beginning of selection. |
| 8 (812) VAR EOS | | 8 EOS end of selection. |
| 9 (814) VAR TOP | | 9 TOP top line on screen. |
| 10 (816) VAR BOC | | 10 BOC beginning of cut buffer. |
| 11 (818) VAR QEOS | | 11 QEOS old end of selection. |
| 12 (81A) VAR BOTTOM | | 12 BOTTOM bottom of all text area. |
| 13 (81C) VAR DIRTY | | 13 DIRTY state of text. |
| 14 (81E) VAR LOCAL1 | | 14 LOCAL1 (used as flag for creep). |
| 15 (820) VAR QIN | | 15 QIN pointer to que input. |
| 16 (822) VAR QOUT | | 16 QOUT pointer to que output. |
| 17 (824) VAR NARROW | | 17 NARROW state of cursor. |
| 18 (826) VAR CHAR | | 18 CHAR character buffer. |
| 19 (828) VAR LONG | | 19 LONG lines of text per page. |
| 20 (82A) VAR WIDE | | 20 WIDE columns on page. |
| 21 (82C) VAR YWRAP | | 21 YWRAP horizontal wrap. |
| 22 (82E) VAR XFLAG | | 22 XFLAG state of apple (lex) keys. |
| 23 (830) VAR LCTR | | 23 LCTR cumulative line counter. |

39

| | |
|---------------------------|--|
| 0 (VARIABLES) HEX | |
| 1 (832) VAR PCT | |
| 2 (834) VAR LCT | |
| 3 (836) VAR LINES | |
| 4 (838) VAR PAGES | |
| 5 (83A) VAR CLIN | |
| 6 (83C) VAR OLIN | |
| 7 (83E) VAR GAP | |
| 8 (840) VAR LINE# | |
| 9 (842) VAR PAGE# | |
| 10 (844) VAR CTR | |
| 11 (846) VAR LINREL | |
| 12 (848) VAR LINADR | |
| 13 (84A) VAR PAGEFLAG | |
| 14 (84C) VAR EFLAG | |
| 15 (84E) VAR EOW | |
| 16 (850) VAR RETN | |
| 17 (852) VAR RETNCHR | |
| 18 (854) VAR COL# | |
| 19 (856) VAR .LF | |
| 20 (858) VAR .BL | |
| 21 (85A) VAR LRFLAG | |
| 22 (85C) VAR CT | |
| 23 (85E) VAR PRINTBREAK | |

| | |
|---------------------|------------------------------|
| 0 (VARIABLES) HEX | |
| 1 PCT | page count (temporary). |
| 2 LCT | line count (temporary). |
| 3 LINES | total # of lines in text. |
| 4 PAGES | total # of pages in text. |
| 5 CLIN | current cursor screen line. |
| 6 OLIN | old cursor line position. |
| 7 GAP | space remaining (BEOT-EBOT). |
| 8 LINE# | line number. |
| 9 PAGE# | page number. |
| 10 CTR | counter for blink rate. |
| 11 LINREL | relative line. |
| 12 LINADR | line address. |
| 13 PAGEFLAG | state of page change. |
| 14 EFLAG | |
| 15 EOW | end of window. |
| 16 RETN | BASIC horizontal position. |
| 17 RETNCHR | character passed from BASIC. |
| 18 COL# | horizontal position. |
| 19 .LF | line feed (see SETPRINTER). |
| 20 .BL | blanks to print for margin. |
| 21 LRFLAG | state of lexing. |
| 22 CT | |
| 23 PRINTBREAK | state of page break display. |

scr # 40

| | |
|---------------------|--|
| 0 (VARIABLES) HEX | |
| 1 (860) VAR E# | |
| 2 (862) VAR B# | |
| 3 (864) VAR VECT | |
| 4 (866) VAR OLDE# | |

| | |
|---------------------|-------------------------|
| 0 (VARIABLES) HEX | |
| 1 E# | line # of EOS. |
| 2 B# | line # of BOS. |
| 3 VECT | |
| 4 OLDE# | previous line # of EOS. |

5 (868) VAR OLDB#
 6 (86A) VAR NUFLAG
 7 (86C) VAR LEXXING
 8 (86E) VAR PTR
 9 (870) VAR W/2
 10 (872) VAR TRACK
 11 (874) VAR XPOS
 12 (876) VAR YPOS
 13 (878) VAR MQIN
 14 (87A) VAR MQOUT
 15 (87C) VAR BLO
 16 (87E) VAR BL1
 17 (880) VAR BANK
 18 (882) VAR SAVECHAR
 19 (884) VAR FIRST
 20 (886) VAR SIZE
 21 (888) VAR ABOVE%
 22 (88A) VAR BELOW%
 23 (88C) VAR PAGE%

5 OLDB# previous line # of BOS.
 6 NUFLAG state for new display.
 7 LEXXING state for lex/rex operation.
 8 PTR
 9 W/2
 10 TRACK desired track number.
 11 XPOS display cursor x position.
 12 YPOS display cursor y position.
 13 MQIN modem que input pointer.
 14 MQOUT modem que output pointer.
 15 BLO used for cursor blinking.
 16 BL1 used for cursor blinking.
 17 BANK active display bank.
 18 SAVECHAR
 19 FIRST
 20 SIZE
 21 ABOVE% # of lines on top of page.
 22 BELOW% # of lines at bottom.
 23 PAGE% page number to print.

41

0 (VARIABLES) HEX
 1 (88E) VAR MARGIN%
 2 (890) VAR HALF-TRACK#
 3 (892) VAR LINESCOUNT
 4 (894) VAR EXTENDED
 5 (896) VAR LPAGE% (898) VAR PFLAG%
 6 (89A) VAR THOROUGH?
 7 (89C) VAR LASTC
 8 (89E) VAR PRINT? (8A0) VAR OLDPAGE
 9 (8A2) VAR DISK# (8A4) VAR OLDDISK#
 10 (8A6) VAR SAVED?
 11 (8A8) VAR FILLED-LEN
 12 (8AA) VAR SSC? (8AC) VAR TEOS
 13 (8AE) VAR SPACING (8B0) VAR LINEND%
 14 (8B2) VAR SEND% (8B4) VAR HEAD%
 15 (8B6) VAR PLEN% (8B8) VAR LOCAL2
 16 (8BA) VAR UFLAG (8BC) VAR BELL?
 17 (8BE) VAR SAVED (8C0) VAR RESEEK
 18 (BC2) VAR NEWBOTTOM
 19 (BC4) VAR CUTPAGES
 20 (BC6) VAR WRAPDONE
 21
 22 8D0 CONSTANT USTART 8D8 CONSTANT UEND
 23 8E0 CONSTANT PBUF

0 (VARIABLES) HEX
 1 MARGIN% # of spaces for left margin.
 2 HALF-TRACK#
 3 LINESCOUNT
 4 EXTENDED
 5 LPAGE%
 6 PFLAG%
 7 THOROUGH? wrap without interruption.
 8 LASTC last command buffer.
 9 PRINT? state for printing.
 10 OLDPAGE
 11 DISK# disk identification #.
 12 OLDDISK# old disk identification #.
 13 SAVED? FILLED-LEN unused.
 14 SSC? flag for super serial card.
 15 TEOS temporary EOS.
 16 SPACING LINEND%
 17 SEND% HEAD%
 18 PLEN% page length LOCAL2 xflag buffer
 19 UFLAG backup to u'l BELL? sound bell?
 20 SAVED tracks saved RESEEK find header.
 21
 22 underlining: USTART, UEND.
 23 PBUF PR\$ buffer.

scr # 42

0 (ARRAYS) HEX
 1
 2 900 CONSTANT PATT 920 CONSTANT KQUE
 3 930 CONSTANT CURN 980 CONSTANT UPDATE
 4 998 CONSTANT WND0 980 CONSTANT WND1
 5 9C8 CONSTANT WND2 9E0 CONSTANT WND3
 6 A00 CONSTANT PGSO 800 CONSTANT PGS1
 7 C00 CONSTANT PGS2 D00 CONSTANT PGS3
 8
 9 E00 CONSTANT <LEMIT2>
 10 E10 CONSTANT <NDISK>
 11 E70 CONSTANT <CDISK>
 12 E80 CONSTANT <ZPMOVE>
 13 E90 CONSTANT <AUX>
 14 EFO CONSTANT <MAIN>
 15 F00 CONSTANT <XNEXT>

0 (ARRAYS) HEX
 1 PATT search pattern KQUE key queue
 2 CURN printer/screen buffer for line.
 3 WND0, WND1 addr for line on display (WR)
 4 WND2 line on page (LCT)
 5 WND3 page number (PCT)
 6 PGSO, PGS1 addr for page (WR)
 7 PGS2, PGS3 cumulative # of lines (LCTR)
 8
 9 <LEMIT2> printer routine.
 10 <NDISK> call 3600.
 11 <CDISK> clear disk.
 12 <ZPMOVE> zero page move.
 13 <AUX>
 14 <MAIN>
 15 <XNEXT> exit from bank 2 routine.

```

16 F10 CONSTANT <MON>
17 F20 CONSTANT <B/F>
18 F30 CONSTANT <D444>
19 F40 CONSTANT <CH/F>
20 F50 CONSTANT <XFER>
21 F60 CONSTANT <RTS>
22 F70 CONSTANT <LEMIT>
23 FA0 CONSTANT <START>

```

43

```

0 ( END OF VARIABLES )
1
2 1000 CONSTANT BASIC0
3 1100 CONSTANT BASIC1
4 1140 CONSTANT FORTH0
5 11A0 CONSTANT FORTH1
6 B400 CONSTANT MQUE
7 FFF8 CONSTANT ROM?
8
9 O ' A.PLACE LFA
10 FORTH DEFINITIONS
11 !
12
13
14
15
16
17
18
19
20
21
22
23

```

```

16 <MON> call to Apple monitor.
17 <B/F> basic/forth interface.
18 <D444> call to Apple BASIC.
19 <CH/F> character from basic to forth.
20 <XFER> entry for bank 2 routine.
21 <RTS> return from Apple BASIC.
22 <LEMIT> printer routine.
23 <START> setup before BASIC.

```

```

0 ( END OF VARIABLES )
1
2 BASIC0 BASIC zero page.
3 BASIC1 BASIC page 1.
4 FORTH0 forth zero page.
5 FORTH1 forth page 1.
6 TIMER programmable counter
7 .IVEC input from modem routine
8 .OVEC output to modem routine
9 .SVEC initialize modem routine
10 .QVEC poll modem routine
11 MQUE modem que - holds input
12 ROM? if the Swyft system is operating
13 from a disk then the value at this
14 location probably will be different
15
16 placing a 0 in the lfa of the first
17 definition stops vocabulary searches
18
19
20
21
22
23

```

scr # 44

```

0 ( COMPILER DEFINITIONS ) VOCABULARY
1 COMPILER IMMEDIATE COMPILER DEFINITIONS
2 : DO SOURCE .DO FORTH C, 3 ;
3 : IF SOURCE .OBRA N FORTH C,
4 HERE O C, 2 ;
5 : BEGIN HERE 1 ; : WHILE IF 2+ ;
6 : >RESOLVE HERE BOUND @ - SWAP C! ;
7 : <LOOP> C, FORTH BEGIN DUP 4 = WHILE
8 DROP >RESOLVE REPEAT 3 ?PAIRS ;
9 : LOOP SOURCE .LOOP FORTH <LOOP> ;
10 : +LOOP SOURCE .+LOOP FORTH <LOOP> ;
11 : <RESOLVE C, 1 ?PAIRS BOUND @ - C, ;
12 : UNTIL SOURCE .OBRA N FORTH <RESOLVE ;
13 : AGAIN SOURCE .BRAN FORTH <RESOLVE ;
14 : THEN O >R FORTH BEGIN DUP 4 =
15 WHILE >R >R REPEAT 2 ?PAIRS >RESOLVE
16 BEGIN R> -DUP WHILE R> REPEAT ;
17 : REPEAT >R >R AGAIN R> R> 2- THEN ;
18 : ELSE O >R FORTH BEGIN DUP 4 = WHILE
19 >R >R REPEAT 2 ?PAIRS SOURCE .BRAN
20 FORTH C, O C, >RESOLVE HERE 1- 2
21 BEGIN R> -DUP WHILE R> REPEAT ;
22 : LEAVE SOURCE .LEAVE FORTH C, HERE 4
23 O C, ; : ENDIF THEN ;

```

```

0 ( COMPILER DEFINITIONS ) VOCABULARY
1 immediate compiler commands
2 DO ( -- 3) compile .DO token
3 IF ( -- 2) compile .OBRA N token
4 BEGIN ( --here 1)
5 WHILE ( -- 4)
6 >RESOLVE ( n --) resolve forward ref.
7 <LOOP> ( 3 .loop --) compile .LOOP
8 LOOP ( 3 --) compile .LOOP
9 +LOOP ( 3 --) compile .+LOOP
10 UNTIL ( f --) compile .OBRA N
11 AGAIN ( --) compile .BRAN
12 : THEN O >R FORTH BEGIN DUP 4 =
13 WHILE >R >R REPEAT 2 ?PAIRS >RESOLVE
14 BEGIN R> -DUP WHILE R> REPEAT ;
15 : REPEAT >R >R AGAIN R> R> 2- THEN ;
16 : ELSE O >R FORTH BEGIN DUP 4 = WHILE
17 >R >R REPEAT 2 ?PAIRS SOURCE .BRAN
18 FORTH C, O C, >RESOLVE HERE 1- 2
19 BEGIN R> -DUP WHILE R> REPEAT ;
20 LEAVE compile .LEAVE O , here 4 O c,
21 ENDIF then
22
23

```

45
 0 (COMPILER DEFINITIONS)
 1
 2 00 ' DO LFA
 3 FORTH DEFINITIONS
 4 !
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23

0 (COMPILER DEFINITIONS)
 1
 2 store 0 in lfa of first word in
 3 compiler vocabulary to limit searches
 4
 5 GET# common to ERRORIS, CALL, and >NUM
 6
 7 ERRORIS compile error# phrase
 8
 9 CALL compile call and address
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23

scr # 46

0 (MORE COMPILER) HEX
 1
 2 : ?COMMAND ' COMPILER 2+ @ (FIND)
 3 IF DROP CFA EXECUTE 1 ELSE 0 ENDIF ;
 4
 5 : ?VAR ' ASSEMBLER 2+ @ (FIND) DUP
 6 IF 2DROP @ DUP 8FF U>
 7 IF SOURCE .LIT FORTH C,
 8 ELSE SWAB
 9 ENDIF , 1 ENDIF ;
 10
 11 : ?COMPILE ' SOURCE 2+ @ (FIND) DUP
 12 IF 2DROP @ DUP 0< ABORT" FRAGment:"
 13 C, 1 ENDIF ; (all 1 byte tokens)
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23

47

0 (MORE COMPILER) HEX
 1
 2 : ?NUM (addr --)
 3 0 OVER DUP C@ 1+ + ROT 1+
 4 DO I C@ 10 DIGIT
 5 IF SWAP 10 * +
 6 ELSE R> R> ." compile error: "
 7 HERE COUNT TYPE ABORT
 8 ENDIF
 9 LOOP DUP 100 U<

0 (MORE COMPILER) HEX
 1
 2 : ?COMMAND (adr -- flag)
 3 true=executed compiler word
 4 false=not a compiler word
 5
 6 : ?VAR (adr -- flag)
 7 true=compiled either a .lit or
 8 .variable and its value
 9 false=not an assembler word
 10
 11 : ?COMPILE (adr -- flag)
 12 true=compiled a token
 13 false=not a source word, abort if
 14 token is negative (i.e., a fragment)
 15
 16
 17
 18
 19
 20
 21
 22
 23

0 (MORE COMPILER) HEX
 1
 2 : ?NUM (addr --)
 3 in T: if it is not ?command, ?var or
 4 ?compile then try to convert it to a
 5 number; if successful, compile as a
 6 .blit or .lit (as appropriate), if not
 7 then abort with a compile error.
 8
 9

```

10 IF SOURCE .BLIT FORTH C, C,
11 ELSE SOURCE .LIT FORTH C, ,
12 THEN ;
13
14
15
16
17
18
19
20
21
22
23

```

```

10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

scr # 48

```

0 ( MORE COMPILER ) HEX
1
2 : T' ( -- pfa )
3 BL WORD ' SOURCE 2+ @ (FIND) 0=
4 ABORT" not NAMED " DROP
5 NAMED @ 1 XOR DUP NAMED !
6 IF CR 0 OUT !
7 ELSE 28 OUT @ - SPACES
8 THEN
9 BASE @ HERE ADR HEX U. BASE !
10 DUP @ DUP 0<
11 IF DROP 5 SPACES
12 ELSE 3 .R SPACE SPACE
13 THEN HERE COUNT TYPE SPACE ;
14
15 : !FRAG HERE ADR SWAP 2+ !
16 [COMPILE] ASSEMBLER ;
17
18
19
20
21
22
23

```

49

```

0 ( MORE COMPILER ) HEX
1
2 : FRAG T' DUP !FRAG @ 0< 0=
3 IF ." FRAG has a token" ABORT THEN ;
4
5 : LABEL T' DUP !FRAG DUP @ 0<
6 IF ." LABEL with no token" ABORT THEN
7 HERE ADR SWAP @ DUP + TKTABLE + ! ;
8
9 : T: LABEL
10 20 C, SOURCE ' .NEST FORTH 2+ @ ,
11 HERE 1- BOUND !
12 BEGIN BL WORD @ 3B01 = 0=
13 WHILE HERE ?COMPILE 0=
14 IF HERE ?COMMAND 0=
15 IF HERE ?VAR 0=
16 IF HERE ?NUM
17 ENDIF ENDIF ENDIF
18 REPEAT HERE BOUND @ - FF U>
19 ABORT" definition too large"
20 SOURCE EXIT FORTH C, ;

```

```

0 ( MORE COMPILER ) HEX
1
2 : T' ( -- pfa )
3 abort if word not defined by NAME,
4 otherwise print out its address and
5 its token and then leave pfa on stack
6
7 : !FRAG ( pfa --) resolve NAMED word
8 for fragment with ROM+offset
9 and leave in assembler
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 ( MORE COMPILER ) HEX
1 : FRAG ( --) if it is a fragment then
2 associate an address with the name
3 (where the address points to code)
4 otherwise abort. the address is not
5 placed in the token table.
6 FRAGs are called by JSR and end in RTS
7
8 : LABEL ( --) if it is a label then
9 associate an address with the token in
10 in the token table. abort if token is
11 a code fragment (i.e., <0). LABELs
12 are machine code ending with JMP NEXT.
13
14 : T: ( --) compiles tokenized words.
15 if NAME is found then compile JSR .NEST
16 to execute tokenized words, and compile
17 tokens until ";" found.
18 if BOUND exceeds $FF then the word is
19 too large for Y register incrementation
20 by NEXT so abort.

```

```

21
22
23

```

```

scr # 50
0 ( MORE COMPILER )
1
2 : \ BL WORD ' SOURCE 2+ @ (FIND)
3 IF DROP 2+ @ DUP 0=
4 IF HERE COUNT TYPE
5 ." not yet a FRAGMENT" ABORT ENDIF
6 ELSE HERE COUNT TYPE
7 ." not NAMED" ABORT ENDIF ;
8
9 : TNEXT, ASSEMBLER NEXT JMP, ;
10
11 : " 22 WORD C@ 1+ ALLOT ;
12
13 : H, SWAB C, ;
14
15 : TARGET AIM 1000 - 17 4000 >DISK ;
16
17
18
19
20
21
22
23

```

```

51
0 ( ADDITIONS TO THE METACOMPILER ) HEX
1
2 : ?FITS ( # -- | aborts if HERE is
3 more than # bytes beyond a page )
4 HERE OFF AND SWAP U<
5 ABORT" Doesn't fit. Try again" ;
6
7 : XFER LABEL
8 BL WORD ' SOURCE 2+ @ (FIND)
9 0= ABORT" doesn't exist "
10 DROP DUP @ 0<
11 0= ABORT" don't transfer to a token "
12 2+ @ ASSEMBLER DUP
13 YSAVE STY,
14 OFF AND #B LDY,
15 SWAB OFF AND #B LDA,
16 <XFER> JMP, ;
17
18
19
20
21
22
23

```

```

scr # 52
0 ( PROM BURNER FOR 2764'S ) ;S HEX
1
2 COAO CONSTANT DRA ( DATA A )
3 DRA 2+ CONSTANT DRB ( DATA B )
4 DRA 1+ CONSTANT CRA ( CTLR A )

```

```

21 T: definitions end with JMP NEXT.
22
23

```

```

0 ( MORE COMPILER )
1
2 : \ ( -- token)
3 find a NAME; if not NAMED or not a
4 resolved fragment then abort.
5
6 : TNEXT,
7 ending for a T: definition.
8
9 :
10 compile a string into the dictionary.
11
12 : H,
13 compile the hi byte only.
14
15
16 : TARGET
17 save image of Swyft program on T1.7
18 disk.
19
20
21
22
23

```

```

0 ( ADDITIONS TO THE METACOMPILER ) HEX
1
2 : ?FITS aborts if HERE is
3 more than # bytes beyond a page
4
5
6
7 : XFER
8 PURPOSE: transfer to machine language
9 routine in bank 2. return through
10 <xnext>.
11
12 if the next two words are defined then
13 point the first word to the following
14 code:
15 save y-reg and (using the resolved
16 address in the first word)
17 lda# hi-byte and ldy# lo-byte
18 then JMP <XFER>.
19
20
21
22
23

```

```

0 ( PROM BURNER FOR 2764'S ) ;S HEX
1
2
3
4

```

```

5 DRA 3 + CONSTANT CRB ( CTRL B )      5
6 VARIABLE CNT                         6
7 : MS 0 DO 5 0 DO LOOP LOOP ;        7
8 : ?T ?TERMINAL IF QUIT ENDIF ;      8
9 : !AND OVER C@ AND SWAP C! ;        9
10 : !OR OVER C@ OR SWAP C! ;         10
11 : PGML DRB FB !AND ;             11
12 : PGMH DRB 04 !OR ;              12
13 : CEL DRB DF !AND ;             13
14 : CEH DRB 20 !OR ;              14
15 : OEL DRB EF !AND ;             15
16 : OEH DRB 10 !OR ;              16
17 : VPPL DRB 80 !OR ;             17
18 : VPPH DRB 7F !AND ;             18
19                                         19
20 : INA CRA FB !AND 0 DRA C! CRA 4 !OR ; 20
21 : OTA CRA FB !AND FF DRA C! CRA 4 !OR ; 21
22 : OTB CRB FB !AND FF DRB C! CRB 4 !OR ; 22
23                                         23

```

53

| | |
|---|------------------------------|
| 0 (PROM PROGRAMMER) ;S HEX | 0 (PROM PROGRAMMER) ;S HEX |
| 1 | 1 |
| 2 : CAL CRA C@ 38 OR F7 AND CRA C! ; | 2 |
| 3 : CAH CRA 38 !OR ; | 3 |
| 4 : CBL CRB C@ 38 OR F7 AND CRB C! ; | 4 |
| 5 : CBH CRB 38 !OR ; | 5 |
| 6 | 6 |
| 7 : INI OTB INA PGMH CEH OEH | 7 |
| 8 DRB FC !AND | 8 |
| 9 VPPL CEH PGMH OEH ; | 9 |
| 10 : RES CBH CBL 0 CNT ! | 10 |
| 11 DRB FC !AND ; | 11 |
| 12 : COU CAL CAH 1 CNT +! ; | 12 |
| 13 : INCR (INCREMENT HIGH BITS) | 13 |
| 14 DRB C@ DUP 1+ 3 AND SWAP FC AND OR | 14 |
| 15 DRB C! ; | 15 |
| 16 : BUMP COU CNT @ OFFF AND 0= | 16 |
| 17 IF INCR ENDIF ; | 17 |
| 18 : ZAP PGML 35 MS PGMH ; | 18 |
| 19 : SETS -DUP IF 0 DO BUMP LOOP THEN ; | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

scr # 54

| | |
|--|------------------------------|
| 0 (PROM PROGRAMMER) ;S HEX | 0 (PROM PROGRAMMER) ;S HEX |
| 1 | 1 |
| 2 : BURN CEL VPPH OTA RES SETS | 2 |
| 3 OVER + SWAP | 3 |
| 4 DO I C@ DRA C! ZAP BUMP ?T LOOPINI ; | 4 |
| 5 : READ INA CEL OEL RES SETS | 5 |
| 6 OVER + SWAP | 6 |
| 7 DO DRA C@ I C! BUMP ?T LOOPINI ; | 7 |
| 8 : GET 30 EOVRAM | 8 |
| 9 DO I OVER 1 R/W 1+ 400 +LOOP DROP ; | 9 |
| 10 : SAVE 30 EOVRAM | 10 |
| 11 DO I OVER 0 R/W 1+ 400 +LOOP DROP ; | 11 |
| 12 : START GET RE ; | 12 |
| 13 : ROM0INI AIM 1000 0 BURN | 13 |
| 14 AIM 3000 + 800 1000 BURN ; | 14 |
| 15 : ROM1INI AIM 1000 + 2000 0 BURN ; | 15 |

```

16 DECIMAL          16
17 : COPIER 141 1 5 BLKCOPY SAVE-IMAGE   17
18 SAVE ;           18
19                   19
20                   20
21                   21
22                   22
23                   23
35
0                   0
1                   1
2                   2
3                   3
4                   4
5                   5
6                   6
7                   7
8                   8
9                   9
10                  10
11                  11
12                  12
13                  13
14                  14
15                  15
16                  16
17                  17
18                  18
19                  19
20                  20
21                  21
22                  22
23                  23

```

```

:cr # 56
0 ( writing a target image to disk ) HEX
1
2 VARIABLE NAMED      0 NAMED !
3 VARIABLE PRINTING   1 PRINTING !
4
5 : ?CR ( -- ) NAMED @ 1 XOR DUP NAMED !
6 IF CR 0 OUT !
7 ELSE 28 OUT @ - SPACES THEN ;
8
9 : LPON? PRINTING @ IF LON THEN ;
10 : LPDONE PRINTING @ IF FORM LOFF THEN ;
11
12 : >DISK  ( a n # -- | copy # bytes
13             from address a to block n )
14     400 /MOD SWAP >R
15     OVER + DUP >R SWAP DO
16       DUP I BLOCK 400 CMOVE
17       UPDATE FLUSH 400 +
18     LOOP R> BLOCK R> CMOVE
19     UPDATE FLUSH ;
20
21
22
23

```

```

0 ( writing a target image to disk ) HEX
1
2 NAMED is used to determine which half of
3 the page to print listing; a toggle
4
5 PRINTING is a flag to determine if a
6 listing is to be printed.
7
8 ?CR ( -- )
9   formatting word for printing listing
10  during compilation.
11
12 : LPON? PRINTING @ IF LON THEN ;
13 : LPDONE PRINTING @ IF FORM LOFF THEN ;
14
15 >DISK  ( a n # -- )
16   copy # bytes from address a to block n.
17
18
19
20
21
22
23

```

```

57
0 ( LISTIT, INDEXIT )
1
2 : PRINIT
3 LON 27 EMIT 77 EMIT 27 EMIT 61 EMIT ;
4 : PLIST BASE @ ROT ROT DECIMAL PRINIT
5 1+ SWAP DO I 2+ I DO
6   I BLOCK I 140 + BLOCK
7   ."     SCR # " I 0 3 D.R
8   ."
9   SCR # " I 140 + 0 3 D.R CR
10  25 0 DO ."      "
11  I 0 3 D.R ."    " 40 0 DO
12  OVER J 40 * I + + C@ EMIT LOOP
13  ."
14  I 0 3 D.R ."    " 40 0 DO
15  DUP J 40 * I + + C@ EMIT LOOP CR
16  LOOP CR CR CR CR DROP DROP
17  LOOP FORM 2 +LOOP LOFF BASE ! ;
18 : PINDEX DECIMAL PRINIT 1+ SWAP DO
19  I 60 + 281 MIN I DO I BLOCK I 0 4 D.R
20  ."    " 40 0 DO DUP I + C@ EMIT LOOP CR
21  DROP LOOP FORM 60 +LOOP LOFF ;
22
23

```

```

scr # 58
0 ( LISTIT, INDEXIT & LOAD CONTROL )
1
2 : LISTIT BASE -@ ROT ROT DECIMAL PRINIT
3 1+ SWAP DO I 4 + I DO
4   I BLOCK I 1+ BLOCK
5   ."     SCR # " I 0 3 D.R
6   ."
7   SCR # " I 1+ 0 3 D.R CR
8   25 0 DO ."      "
9   I 0 3 D.R ."    " 40 0 DO
10  OVER J 40 * I + + C@ EMIT LOOP
11  ."
12  I 0 3 D.R ."    " 40 0 DO
13  DUP J 40 * I + + C@ EMIT LOOP CR
14  LOOP CR CR CR CR DROP DROP
15  2 +LOOP FORM 4 +LOOP LOFF BASE ! ;
16 : INDEXIT DECIMAL PRINIT 1+ SWAP DO
17  I 48 + 281 MIN I DO I BLOCK I 0 4 D.R
18  ."    " 40 0 DO DUP I + C@ EMIT LOOP CR
19  DROP LOOP FORM 48 +LOOP LOFF ;
20
21
22
23
59
0
1
2
3
4
5
6
7
8
9

```

```

10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

:clr # 60
0 ( BOOT1 copy EDDE to ramcard ) HEX
1
2 FRAG BOOT1 SEI, 00 #B LDA,
3 67F8 STA, 67F9 STA, ( disk id )
4 3C STA, 42 STA,
5 20 #B LDA, 3D STA, 43 STA,
6 2F #B LDA, 3F STA, FF #B LDA, 3E STA,
7 SEC, C311 JSR, ( auxmove )
8 C009 STA, C083 LDA, C083 LDA,
9 00 #B LDA, 3C STA, 42 STA,
10 20 #B LDA, 3D STA, D0 #B LDA, 43 STA,
11 2F #B LDA, 3F STA, FF #B LDA, 3E STA,
12 SEC, C311 JSR, ( auxmove )
13 C08F LDA, C08F LDA,
14 00 #B LDA, 3C STA, 42 STA,
15 38 #B LDA, 3D STA, D0 #B LDA, 43 STA,
16 67 #B LDA, 3F STA, FF #B LDA, 3E STA,
17 SEC, C311 JSR, ( auxmove )
18 C005 STA, C003 STA,
19 0 #B LDA, 39E STA, ( force cold start)
20 D200 JMP,
21
22
23

```

```

61
0 ( 2.REVERSE ) HEX
1
2 ( START LENGTH --- )
3 FRAG 2.REVERSE
4 0 SP) LDA, X0 STA,
5 1 SP) LDA, X0 1+ STA,
6 2 SP) LDA, X1 STA,
7 3 SP) LDA, X1 1+ STA,
8 INX, INX, INX, INX, XSAVE STX,
9 0 #B LDX,
10
11
12
13
14
15
16
17
18
19
20

```

```

0 FRAG BOOT1
1 PURPOSE: move EDDE image to romcard.
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 FRAG 2.REVERSE ( start length -- )
1 PURPOSE: reverse the order of bytes,
2 e.g., first byte is placed at the end,
3 last byte is placed at the beginning.
4 REASON: to move a section of a length
5 from 1 end to the other in place (ie,
6 without a buffer of equal length) can
7 be done with a reverse of the entire
8 section then reversal of 2 subsets of
9 the length.
10
11 store the length in X0, the starting
12 address in X1.
13 set X-reg to 0 to defeat addressing
14 mode (eg, LDA(Sz-page-adr,X)).
15 while the length is greater than 2,
16 decrement the number of pages (X0),
17 set X2 to be equal to X0+X1 minus
18 1 page and decrement X0+1.
19 swap 1 page of bytes betw X0,Y (Y=FF)
20 and (X2,X) (X=0).

```

21
22
23

scr # 62

0 (2.REVERSE ...) HEX
 1
 2 BEGIN, X0 1+ LDA, 2 #B CMP, CS
 3 WHILE, X0 1+ DEC, CLC,
 4 X1 LDA, X0 ADC, X2 STA,
 5 X1 1+ LDA, X0 1+ ADC, X2 1+ STA,
 6 X0 1+ DEC, OFF #B LDY,
 7 BEGIN, X1)Y LDA, X3 STA,
 8 X2 X) LDA, X1)Y STA, X3 LDA,
 9 X2 X) STA, DEY, X2 INC, EQ
 10 UNTIL, X2 1+ INC, OFF #B CPY, NE
 11 IF, 0 #B CPY, NE
 12 IF,
 13 BEGIN,
 14 X1)Y LDA, X3 STA, X2 X) LDA,
 15 X1)Y STA, X3 LDA, X2 X) STA,
 16 X2 INC, DEY, EQ
 17 UNTIL,
 18 ENDIF,
 19 X1)Y LDA, X3 STA, X2 X) LDA,
 20 X1)Y STA, X1)Y STA, X3 LDA,
 21 X2 X) STA,
 22 ENDIF, X1 1+ INC.
 23 REPEAT,

63

0 (2.REVERSE ...) HEX
 1
 2 X0 LDA, .A LSR, CLC,
 3 X0 1+ LDY, NE IF, 80 #B ADC, ENDIF,
 4 TAY,
 5 X1 ADC, X2 STA, 0 #B LDA,
 6 X1 1+ ADC, X2 1+ STA,
 7 X0 LSR, CS
 8 IF, X2 INC, EQ IF, X2 1+ INC, ENDIF,
 9 ENDIF,
 10 BEGIN, DEY, OFF #B CPY, NE
 11 WHILE,
 12 X1)Y LDA, X3 STA,
 13 X2 X) LDA, X1)Y STA,
 14 X3 LDA, X2 X) STA,
 15 X2 INC, EQ IF, X2 1+ INC, ENDIF,
 16 REPEAT,
 17 XSAVE LDX, <XNEXT> JMP,
 18
 19
 20
 21
 22
 23

scr # 64

0 (2.QUE) HEX
 1
 2 FRAG 2.QUE C010 STA,
 3 FF #B CMP, 0 #B ADC,
 4 7F #B AND, 20 #B CMP, NC

46

21 exchange the last bytes.
 22 ...
 23

0 (2.REVERSE...) HEX
 1
 2 BEGIN, X0 1+ LDA, 2 #B CMP, CS
 3 WHILE, X0 1+ DEC, CLC,
 4 X1 LDA, X0 ADC, X2 STA,
 5 X1 1+ LDA, X0 1+ ADC, X2 1+ STA,
 6 X0 1+ DEC, OFF #B LDY,
 7 BEGIN, X1)Y LDA, X3 STA,
 8 X2 X) LDA, X1)Y STA, X3 LDA,
 9 X2 X) STA, DEY, X2 INC, EQ
 10 UNTIL, X2 1+ INC, OFF #B CPY, NE
 11 IF, 0 #B CPY, NE
 12 IF,
 13 BEGIN,
 14 X1)Y LDA, X3 STA, X2 X) LDA,
 15 X1)Y STA, X3 LDA, X2 X) STA,
 16 X2 INC, DEY, EQ
 17 UNTIL,
 18 ENDIF,
 19 X1)Y LDA, X3 STA, X2 X) LDA,
 20 X1)Y STA, X1)Y STA, X3 LDA,
 21 X2 X) STA,
 22 ENDIF, X1 1+ INC,
 23 REPEAT,

0 (2.REVERSE...) HEX
 1
 2 X0 LDA, .A LSR, CLC,
 3 X0 1+ LDY, NE IF, 80 #B ADC, ENDIF,
 4 TAY,
 5 X1 ADC, X2 STA, 0 #B LDA,
 6 X1 1+ ADC, X2 1+ STA,
 7 X0 LSR, CS
 8 IF, X2 INC, EQ IF, X2 1+ INC, ENDIF,
 9 ENDIF,
 10 BEGIN, DEY, OFF #B CPY, NE
 11 WHILE,
 12 X1)Y LDA, X3 STA,
 13 X2 X) LDA, X1)Y STA,
 14 X3 LDA, X2 X) STA,
 15 X2 INC, EQ IF, X2 1+ INC, ENDIF,
 16 REPEAT,
 17 XSAVE LDX, <XNEXT> JMP,
 18
 19
 20
 21
 22
 23

0 FRAG 2.QUE (--)
 1 PURPOSE: add a character to key queue
 2 during pattern search.
 3
 4 clear keyboard buffer.

4,806,916

47

```
5 IF, TAY, HIMEM ,Y LDA, ENDIF,
6 CHAR LDY, PL
7 IF, 80 #B ORA, CHAR STA,
8 ELSE, QIN LDY, KQUE .Y STA, DEY, MI
9 IF, 4 #B LDY, ENDIF, QIN STY,
10 ENDIF, RTS,
11 .
12 .
13 .
14 .
15 .
16 .
17 .
18 .
19 .
20 .
21 .
22 .
23
```

65

```
0 ( MATCH ) HEX
1
2 FRAG MATCH
3 X3 STY, TYA, CLC,
4 PATT ADC, TAY, PATT LDX,
5 BEGIN, DEY, DEX, PL
6 WHILE,
7 PATT 1+ ,X LDA, 61 #B CMP, CS
8 IF, 7B #B CMP, CS
9 IF, X0 )Y CMP, NE
10 IF, X3 LDY, RTS, ENDIF,
11 ELSE, X0 )Y EOR, ODF #B AND, NE
12 IF, X3 LDY, RTS, ENDIF,
13 ENDIF,
14 ELSE, X0 )Y CMP, NE
15 IF, X3 LDY, RTS, ENDIF,
16 ENDIF,
17 REPEAT,
18 PLA, PLA, XSAVE LDX,
19 CLC, X3 LDA, X0 ADC, 0 SP) STA,
20 0 #B LDA, X0 1+ ADC, 1 SP) STA,
21 <XNEXT> JMP,
22
23
```

48

```
5 decode key.
6 if a regular character then add
7 to key queue.
8
9
10 NOTE: A-reg holds C000 value before
11 calling this routine.
12
13
14
15
16
17
18
19
20
21
22
23
```

```
0 FRAG MATCH ( 0 -- 0 | addr )
1 PURPOSE: compare pattern at PATT to text
2 at X0+Y.
3
4 input:
5 X0      address of text
6 Y      offset beyond X0      X3
7 PATT    length of pattern   X
8 PATT+1  pattern (X chars)
9
10 store pattern length + offset in Y
11 store pattern length      in X
12 for each character in pattern
13 get the character from PATT
14 if it is lower case (61 thru 7A)
15 ignore case
16 if it doesn't match restore Y-reg.
17 else: if it doesn't match exactly:
18     restore Y register
19 if all characters match:
20 discard return address (to exit from
21 2.SEEK> or 2.SEEK<).
22 restore X register
23 add offset to address, place on stack
```

scr # 66

```
0 ( 2.SEEK> ) HEX
1
2 ( LEFTSIDE RIGHTSIDE -- ADDR | 0 )
3 FRAG 2.SEEK>
4 SEC,
5 2 SP) LDA, X0 STA, 0 SP) SBC, X5 STA,
6 3 SP) LDA, X0 1+ STA, 1 SP) SBC,
7 X5 1+ STA, INX, INX, 0 #B LDA,
8 0 SP) STA, 1 SP) STA, CS
9 IF, <XNEXT> JMP, ENDIF,
10
11 XSAVE STX, SEC,
12 0 #B LDA, X5 SBC, X5 STA,
13 0 #B LDA, X5 1+ SBC, X5 1+ STA,
14
15 PATT 1+ LDA, ODF #B AND, X1 STA,
```

```
0 FRAG 2.SEEK>
1 ( leftside rightside -- addr | 0 )
2 PURPOSE: search for pattern among text
3 characters from leftside to rightside.
4
5 store leftside in X0
6 store negative of length of text to be
7 searched in X5
8 store default 0 on stack
9 return on negative length
10 save X register
11 negate value in X5
12 store first two characters from PATT
13 in X1 and X2, ignoring case
14
15 NOTE1: 2.SEEK> is exitted when 2.MATCH
```

```

16 PATT 2+ LDA, ODF #B AND, X2 STA,
17
18
19
20
21
22
23
67
0 ( 2.SEEK> ... ) HEX
1
2 BEGIN, X5 LDA, 90 #B CMP,
3 X5 1+ LDA, 0 #B SBC, CS
4 WHILE, PATT LDY, DEY, EQ
5 IF, BEGIN, XO )Y LDA, ODF #B AND,
6 X1 CMP, EQ IF, \ MATCH JSR, ENDIF,
7 INY, MI UNTIL,
8 ELSE, 1 #B LDY,
9 BEGIN, XO )Y LDA, ODF #B AND, X2 CMP,
10 EQ IF, DEY, XO )Y LDA, ODF #B AND,
11 X1 CMP, EQ IF, \ MATCH JSR, ENDIF,
12 INY, XO )Y LDA, ODF #B AND, ENDIF,
13 INY, X1 CMP, EQ
14 IF, XO )Y LDA, ODF #B AND, X2 CMP,
15 EQ IF, DEY, \ MATCH JSR, INY, ENDIF,
16 ENDIF, INY, MI UNTIL,
17 ENDIF, CLC,
18 C000 LDA, MI IF, \ 2.QUE JSR, ENDIF,
19 XO LDA, 80 #B ADC, XO STA, CS
20 IF, XO 1+ INC, ENDIF, SEC,
21 X5 LDA, 80 #B SBC, X5 STA, NC
22 IF, X5 1+ DEC, ENDIF,
23 REPEAT,

```

scr # 68

```

0 ( 2.SEEK> ... ) HEX
1
2 0 #B LDY, -
3 BEGIN,
4 XO )Y LDA, ODF #B AND, X1 CMP, EQ
5 IF, \ MATCH JSR, ENDIF,
6 INY, X5 CPY, EQ
7 UNTIL,
8 XSAVE LDX, <XNEXT> JMP,
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

16 discards the return address of 2.SEEK>
17 or if no match is found.
18
19
20
21
22
23
0
1 while there are more than 90 characters
2 to be searched
3 for a pattern length of one
4 compare with 80 text characters
5 ignoring case
6 for each match: call MATCH
7 for a pattern length greater than one
8 for the first 80 text characters
9 incrementing two at a time
10 compare first two pattern characters
11 ignoring case
12 for each matched pair: call MATCH
13 check for key press, call .QUE if need
14 to add character to key queue after
15 every 80 characters searched.
16 increment address of text to be
17 searched by 80
18 decrement length to be searched by 80

```

69

```

0 ( 2.SEEK< ) HEX
1
2 ( LEFTSIDE RIGHTSIDE --- ADDR OR 0 )
3 FRAG 2.SEEK<
4 SEC,
5 0 SP) LDA, X0 STA, 2 SP) SBC, X5 STA,
6 1 SP) LDA, X0 1+ STA, 3 SP) SBC,
7 X5 1+ STA,
8 INX, INX, 0 #B LDY, 0 SP) STY,
9 1 SP) STY, NC
10 IF, <XNEXT> JMP, ENDIF,
11 X5 ORA, EQ IF, <XNEXT> JMP, ENDIF,
12 XSAVE STX,
13
14 PATT 1+ LDA, ODF #B AND, X1 STA,
15 PATT 2+ LDA, ODF #B AND, X2 STA,
16
17
18
19
20
21
22
23

```

```

0 FRAG 2.SEEK<
1 ( leftside rightsid -- addr | 0 )
2 PURPOSE: search for pattern among text
3 characters from rightside to leftside.
4
5 store rightsid in X0
6 store length of text to be searched
7 in X5
8 store default 0 on stack
9 return on negative or zero length
10 save X register
11 store first two characters from PATT
12 in X1 and X2, ignoring case
13
14
15 NOTE1: 2.SEEK< is exitted when 2.MATCH
16 discards the return address of 2.SEEK<
17 or if no match is found.
18
19
20
21
22
23

```

scr # 70

```

0 ( 2.SEEK< ... ) HEX
1
2 BEGIN, X5 LDA, 90 #B CMP,
3 X5 1+ LDA, 0 #B SBC, CS
4 WHILE, X0 LDA, 80 #B SBC, X0 STA, NC
5 IF, X0 1+ DEC, SEC, ENDIF,
6 X5 LDA, 80 #B SBC, X5 STA, NC
7 IF, X5 1+ DEC, ENDIF,
8 7F #B LDY, PATT LDX, DEX, EQ
9 IF,
10 BEGIN, X0 )Y LDA, ODF #B AND,
11 X1 CMP, EQ IF, \ MATCH JSR, ENDIF,
12 DEY, MI UNTIL,
13 ELSE, BEGIN, X0 )Y LDA, ODF #B AND,
14 X1 CMP, EQ IF, INY, X0 )Y LDA,
15 ODF #B AND, DEY, X2 CMP, EQ
16 IF, \ MATCH JSR, ENDIF, X0 )Y LDA,
17 ODF #B AND, ENDIF, DEY, X2 CMP, EQ
18 IF, X0 )Y LDA, ODF #B AND, X1 CMP,
19 EQ IF, \ MATCH JSR, ENDIF,
20 ENDIF, DEY, MI UNTIL,
21 ENDIF,
22 C000 LDA, MI IF, \ 2.QUE JSR, ENDIF,
23 REPEAT,

```

71

```

0 ( 2.SEEK< ... ) HEX
1
2 X0 LDA, X5 SBC, X0 STA, NC
3 IF, X0 1+ DEC, ENDIF, X5 LDY,
4
5 BEGIN,
6 X0 )Y LDA, ODF #B AND, X1 CMP, EQ
7 IF, \ MATCH JSR, ENDIF,
8 DEY, EQ
9 UNTIL,

```

```

0
1 while there are more than 90
2 characters to be searched
3 decrement address of text to be
4 searched by 80
5 decrement length to be searched by 80
6 for a pattern length of one
7 compare with 80 text characters
8 ignoring case
9 for each match: call MATCH
10 for a pattern length greater than one
11 for the first 80 text characters
12 decrementing two at a time
13 compare first two pattern characters
14 ignoring case
15 for each matched pair: call MATCH
16 check for key press and add characters
17 to key queue as necessary after
18 searching every 80 characters.
19
20
21
22
23

```

```

0
1 for less than 90 characters to be
2 searched
3 for each character match, ignoring
4 case: call MATCH
5 match failed
6 restore X register
7
8
9

```

```

10
11 XSAVE LDX, <XNEXT> JMP,
12
13
14
15 .
16
17
18
19
20
21
22
23

```

```

10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

scr # 72

```

0 ( 2.AJUST ) HEX
1 FRAG 2.AJUST
2 0 #B LDY, Y1 STY, Y2 STY,
3 WR LDA, EOS CMP,
4 WR 1+ LDA, EOS 1+ SBC,
5 WC LDA, Y0 STA, CS
6 IF, <XNEXT> JMP, ENDIF,
7 WR ADC, X1 STA, TYA,
8 WR 1+ ADC, X1 1+ STA, ( X1=LINE END )
9 BOS LDA, X1 CMP,
10 BOS 1+ LDA, X1 1+ SBC, CS
11 IF, ( BOS>=LINE END )
12 X1 LDA, EBOT SBC, X0 STA,
13 X1 1+ LDA, EBOT 1+ SBC, NC
14 IF, <XNEXT> JMP, ENDIF,
15 X1 LDA, BEOT CMP,
16 X1 1+ LDA, BEOT 1+ SBC, CS
17 IF, <XNEXT> JMP, ENDIF, SEC,
18 BOS LDA, BEOT SBC, X2 STA,
19 BOS 1+ LDA, BEOT 1+ SBC, X2 1+ STA,
20 X2 LDA, X0 SBC,
21 X2 1+ LDA, 0 #B SBC, CS
22 IF, <XNEXT> JMP, ENDIF,
23 ENDIF,

```

```

73
0 ( 2.AJUST ... ) HEX
1
2 BOS LDA, X2 STA,
3 BOS 1+ LDA, X2 1+ STA,
4 EOS LDA, X3 STA,
5 EOS 1+ LDA, X3 1+ STA,
6 BEOT LDA, X1 CMP,
7 BEOT 1+ LDA, X1 1+ SBC, CS
8 IF, X2 LDA, BEOT CMP,
9 X2 1+ LDA, BEOT 1+ SBC, CS
10 IF, X2 LDA, GAP SBC, X2 STA,
11 X2 1+ LDA, GAP 1+ SBC, X2 1+ STA,
12 ENDIF,
13 X3 LDA, BEOT CMP,
14 X3 1+ LDA, BEOT 1+ SBC, CS
15 IF, X3 LDA, GAP SBC, X3 STA,
16 X3 1+ LDA, GAP 1+ SBC, X3 1+ STA,
17 ENDIF,
18 ENDIF,
19

```

0 FRAG 2.AJUST

```

1 PURPOSE: calculates offsets to normal
2 and inverse fields during display
3 of a line.
4
5 clear Y-reg, Y1 and Y2.
6 subtract EOS from WR (setting carry).
7 store wrap count in Y0.
8 if wrap address >= to EOS then exit.
9 otherwise add wrap count to wrap address
10 and store answer in X1 (line end).
11 if BOS >= line end (X1) and
12 if EBOT > line end (X1) then exit
13 else store line end (X1) - EBOT in X0.
14 otherwise (BOS still >= line end and)
15 if line end (X1) >= BEOT then exit.
16 otherwise store BOS - BEOT in X2.
17 if (BOS-BEOT) >= (line end-EBOT)
18 then exit.
19
20
21
22
23

```

```

0
1 otherwise store BOS in X2 and EOS
2 in X3.
3 if BEOT >= line end (X1) and
4 if BOS (X2) >= BEOT then store BOS -
5 GAP in X2.
6 if EOS (X3) >= BEOT then store EOS -
7 GAP in X3.
8
9
10
11
12
13
14
15
16
17
18
19

```

```

20
21
22
23
scr # 74
0 ( 2.AJUST ... ) HEX
1
2 WR LDA, X2 CMP, ( WRAP>=BOS )
3 WR 1+ LDA, X2 1+ SBC, CS
4 IF, X3 LDA, X1 CMP, ( EOS>=ENDLINE )
5 X3 1+ LDA, X1 1+ SBC, CS
6 IF, Y0 LDA, Y1 STA,
7 ELSE, SEC, X3 LDA, WR SBC, Y1 STA,
8 SEC, X1 LDA, X3 SBC, Y2 STA,
9 ENDIF, Y0 STY,
10 ELSE, SEC, ( WRAP<BOS )
11 X2 LDA, WR SBC, Y0 STA,
12 X3 LDA, X1 CMP, ( EOS>=ENDLINE )
13 X3 1+ LDA, X1 1+ SBC, CS
14 IF, X1 LDA, X2 SBC, Y1 STA,
15 ELSE, SEC,
16 X3 LDA, X2 SBC, Y1 STA, SEC,
17 X1 LDA, X3 SBC, Y2 STA,
18 ENDIF,
19 ENDIF,
20 <XNEXT> JMP,
21
22
23
75

```

```

0 ( 2.TOBUFF ) HEX
1
2 FRAG 2.TOBUFF
3 XSAVE STX,
4 50 #B LDY, WC CPY, NE
5 IF, A0 #B LDA,
6 BEGIN, DEY, CURR ,Y STA, WC CPY, EQ
7 UNTIL,
8 ENDIF, DEY,
9 Y2 LDX, NE
10 IF, WR )Y LDA, 1D #B CMP, EQ
11 IF, A0 #B LDA, CURR ,Y STA, DEY, DEX,
12 ENDIF, NE
13 IF,
14 BEGIN, WR )Y LDA, 80 #B ORA,
15 CURR ,Y STA, DEY, DEX, EQ
16 UNTIL,
17 ENDIF, ENDIF,
18
19
20
21
22
23

```

```

20
21
22
23
0
1 if wrap address >= BOS and
2 if EOS (X3) >= line end (X1)
3 then store Y0 in Y1
4 else store EOS (X1) - wrap address
5 in Y1, Y2.
6 store Y-reg in Y0.
7 else (WRAP<BOS)
8 store BOS (X2) - wrap address in Y0,
9 if EOS >= line end then
10 store Y1 with line end (X1) - BOS (X2)
11 exit
12
13
14
15
16
17
18
19
20
21
22
23
0 FRAG 2.TOBUFF
1 PURPOSE: convert/move text to display
2 buffer highlighting selected text.
3 CAPS = 0 thru 1F
4 cr = 7F
5 normal text with high bit on
6 cr = A0
7
8 input:
9 WC      count of characters from text
10 WR     address of text
11 Y2      count of trailing blanks
12 Y1      count of selected text
13 PRINT? flag true if printing
14           false if displaying
15 Y0      count of leading normal text
16
17 output:
18 CURR display buffer holds converted
19 text
20
21
22
23

```

```

scr # 76
0 ( 2.TOBUFF ... ) HEX
1
2 Y1 LDX, NE
3 IF, WR )Y LDA, 1D #B CMP, EQ

```

```

0
1
2
3

```

```

4 IF. 7F #B LDA, CURR ,Y STA, DEY, DEX,      4
5 ENDIF, NE          5
6 IF,               6
7 BEGIN, PRINT? LDA, EQ      7
8 IF, WR )Y LDA, 40 #B CMP, CS      8
9 IF, 60 #B CMP, NC      9
10 IF, 1F #B AND, ENDIF,      10
11 ENDIF,           11
12 ELSE, WR )Y LDA,      12
13 ENDIF, CURR ,Y STA,      13
14 DEY, DEX, EQ      14
15 UNTIL,           15
16 ENDIF, ENDIF,      16
17                   17
18                   18
19                   19
20                   20
21                   21
22                   22
23                   23

77
0 ( 2.TOBUFF ... ) HEX      0
1                   1
2 YO LDX, NE          2
3 IF, WR )Y LDA, 1D #B CMP, EQ      3
4 IF, A0 #B LDA, CURR ,Y STA, DEY, DEX,      4
5 ENDIF, NE          5
6 IF,               6
7 BEGIN, WR )Y LDA, 80 #B ORA,      7
8 CURR ,Y STA, DEY, MI      8
9 UNTIL,           9
10 ENDIF, ENDIF,      10
11 XSAVE LDX, <XNEXT> JMP,      11
12                   12
13                   13
14                   14
15                   15
16                   16
17                   17
18                   18
19                   19
20                   20
21                   21
22                   22
23                   23

```

scr # 78

```

0 ( 2.PRESET ) HEX
1
2 FRAG 2.PRESET -
3 OLIN LDY, WND2 ,Y LDA, EQ
4 IF, DEY, ( 1ST LINE ON PAGE) .ENDIF,
5 DEY, MI IF, 0 #B LDY, ENDIF,
6 CLIN STY. CLC,
7 CLIN LDA, TOP ADC, LCTR STA,
8 0 #B LDA, TOP 1+ ADC, LCTR 1+ STA,
9 WND0 ,Y LDA, WR STA,
10 WND1 ,Y LDA, WR 1+ STA,
11 WND2 ,Y LDA, LCT STA,
12 WND3 ,Y LDA, PCT STA,
13 EBOT    LDA, XO STA,
14 EBOT 1+ LDA, XO 1+ STA,

```

0 2.PRESET
1 PURPOSE: Decides what line to refresh,
2 gets variables from window arrays,
3 moves 82 bytes at BEOT to EBOT to wrap
4
5 input: OLIN WND0-3
6 output: CLIN LCTR WR LCT PCT GAP
7
8 OLIN is line# of the last event.
9 WND2 is page relative line count.
10 If the old line is at the top of a pag
11 wrap beginning with the last line in
12 the preceding page.
13 else wrap beginning with the line above
14 ie:

```

15 BEOT LDA, X1 STA,
16 BEOT 1+ LDA, X1 1+ STA, 51 #B LDY,
17 BEGIN, X1 )Y LDA, X0 )Y STA, DEY, MI
18 UNTIL, SEC,
19 BEOT LDA, EBOT SBC, GAP STA,
20 BEOT 1+ LDA, EBOT 1+ SBC, GAP 1+ STA,
21 <XNEXT> JMP,
22
23
79
0 ( 2.40COL 2.MON 2.ABOOT ) HEX
1
2 FRAG 2.40COL
3 C051 LDA, COOE STA,
4 C056 LDA, COOC STA,
5 C054 LDA, COOO STA,
6 F0 #B LDA, 36 STA,
7 FD #B LDA, 37 STA,
8 FF #B LDA, 32 STA,
9 0 #B LDA, 24 STA, 25 STA, RTS,
10
11 FRAG 2.ABOOT \ 2.40COL JSR,
12 0 #B LDA, 3F4 STA, 39E STA, 3E0 JMP,
13
14 { copy text & variables to main ram }
15 FRAG 2.MON \ 2.40COL JSR, FFF8-LDA,
16 EQ IF, 3C STA, 3D STA, 42 STA, 43 STA,
17 EBOT LDA, 3E STA,
18 EBOT 1+ LDA, 3F STA, CLC, C311 JSR,
19 BEOT LDA, 3C STA, 42 STA,
20 BEOT 1+ LDA, 3D STA, 43 STA,
21 FF LDA, 3E STA,
22 BF #B LDA, 3F STA, CLC, C311 JSR,
23 ENDIF, <MON> JMP,

```

```

15 CLIN = OLIN - 1 (not first line)
16 CLIN = OLIN - 2 (first line on page)
17 CLIN = 0 (first line in text)
18 LCTR = TOP + CLIN
19 WR = CLINth element in WND0 and WND1
20 LCT = " WND2
21 PCT = " WND3
22 Move 82 bytes at BEOT to EBOT.
23 GAP = BEOT - EBOT

```

scr # 80

```

0 ( 2.<READ> ) HEX
1
2 FRAG 2.<READ>-
3 XSAVE STX, F0 #B LDY,
4 0 #B LDA, X0 STA, B3 #B LDX,
5 X0 1+ STX, C0 #B LDA, X5 STA, CLV,
6 SEI,
7 BEGIN,
8 BEGIN, COEC LDA, MI UNTIL,
9 BEGIN, SWAP
10 BEGIN, SWAP ED #B CMP, EQ UNTIL,
11 BEGIN, COEC LDA, MI UNTIL,
12 DE #B CMP, EQ
13 UNTIL, BEGIN, COEC LDA, MI UNTIL,
14 DA #B CMP, EQ
15 UNTIL,
16 BEGIN,
17 BEGIN, COEC LDA, MI UNTIL,
18 SEC, .A ROL, X2 STA, OFF #B CPY, EQ
19 IF, INX, X5 CPX, -1 DP +! ELSE,
20 X5 HERE 3 - C! CLC, ENDIF,
21 BEGIN, COEC LDA, MI UNTIL,
22 X2 AND, X0 )Y STA, INY, X0 1+ STX, CS
23 UNTIL, XSAVE LDX, CLI, <XNEXT> JMP,

```

81 0 (*100US PHSW PHSW2 ONDL OFFDL) HEX
 1 1 FRAG *100US
 2 2 BEGIN, 11 #B LDX,
 3 3 BEGIN, DEX, EQ UNTIL,
 4 4 NOP, NOP, NOP, NOP, SEC, 1 #B SBC, EQ
 5 5 UNTIL, RTS,
 6 6
 7 7
 8 8 FRAG PHSW TRACK LDA,
 9 9 FRAG PHSW2 3 #B AND, .A ROL, TAX,
 10 10 COEO ,X LDA, RTS,
 11 11
 12 12 FRAG ONDL
 13 13 3001 , 2428 , 1E20 , 1C1D , 1C1C ,
 14 14 1C1C ,
 15 15
 16 16 FRAG OFFDL
 17 17 2C70 , 2226 , 1E1F , 1C1D , 1C1C ,
 18 18 1C1C ,
 19 19
 20 20 FRAG DL12 RTS,
 21 21
 22 22 FRAG WB30 NOP, PHA, PLA, COED ,X STA,
 23 23 COEC ,X CMP, RTS,

0 FRAG *100US (A-reg --)
 1 PURPOSE: delay by value in A-reg times
 2 100us.
 3
 4 FRAG PHSW TRACK LDA,
 5 LABEL PHSW2 3 #B AND, .A ROL, TAX,
 6 COEO ,X LDA, RTS,
 7
 8 FRAG ONDL
 9 3001 , 2428 , 1E20 , 1C1D , 1C1C ,
10 1C1C ,
11
12 FRAG OFFDL
13 2C70 , 2226 , 1E1F , 1C1D , 1C1C ,
14 1C1C ,
15
16 FRAG DL12 (--)
17 delay 12 machine cycles
18
19 FRAG WB30 (--)
20 write a byte in 30 machine cycles
21
22
23

scr # 82
 0 (2.<WRITE>) HEX
 1
 2 FRAG 2.<WRITE> XSAVE STX, OD #B LDA,
 3 X5 STA, B3 #B LDY, X0 1+ STY, CLV,
 4 0 #B LDX, X0 STX,
 5 OFO #B LDY, TYA, PHA,
 6 SEI,
 7 COED ,X LDA, COEE ,X LDA, 0 #B LDY,
 8 OFF #B LDA, COEF ,X STA, COEC ,X CMP,
 9 PHA, PLA,
 10 BEGIN, \ DL12 JSR, \ DL12 JSR,
 11 COED ,X STA, COEC ,X CMP, NOP, DEY, EQ
 12 UNTIL, ED #B LDA, \ WB30 JSR,
 13 DE #B LDA, \ WB30 JSR, \ DL12 JSR,
 14 X0 LDA,
 15 DA #B LDA, COED ,X STA, COEC ,X CMP,
 16 PLA, TAY,
 17
 18
 19
 20
 21
 22
 23

0 FRAG 2.<WRITE> (--)
 1 write a track (32 cycles per byte)
 2 from ram (B3F0 through BFFF)
 3 including:
 4 256 self-sync (40 cycle) bytes
 5 an EDDE header (ED DE DA)
 6 a 16 byte preface
 7 a 3K track image
 8
 9 soft switches:
 10 COED, COEC write a byte
 11 COED, COEE sense write protect
 12 COEF set mode to write
 13
 14 start code at a page boundary
 15
 16
 17
 18
 19
 20
 21
 22
 23

83 0 (2.<WRITE> ...) HEX
 1
 2 BEGIN, X0 LDA, X0)Y LDA, PHA, .A LSR,
 3 AA #B ORA, NOP, COED ,X STA,
 4 COEC ,X CMP, INY, EQ
 5 IF, X0 1+ INC, X5 DEC,
 6 -1 DP +! ELSE,
 7 X5 HERE 3 - C! \ DL12 JSR,
 8 ENDIF,
 9 PLA, AA #B ORA, COED ,X STA,

0
 1
 2
 3
 4
 5
 6
 7
 8
 9

```

10 COEC ,X CMP, X5 LDA, EQ          10
11 UNTIL,                           11
12 NOP, NOP, \ DL12 JSR,           12
13 DA #B LDA, COED ,X STA, COEC ,X CMP, 13
14 NOP, NOP, NOP,                 14
15 DE #B LDA, \ WB30 JSR,         15
16 FF #B LDA, \ WB30 JSR, X0 LDA, NOP, 16
17 \ DL12 JSR, COEE ,X LDA,      17
18 XSAVE LDX,                      18
19 CLI, <XNEXT> JMP,             19
20                               20
21 A0 ?FITS                         21
22                               22
23                               23

```

scr # 84

| | |
|---|-----------------------------|
| 0 (2.<SEEK>) HEX | 0 FRAG 2.<SEEK> (t --) |
| 1 | 1 PURPOSE: seek to track t. |
| 2 FRAG 2.<SEEK> O SP) LDA, X2 STA, | 2 |
| 3 INX, INX, XSAVE STX, TRACK CMP, EQ | 3 |
| 4 IF, <XNEXT> JMP, ENDIF, | 4 |
| 5 O #B LDA, X0 STA, | 5 |
| 6 SEI, | 6 |
| 7 BEGIN, TRACK LDA, X1 STA, SEC, | 7 |
| 8 X2 SBC, NE | 8 |
| 9 WHILE, NC | 9 |
| 10 IF, OFF #B EOR, TRACK INC, | 10 |
| 11 ELSE, OFE #B ADC, TRACK DEC, | 11 |
| 12 ENDIF, | 12 |
| 13 X0 CMP, CS IF, X0 LDA, ENDIF, | 13 |
| 14 OC #B CMP, NC IF, TAY, ENDIF, SEC, | 14 |
| 15 \ PHSW JSR, NOP, \ ONDL ,Y LDA, NOP, | 15 |
| 16 \ *100US JSR, X1 LDA, CLC, | 16 |
| 17 \ PHSW2 JSR, \ OFFDL ,Y LDA, | 17 |
| 18 \ *100US JSR, X0 INC, EQ | 18 |
| 19 UNTIL, HERE OVER - 1- SWAP C! | 19 |
| 20 \ *100US JSR, CLC, \ PHSW JSR, | 20 |
| 21 CLI, | 21 |
| 22 XSAVE LDX, <XNEXT> JMP, | 22 |
| 23 | 23 |

85

| | |
|------------------------------------|---|
| 0 (2.?EDDE) HEX | 0 FRAG 2.?EDDE (-- flag) |
| 1 | 1 PURPOSE: checks disk for EDDE header. |
| 2 FRAG 2.?EDDE O #B LDY, DEX, DEX, | 2 true means the disk was written by |
| 3 XSAVE STX, O SP) STY, 1 SP) STY, | 3 EDDE, which means that on that track |
| 4 20 #B LDX, SEI, | 4 can be found the bytes: ED DE DA. |
| 5 BEGIN, | 5 |
| 6 BEGIN, | 6 |
| 7 BEGIN, DEY, EQ | 7 |
| 8 IF, DEX, EQ | 8 |
| 9 IF, XSAVE LDX, CLI, <XNEXT> JMP, | 9 |
| 10 ENDIF, | 10 |
| 11 ENDIF, | 11 |
| 12 BEGIN, COEC LDA, MI UNTIL, | 12 |
| 13 OED #B CMP, EQ UNTIL, | 13 |
| 14 BEGIN, COEC LDA, MI UNTIL, | 14 |
| 15 DE #B CMP, EQ UNTIL, | 15 |
| 16 BEGIN, COEC LDA, MI UNTIL, | 16 |
| 17 DA #B CMP, EQ UNTIL, | 17 |
| 18 XSAVE LDX, O SP) INC, | 18 |
| 19 CLI, <XNEXT> JMP, | 19 |

```

20
21
22
23

```

0 FRAG 2.?APPLE (-- flag)
 1 PURPOSE: check disk for Apple header.
 2 true means initialized by Apple DOS
 3 (see ?EDDE).

```

scr # 86
 0 ( 2.?APPLE ) HEX
 1
 2 FRAG 2.?APPLE- DEX, DEX, XSAVE STX,
 3 0 #B LDY, 0 SP) STY, 1 SP) STY,
 4 7C #B LDX, 20 #B LDA, Y0 STA,
 5 SEI,
 6 BEGIN, DEY, EQ
 7 IF, Y0 DEC, EQ
 8 IF, XSAVE LDX, CLI, <XNEXT> JMP,
 9 ENDIF,
10 ENDIF,
11 BEGIN, C070 ,X LDA, MI UNTIL,
12 BEGIN, SWAP
13 BEGIN, SWAP D5 #B CMP, EQ UNTIL,
14 BEGIN, C070 ,X LDA, MI UNTIL,
15 AA #B CMP, EQ UNTIL,
16 BEGIN, C070 ,X LDA, MI UNTIL,
17 96 #B CMP, EQ UNTIL,
18 XSAVE LDX, 0 SP) INC,
19 CLI, <XNEXT> JMP,
20
21
22
23

87
 0 ( 2.CMOVE2 from bank2 to B400 )
 1
 2 FRAG 2.CMOVE2
 3 0 #B LDA, X0 STA, X1 STA, TAY,
 4 1 SP) LDA, X0 1+ STA,
 5 B4 #B LDA, X1 1+ STA,
 6 INX, INX, XSAVE STX, 0C #B LDX,
 7 BEGIN,
 8 BEGIN, X0 )Y LDA, X1 )Y STA, INY, EQ
 9 UNTIL, X0 1+ INC, X1 1+ INC, DEX, EQ
10 UNTIL,
11 XSAVE LDX, <XNEXT> JMP,
12
13 FRAG 2.CHECKSUM ( -- # )
14 F0 #B LDY, B3 #B LDA, X0 1+ STA,
15 0 #B LDA, X0 STA,
16 PHA, BEGIN, PLA,
17 BEGIN, X0 )Y EOR, INY, EQ UNTIL,
18 PHA, X0 1+ INC, X0 1+ LDA,
19 CO #B CMP, EQ UNTIL,
20 DEX, DEX, PLA, 0 SP) STA,
21 0 #B LDA, 1 SP) STA, <XNEXT> JMP,
22
23

 0 FRAG 2.CMOVE2 ( a(hi) -- ) cmove from
 1 bank to B400
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
13 2.CHECKSUM ( -- # )
14 calculate the EXCLUSIVE-OR checksum
15 for the ram buffer (B3F0 through BFFF)
16
17 NOTE: if the checksum byte is zero,
18 and the checksum is placed there,
19 the new checksum will be zero
20
21
22
23

```

```

scr # 88
 0 ( 2.?UPDATE ) HEX
 1
 2 FRAG 2.?UPDATE 0 SP) LDY,
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23

```

0 FRAG 2.?UPDATE (line# -- flag)
 1 PURPOSE: update line in window array.
 2 true means changed.

```

3 WR LDA, WND0 ,Y CMP, EQ
4 IF, WR 1+ LDA, WND1 ,Y CMP, EQ
5 IF, LCT LDA, WND2 ,Y CMP, EQ
6 IF, PCT LDA, WND3 ,Y CMP, EQ
7 IF, O #B LDA, O SP) STA, 1 SP) STA,
8 <XNEXT> JMP,
9 ENDIF, ENDIF, ENDIF, ENDIF,
10 WR LDA, WND0 ,Y STA,
11 WR 1+ LDA, WND1 ,Y STA,
12 LCT LDA, WND2 ,Y STA,
13 PCT LDA, WND3 ,Y STA,
14 OFF #B LDA, O SP) STA, 1 SP) STA.
15 <XNEXT> JMP,
16
17
18
19
20
21
22
23

```

89

```

0 ( 2.WRITE0 image ) HEX
1
2 FRAG 2.WRITE0 XSAVE STX,
3 SEI, 60 #B LDX, C08D ,X LDA,
4 C08E ,X LDA, O #B LDA,
5 TAY, X0 STA, X1 STA, C #B LDA, X2 STA,
6 FF #B LDA, C08F ,X STA, C08C ,X CMP,
7 DE #B LDA, X0 1+ STA, X0 1+ STA,
8 DF #B LDA, X1 1+ STA,
9 BEGIN,
10 BEGIN, NOP, X0 )Y LDA, PL ( 7)
11 IF, PHA, PLA, FF #B LDA, ( 3/11)
12 ENDIF, C08D ,X STA, C08C ,X ORA. ( 9)
13 X0 LDA, X0 LDA, NOP, INY, EQ ( 10)
14 UNTIL, ( 2/3)
15 BEGIN, X0 LDA, X1 )Y LDA, PL ( 8)
16 IF, PHA, PLA, FF #B LDA, ( 3/11)
17 ENDIF, C08D ,X STA, C08C ,X ORA. ( 9)
18 PHA, PLA, INY, EQ ( 9)
19 UNTIL, NOP, X2 DEC, EQ ( 7/3)
20 UNTIL, ( 2/3)
21 C08E ,X LDA,
22 XSAVE LDX, CLI, <XNEXT> JMP,
23 62 ?FITS

```

```

3
4 Y-reg holds the line#.
5 if the address of the line, the line on
6 the page and the current page have not
7 changed then put a 0 on the stack and
8 exit.
9 otherwise (the address, line or page
10 have changed) update that element in
11 the window array and put a -1 on the
12 stack.
13
14
15
16
17
18
19
20
21
22
23

```

0 FRAG 2.WRITE0
1 PURPOSE: write boot 0 track to disk.

```

scr # 90
0 ( 2.NUDGE ) HEX ;S
1
2 FRAG 2.NUDGE -
3 O #B LDY, O SP) LDA, X0 STA,
4 1 SP) LDA, X0 1+ STA, INX, INX,
5 BEGIN, EBOT LDA, PGS0 ,Y CMP,
6 EBOT 1+ LDA, PGS1 ,Y SBC, CS
7 IF, CLC,
8 PGS0 ,Y LDA, X0 ADC, PGS0 ,Y STA,
9 PGS1 ,Y LDA, X0 1+ ADC, PGS1 ,Y STA,
10 SEC,
11 ENDIF, INY, NC
12 UNTIL,
13 WND0 LDA, X0 ADC, WND0 STA,

```

```

14 WND1 LDA, X0 1+ ADC, WND1 STA, CLC, 14
15 BOS LDA, X0 ADC, BOS STA, 15
16 BOS 1+ LDA, X0 1+ ADC, BOS 1+ STA, CLC, 16
17 EOS LDA, X0 ADC, EOS STA, 17
18 EOS 1+ LDA, X0 1+ ADC, EOS 1+ STA, CLC, 18
19 BOT LDA, X0 ADC, BOT STA, 19
20 BOT 1+ LDA, X0 1+ ADC, BOT 1+ STA, CLC, 20
21 EBOT LDA, X0 ADC, EBOT STA, 21
22 EBOT 1+ LDA, X0 1+ ADC, EBOT 1+ STA, 22
23 <XNEXT> JMP, 23

91
0 ( 2.SERIAL# ) HEX
1
2 FRAG .SERIAL# 0 #B LDY,
3 BEGIN, DEY, NE
4 WHILE, X0 )Y LDA,
5 CLC, X2 ADC, X2 STA, CS
6 IF, X2 1+ INC, ENDIF,
7 X2 1+ LDA, .A ROL,
8 X2 LDA, .A ROL, X2 STA.
9 X2 1+ LDA, .A ROL, X2 1+ STA,
10 REPEAT, RTS,
11
12 FRAG 2.SERIAL# ( -- # )
13 0 #B LDA, X2 STA, X2 1+ STA,
14 EBOT LDA, EBOT 1+ LDY,
15 X0 STA, X0 1+ STY,
16 \ .SERIAL# JSR,
17 X0 1+ INC,
18 \ .SERIAL# JSR,
19 DEX, DEX, X2 LDA, 0 SP) STA,
20 X2 1+ LDA, 1 SP) STA,
21 <XNEXT> JMP,
22
23

```

0 FRAG .SERIAL#
 1 PURPOSE: calculate a unique number.
 2
 3
 4
 5
 6
 7
 8 LABEL 2.SERIAL# (-- #)
 9 PURPOSE: calculate a unique number to
 10 place on a disk.
 11
 12 start with a seed of 0
 13 start with 100 hex bytes below cursor
 14 modify the seed with those bytes
 15 end with 100 hex bytes above cursor
 16 modify the seed with those bytes
 17 store the result on the stack
 18
 19
 20
 21
 22
 23

scr # 92

```

0 ( .DECIMATE ) HEX ( later: y0,1 -> x1-5)
1
2 FRAG .DECIMATE
3 0 #B LDA, PHA,
4 PCT LDA, CLC, PAGE% ADC, X1 STA,
5 PCT 1+ LDA, PAGE% 1+ ADC, X2 STA,
6 80 #B AND, NE
7 IF, PLA, FF #B LDA, PHA,
8 X1 EOR, CLC, 1 #B ADC, X1 STA,
9 X2 LDA, FF #B EOR, 0 #B ADC, X2 STA,
10 ENDIF,
11
12
13
14
15
16
17
18
19
20
21
22
23

```

0 FRAG .DECIMATE (--)
 1 PURPOSE: subroutine convert hex number
 2 in register to ascii characters
 3 in place.
 4
 5 Y high order byte X1
 6 A low X2
 7
 8 X3 ten thousands
 9 X4 thousands
 10 X5 hundreds
 11 Y0 tens
 12 Y1 ones
 13 X1 -1 is negative, 0 is positive
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23

93

| | | |
|---|-----|----|
| 0 (.DECIMATE ...) | HEX | 0 |
| 1 | | 1 |
| 2 SEC, OFF #B LDY, | | 2 |
| 3 BEGIN, INY, X1 LDA, 10 #B SBC, X1 STA, | | 3 |
| 4 X2 LDA, 27 #B SBC, X2 STA, NC UNTIL, | | 4 |
| 5 X1 LDA, 10 #B ADC, X1 STA, | | 5 |
| 6 X2 LDA, 27 #B ADC, X2 STA, TYA, | | 6 |
| 7 30 #B ORA, X3 STA, SEC, OFF #B LDY, | | 7 |
| 8 BEGIN, INY, X1 LDA, E8 #B SBC, X1 STA, | | 8 |
| 9 X2 LDA, 03 #B SBC, X2 STA, NC UNTIL, | | 9 |
| 10 X1 LDA, E8 #B ADC, X1 STA, | | 10 |
| 11 X2 LDA, 03 #B ADC, X2 STA, TYA, | | 11 |
| 12 30 #B ORA, X4 STA, SEC, OFF #B LDY, | | 12 |
| 13 BEGIN, INY, X1 LDA, 64 #B SBC, X1 STA, | | 13 |
| 14 X2 LDA, 00 #B SBC, X2 STA, NC UNTIL, | | 14 |
| 15 X1 LD _A , 64 #B ADC, PHA, | | 15 |
| 16 TYA, 30 #B ORA, X5 STA, | | 16 |
| 17 SEC, OFF #B LDY, PLA, | | 17 |
| 18 BEGIN, INY, OA #B SBC, NC UNTIL, | | 18 |
| 19 OA #B ADC, 30 #B ORA, Y1 STA, | | 19 |
| 20 TYA, 30 #B ORA, Y0 STA, | | 20 |
| 21 PLA, X1 STA, RTS, | | 21 |
| 22 | | 22 |
| 23 | | 23 |

scr # 94

| | |
|---|------------|
| 0 (2.PAGEPRINT) | HEX |
| 1 FRAG 2.PAGEPRINT | XSAVE STX, |
| 2 W/2 LDA, MARGIN% ADC, .BL ADC, X2 STA, | |
| 3 X2 DEC, | |
| 4 BEGIN, 20 #B LDX, <LEMIT2> JSR, X2 DEC, | |
| 5 EQ UNTIL, \ .DECIMATE JSR, X1 LDX, NE | |
| 6 IF, 2D #B LDX, <LEMIT2> JSR, ENDIF, | |
| 7 X3 LDX, 30 #B CPX, NE | |
| 8 IF, <LEMIT2> JSR, X4 LDX, <LEMIT2> JSR, | |
| 9 X5 LDX, <LEMIT2> JSR, | |
| 10 Y0 LDX, <LEMIT2> JSR, | |
| 11 ELSE, X4 LDX, 30 #B CPX, NE | |
| 12 IF, <LEMIT2> JSR, | |
| 13 X5 LDX, <LEMIT2> JSR, | |
| 14 Y0 LDX, <LEMIT2> JSR, | |
| 15 ELSE, X5 LDX, 30 #B CPX, NE | |
| 16 IF, <LEMIT2> JSR, | |
| 17 Y0 LDX, <LEMIT2> JSR, | |
| 18 ELSE, Y0 LDX, 30 #B CPX, NE | |
| 19 IF, <LEMIT2> JSR, | |
| 20 ENDIF, ENDIF, ENDIF, ENDIF, | |
| 21 Y1 LDX, <LEMIT2> JSR, | |
| 22 0D #B LDX, <LEMIT2> JSR, | |
| 23 XSAVE LDX, <XNEXT> JMP, | |

95

| | |
|--|---------------------|
| 0 (2.SHOWPAGE) | HEX |
| 1 | |
| 2 FRAG 2.SHOWPAGE | WR LDA, EOT CMP, EQ |
| 3 IF, WR 1+ LDA, EOT 1+ CMP, EQ | |
| 4 IF, (4F #B LDY, A0 #B LDA, scroll | |
| 5 BEGIN, CURR ,Y STA, DEY, MI problem? | |
| 6 UNTIL,) <XNEXT> JMP, | |
| 7 ENDIF, ENDIF, | |
| 8 OBD #B LDY, WC LDA, EQ | |
| 9 IF, AD #B LDY, ENDIF, SEC. | |

| | |
|---------------------------------------|---------------------------------|
| 0 FRAG 2.PAGEPRINT | (--) |
| 1 PURPOSE: | print number at bottom of page. |
| 2 | |
| 3 input: | W/2 MARGIN% PCT PAGE% |
| 4 | |
| 5 add MARGIN% to W/2 | |
| 6 add PCT to PAGE%, all 16 bits | |
| 7 convert to decimal ascii characters | |
| 8 replace Apple output vector | |
| 9 with printer driver | |
| 10 print half a line of blanks | |
| 11 print page number ascii characters | |
| 12 restore output vector | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |

| | |
|---|--------------------------------|
| 0 FRAG 2.SHOWPAGE | (--) |
| 1 PURPOSE: | display page break symbols and |
| 2 page number. | |
| 3 | |
| 4 if WRAP got to end of text, | |
| 5 issue a line of spaces | |
| 6 Y register holds pagebreak symbol | |
| 7 if wrap count is zero, | |
| 8 use implicit symbol: "--" (ascii AD), | |
| 9 else explicit symbol: "=" (ascii BD) | |

```

10 WR LDA, BOS SBC, X2 STA,
11 WR 1+ LDA, BOS 1+ SBC, X2 1+ STA, CS
12 IF, WR LDA, EOS CMP,
13 WR 1+ LDA, EOS 1+ SBC, NC
14 IF, TYA, 80 #B EOR, TAY, ENDIF,
15 ENDIF,
16 X2 LDA, X2 1+ ORA, EQ
17 IF, WC LDA, EQ IF, AD #B LDY, ENDIF,
18 ENDIF,
19 TYA, 4F #B LDY, CLC,
20 BEGIN, CURR ,Y STA, DEY, MI UNTIL,
21 80 #B AND, XO STA,
22
23

```

```

10 if WR is equal to or greater than BOS
11 if WR less than EOS
12 toggle high bit (80) of symbol
13 (make highlighted)
14 if WR is equal to BOS,
15 if wrap count zero,
16 use implicit symbol: "--" (ascii AD)
17 fill CURR with symbol
18 strip high bit (80) of symbol
19 (highlighting bit: false=highlight)
20 and store it in XO
21 place decimal page number in center
22 with a space on either side
23

```

scr # 96

```

0 ( 2.SHOWPAGE ... ) HEX
1
2 \ .DECIMATE JSR, 25 #B LDY,
3 20 #B LDA, XO ORA, CURR ,Y STA, INY,
4 X1 LDA, NE IF,
5 2D #B LDA, XO ORA, CURR ,Y STA, INY,
6 ENDIF, X3 LDA, 30 #B CMP, NE
7 IF, XO ORA, CURR ,Y STA, INY,
8 X4 LDA, XO ORA, CURR ,Y STA, INY,
9 X5 LDA, XO ORA, CURR ,Y STA, INY,
10 Y0 LDA, XO ORA, CURR ,Y STA, INY,
11 ELSE, X4 LDA, 30 #B CMP, NE
12 IF, XO ORA, CURR ,Y STA, INY,
13 X5 LDA, XO ORA, CURR ,Y STA, INY,
14 Y0 LDA, XO ORA, CURR ,Y STA, INY,
15 ELSE, X5 LDA, 30 #B CMP, NE
16 IF, XO ORA, CURR ,Y STA, INY,
17 Y0 LDA, XO ORA, CURR ,Y STA, INY,
18 ELSE, Y0 LDA, 30 #B CMP, NE
19 IF, XO ORA, CURR ,Y STA, INY,
20 ENDIF, ENDIF, ENDIF, ENDIF,
21 Y1 LDA, XO ORA, CURR ,Y STA, INY,
22 20 #B LDA, XO ORA, CURR ,Y STA,
23 <XNEXT> JMP,

```

97

```

0 ( 2.0K 2.?X ) HEX
1
2 FRAG 2.0K DEX, DEX,
3 0 #B LDY, 1 SP) STY,
4 CHAR LDA, 7F #B AND,
5 0 SP) STA, CHAR STA,
6 QOUT LDY, QIN CPY, NE
7 IF, KQUE ,Y LDA, DEY, MI
8 IF, 4 #B LDY, ENDIF, QOUT STY,
9 80 #B ORA, CHAR STA,
10 ENDIF, <XNEXT> JMP,
11
12 FRAG 2.?X ( LEX OR REX? )
13 DEX, DEX, 0 #B LDY, 1 #B LDA,
14 C061 BIT, MI
15 IF, DEY, C062 BIT, MI
16 IF, XFLAG LDA, 3 #B ORA, ENDIF,
17 ELSE, C062 BIT, MI
18 IF, DEY, 2 #B LDA, ENDIF,
19 ENDIF,
20 XFLAG STA, 0 SP) STY, 1 SP) STY,

```

```

0 FRAG 2.0K ( -- char )
1 PURPOSE: process keyboard character.
2 inputs: CHAR KQUE QIN QOUT LASTC
3 outputs: CHAR SAVED? QOUT
4
5 place contents of CHAR on stack
6 with its high bit clear
7 compare it to the last char, LASTC
8 if the same
9 is it a control W?
10 if it is, set SAVED?
11 else, clear SAVED?
12 clear the high bit in CHAR
13 check if the key queue is empty
14 if it isn't
15 grab one character.
16 set its high bit
17 store it in CHAR
18 decrement queue index
19
20 LABEL 2.?X ( -- mask | lex or rex? )

```

```
21 <XNEXT> JMP,
22
23
```

```
21 PURPOSE: process lex/rex keys.
22 bit 0 = C061
23 bit 1 = C062
```

```
scr # 98
0 ( 2.V ) HEX
1
2 FRAG 2.V 1 SP) LDA, X0 STA,
3 0 SP) LDA, X0 1+ STA,
4 BASICO 69 + LDA, X1 STA,
5 BASICO 6A + LDA, X1 1+ STA,
6 BASICO 6B + LDA, X2 STA,
7 BASICO 6C + LDA, X2 1+ STA,
8 0 #B LDY,
9 BEGIN, X1 )Y LDA, X0 CMP, EQ
10 IF, INY, X1 )Y LDA, X0 1+ CMP, EQ
11 IF, CLC, X1 LDA, 2 #B ADC,
12 0 SP) STA, X1 1+ LDA, 0 #B ADC,
13 1 SP) STA, <XNEXT> JMP,
14 ENDIF, DEY, ENDIF,
15 CLC, X1 LDA, 7 #B ADC, X1 STA, CS
16 IF, X1 1+ INC, ENDIF,
17 CLC, X1 LDA, X2 CMP, CS
18 IF, X1 1+ LDA, X2 1+ CMP, ENDIF, CS
19 UNTIL, 0 #B LDA, 0 SP) STA, 1 SP) STA,
20 <XNEXT> JMP,
21
22
23
```

```
0 FRAG 2.V ( char-pair -- addr | 0 )
1 PURPOSE: locate the BASIC variable
2 identified by its unique character
3 pair.
4
5 set each high bit, reverse byte order
6 find area BASIC placed them in
7 look for that byte pattern
8 found: return address
9 not: return 0
10 both integers and string pointers
11 are 7 bytes long,
12 so skip 7 bytes for each test
13
14
15
16
17
18
19
20
21
22
23
```

```
99
0 ( 2.0M ) ;S
1
2 ( -- char | remove one character from
3 the modem queue to the stack. If the
4 buffer was full, RSTAT=FF, then send a
5 control-S when it is half empty )
6
7 FRAG 2.0M DEX, DEX, MQOUT LDY,
8 MQUE ,Y LDA, 0 SP) STA,
9 INY, MQOUT STY,
10 RSTAT LDA, NE
11 IF, SEC, MQOUT LDA, MQIN SBC, PL
12 IF, 11 #B LDY, ( send control Q )
13 BEGIN, COA9 LDA, 10 #B AND, NE
14 UNTIL, COA8 STY,
15 0 #B LDA, RSTAT STA,
16 ENDIF, ENDIF,
17 0 #B LDA, 1 SP) STA,
18 <XNEXT> JMP,
19
20
21
22
23
```

```
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
```

```
scr # 100
0 ( 2.ENDWRAP ) HEX
1
2 FRAG 2.ENDWRAP DEX, DEX, OFF #B LDY,
3 WR LDA, WC ADC, WR STA, CS
4 IF, WR 1+ INC, ENDIF, EBOT CMP,
```

```
0 FRAG 2.ENDWRAP ( -- flag )
1 PURPOSE: point wrap address (WR) to the
2 beginning of the next line.
3 update PCT LCT LCTR CLIN.
4
```

```

5 WR 1+ LDA, EBOT 1+ SBC, CS
6 IF, INY,
7 WR LDA, BEOT CMP,
8 WR 1+ LDA, BEOT 1+ SBC, NC
9 IF, WR LDA, GAP ADC, WR STA,
10 WR 1+ LDA, GAP 1+ ADC, WR 1+ STA,
11 ENDIF, ENDIF,
12 WR LDA, EOT CMP,
13 WR 1+ LDA, EOT 1+ SBC, CS
14 IF, EOT LDA, WR STA,
15 EOT 1+ LDA, WR 1+ STA,
16 ENDIF, 0 SP) STY, 1 SP) STY,
17 PAGEFLAG LDY, EQ
18 IF, PCT INC, LCT STY,
19 ELSE, LCT INC,
20 ENDIF, CLIN INC,
21 LCTR INC, EQ IF, LCTR 1+ INC, ENDIF,
22 <XNEXT> JMP,
23

```

101

```

0 ( 2.SETMODEM ) HEX
1
2 FRAG 2.SETMODEM
3 0 #B LDA, SSC? STA, SSC? 1+ STA,
4 C205 LDA, 38 #B CMP, NE
5 IF, <XNEXT> JMP, ENDIF,
6 C20C LDA, 31 #B CMP, NE
7 IF, <XNEXT> JMP, ENDIF,
8 FF #B LDA, SSC? STA, SSC? 1+ STA,
9 0 #B LDA, COA9 STA,
10 SEND% LDA, COAA STA,
11 SEND% 1+ LDA, COAB STA,
12 0 #B LDA, TSTAT STA, RSTAT STA, CLI,
13 <XNEXT> JMP,
14
15
16
17
18
19
20
21
22
23

```

scr # 102

```

0 ( 2.HARDPAGE 2.SOFTPAGE ) HEX
1
2 FRAG 2.HARDPAGE ( addr -- )
3 PAGE# LDY, INY,
4 0 SP) LDA, PGSO ,Y STA,
5 1. SP) LDA, PGS1 ,Y STA,
6 INX, INX, <XNEXT> JMP,
7
8 FRAG 2.SOFTPAGE ( flag -- )
9 0 SP) LDA, NE
10 IF, LOCAL2 LDA, 1 #B CMP, EQ
11 IF,
12 YPOS LDY, WND3 2 + ,Y LDA, TAY, CLC,
13 PGSO ,Y LDA, GAP ADC, PGSO ,Y STA,
14 PGS1 ,Y LDA, GAP 1+ ADC, PGS1 ,Y STA,
15 ELSE,

```

```

5 add WC to WR
6 if WR is past EBOT set false and
7 if WR is not past BEOT then
8 add GAP ...
9 set WR that much past BEOT
10 (ie, EBOT < WR < BEOT)
11 if WR goes past text
12 set WR to end of text
13 if PAGEFLAG is false (was set by WRAP)
14 then: increment PCT, set LCT to zero
15 else: increment LCT
16 increment CLIN, LCTR
17
18
19 NOTE1: WRAP sets PAGEFLAG
20 true=PAGEFLAG=no page break generated.
21 NOTE2: WC set by WRAP, SHOWPAGE.
22
23

```

```

0 FRAG 2.SETMODEM ( -- )
1 PURPOSE: initialize 6551 on super serial
2 card for use with modem.
3
4 if a super serial card isn't in slot 2
5 (C205 = 38 and C20C = 31) then set
6 SSC? to 0 and exit.
7 else, set SSC? to -1.
8 clear transmit (COA9).
9 place the two bytes in SE% (BASIC)
10 in status (COAA) and control (COAB).
11 clear RSTAT and TSTAT.
12 enable interrupts.
13
14
15
16
17
18
19
20
21
22
23

```

```

0
1
2 FRAG 2.HARDPAGE ( address -- )
3 PURPOSE: update page table for cursor
4 creeper crossing a hard page break.
5
6 store the address of the current page in
7 the page table.
8 the variable LOCAL1 is cleared, so that
9 CREEPER will work right.
10
11
12
13
14
15

```

```

16 YPOS LDY, WND3 ,Y LDA, TAY, SEC,      16
17 PGS0 ,Y LDA, GAP     SBC, PGS0 ,Y STA,  17
18 PGS1 ,Y LDA, GAP 1+ SBC, PGS1 ,Y STA,  18
19 ENDIF,                                19
20 ENDIF,                                20
21 INX, INX, <XNEXT> JMP,                 21
22                                         22
23                                         23

```

103

```

0 ( <WRAP> ) HEX ;S
1
2 FRAG <WRAP> SEC,
3 WR LDA, YWRAP SBC, X5 STA,
4 WR 1+ LDA, 0 #B SBC, X5 1+ STA,
5 YWRAP LDY, cr #B LDA,
6 BEGIN, X5 )Y CMP, CS
7 IF, EQ IF, INY, ENDIF,
8 TYA, YWRAP SBC, WC STA, EQ
9 IF, WC INC, ENDIF, RTS,
10 ENDIF, INY, MI UNTIL,
11 20 #B LDA, WIDE LDY, DEY, WR )Y CMP, NE
12 IF, INY, BEGIN, DEY, MI
13 IF, WIDE LDA, WC STA, RTS, ENDIF,
14 WR )Y CMP, EQ
15 UNTIL, INY, WC STY, RTS, ENDIF,
16 DEY, WR )Y CMP, EQ
17 IF, WIDE LDA, WC STA, RTS, ENDIF,
18 WIDE LDY, WR )Y CMP, EQ
19 IF, DEY, DEY, BEGIN, DEY, MI IF, WIDE
20 LDA, WC STA, RTS, ENDIF, WR )Y CMP,
21 EQ UNTIL, INY, WC STY, RTS, ENDIF,
22 WIDE LDA, WC STA, RTS,
23

```

0
1
2 FRAG 2.SOFTPAGE (oldNARROW --)
3 PURPOSE: update page table for cursor
4 creeper crossing a soft page break.
5
6 use vert cursor position on the screen
7 (store YPOS in Y register)
8 if creep was going left then
9 if cursor was wide (stack element = 0)
10 if cursor was on a page boundary
11 (window table - BEOT = 0)
12 get page # from window table
13 add gap
14 and store in that page of page table
15 else (creep was going right)
16 if cursor is at left margin (XPOS = 0)
17 get page # from window table
18 subtract gap
19 and store in that page of page table
20 discard element from stack
21
22
23

scr # 104

```

0 ( 2.WRAP BMP ) HEX ;S
1
2 FRAG 2.WRAP \ <WRAP> JSR, <XNEXT> JMP,
3
4 FRAG BMP CLC,
5 WC LDA, WR ADC, WR STA, CS
6 IF, WR 1+ INC, ENDIF,
7 EBOT CMP, WR 1+ LDA, EBOT 1+ SBC, NC
8 IF, RTS, ENDIF,
9 WR LDA, BEOT CMP,
10 WR 1+ LDA, BEOT 1+ SBC, NC
11 IF, WR LDA, GAP ADC, WR STA,
12 WR 1+ LDA, GAP 1+ ADC, WR 1+ STA,
13 ENDIF,
14 RTS,
15
16
17
18
19
20
21
22
23

```

105
 0 (2.STOP?) HEX
 1
 2 FRAG 2.STOP?
 3 DEX, DEX, 0 #B LDA,
 4 0 SP) STA, 1 SP) STA,
 5 C061 LDA, C062 ORA, MI
 6 IF, <XNEXT> JMP, ENDIF,
 7 0 SP) DEC, 1 SP) DEC,
 8 TEOS 1+ LDA, WR 1+ CMP,
 9 TEOS LDA, WR SBC, NC
 10 IF, <XNEXT> JMP, ENDIF,
 11 MQIN LDA, MQOUT CMP, NE
 12 IF, <XNEXT> JMP, ENDIF,
 13 CHAR LDA, del 80 OR #B CMP, EQ
 14 IF, <XNEXT> JMP, ENDIF,
 15 CHAR LDA, tab 80 OR #B CMP, CS
 16 IF, LEXXING LDA, EQ
 17 IF, <XNEXT> JMP, ENDIF,
 18 ENDIF,
 19 0 SP) INC, 1 SP) INC,
 20 <XNEXT> JMP,
 21
 22
 23

scr # 106
 0 (2.INCPAGES) HEX
 1
 2 (endaddress.increase startpage --)
 3 FRAG 2.INCPAGES 0 SP) LDY,
 4 INX, INX,
 5 BEGIN, INY, 2 SP) LDA, PGS0 ,Y CMP,
 6 3 SP) LDA, PGS1 ,Y SBC, NC
 7 IF, DEY, PCT STY, 0 #B LDA, LCT STA,
 8 PGS2 ,Y LDA, LCTR STA,
 9 PGS3 ,Y LDA, LCTR 1+ STA,
 10 INX, INX, INX, INX,
 11 <XNEXT> JMP,
 12 ENDIF, CLC, 0 SP) LDA, PGS0 ,Y ADC,
 13 PGS0 ,Y STA, WR STA,
 14 1 SP) LDA, PGS1 ,Y ADC,
 15 PGS1 ,Y STA, WR 1+ STA,
 16 AGAIN,
 17
 18
 19
 20
 21
 22
 23

107
 0
 1
 2
 3
 4
 5
 6
 7
 8
 9

0 FRAG 2.STOP? (-- flag)
 1 PURPOSE: true flag means interrupt
 2 wrapping to add a cr, ff, tab, delete
 3 or any printable character wrapped
 4 past TEOS. also process a modem
 5 character.
 6
 7 put 0 flag on stack.
 8 if a lex key then exit.
 9 put -1 flag on stack.
 10 if wrapped past TEOS, or something in
 11 modem queue, or a cr, ff, tab, delete
 12 or any other printed character,
 13 then exit.
 14 put 0 flag on stack and exit.
 15
 16
 17
 18
 19
 20
 21
 22
 23

0 FRAG 2.INCPAGES (endaddress increase
 1 startpage --)
 2 PURPOSE: update the page table by
 3 adding the increase from startpage to
 4 endaddress.
 5
 6 start examining the page table by
 7 setting Y-reg equal to startpage.
 8 while the end address is less than the
 9 address for each page (PGS0,1) add
 10 the increase to that page (PGS0,1)
 11 and update the wrap address (WR).
 12 when the end address is larger than the
 13 address for a page (PGS0,1) store
 14 the last updated page in PCT, clear
 15 LCT, store PGS2,3 into LCTR, and exit.
 16
 17
 18
 19
 20
 21
 22
 23

0 LABEL UM/MOD
 1 (double-number
 2 unsigned-divisor -- remainder quotient)
 3 PURPOSE: return the remainder and
 4 quotient of the unsigned mixed number
 5 division.
 6
 7 NOTE: this has been used in a number of
 8 places to determine the maximum that a
 9 number can be divided by plus one.

```

10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

10 e.g., ( n1 0 n2 -- n3 )
11 UM/MOD SWAP IF 1+ ENDIF
12 see, for example, MARGIN-CHANGES.
13
14
15
16
17
18
19
20
21
22
23

```

scr # 108

```

0
1 2.CMOVE>
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

109

```

0 CR 0 NAMED !
1 FRAG end_of_bank2
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
0
1 return printing to left half of page
2
3 FRAG end_of_bank2 affords printout of
4 the last available byte in bank 2
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

```

21
22
23

21
22
23

```

scr # 110
 0 ( INITIALIZATION CODE ) HEX
 1
 2 ASSEMBLER
 3 0A #B LDX, MI
 4 IF, 0B #B LDX, ENDIF,
 5 SEI, CLD, MI
 6 IF, SOURCE RESET C, WARM C, ASSEMBLER
 7 HERE RES !
 8 IP )Y LDA, INY, .A ASL, NC
 9 IF, HERE RES @ - 3 + NEXT + STA,
10 ROM )JMP,
11 ENDIF, HERE RES @ - 4 + NEXT + STA,
12 CLC, ROM 100 + )JMP,
13 ROM 200 + )JMP,
14 ENDIF, 0 #B LDY,
15 BEGIN, ROM 20C + ,Y LDA, NEXT ,Y STA,
16 INY, 12 #B CPY, EQ
17 UNTIL, IP STX,
18 ROM 200 + SWAB OFF AND #B LDX,
19 IP 1+ STX,
20 08 #B LDX, VB 1+ STX,
21 04F #B LDX, TXS,
22 SPO #B LDX, C010 LDA,
23 0 #B LDY, TNEXT.

111
 0 ( listing header, copyright msg )
 1
 2 CR CR CR ." EDDE Apple Version 104
 3 3 1985 September 27 Friday"
 4 CR CR CR AIM U ." beginning of bank 1"
 5 CR
 6
 7 FRAG .MSG0 " SwyftCard 104
 8 3 //e Copyright 1985 Information Appli
 9 ance Inc."
10
11
12 ( NOTE: if you change the version #,
13 you must ALSO update the screen that
14 .SWYFT is on - 216 )
15
16
17
18
19
20
21
22
23

```

```

 0 initialization code at D200
 1
 2 D200: 0A to X register, for IP = COLD
 3 D204: 0B to X register, for IP = WARM
 4 D206: SEI, CLD,
 5 D208: always branch to D022
 6 D20A: RESET C,
 7 D20B: WARM C,
 8 D20C: rom copy of Forth NEXT (at 006B)
 9
10 YNEXT: YSAVE LDY,
11 NEXT: IP )Y LDA, INY, .A ASL, NC
12 IF, HERE RES @ - 3 + NEXT + STA,
13 ROM )JMP,
14 ENDIF, HERE RES @ - 4 + NEXT +
15 STA, CLC, ROM 100 + )JMP,
16
17 D222: copy code at D00C to NEXT.
18 point IP to $D20A (COLD) or to
19 $D20B (WARM).
20 4F to return stack register.
21 data stack pointer to X register.
22 clear the keyboard strobe.
23

 0 ( listing header, copyright msg )
 1
 2 message for compilation printout.
 3
 4
 5
 6
 7 LABEL .MSG0
 8 PURPOSE: message for SwyftCard bootup.
 9
10
11 NOTE1: the position of the version
12 number within .MSG0 must remain the
13 same. it is used to correctly load
14 the key and command tables with the
15 right values.
16
17
18
19
20
21
22
23

```

```

scr # 112
 0 ( NEST VARIABLE ) HEX
 1
 2 FRAG .NEST
 3 PLA, X0 STA, PLA, X0 1+ STA,
 4 TYA, PHA, 0 #B LDA, PHA,

```

```

 0 ( NEST VARIABLE ) HEX
 1
 2 FRAG .NEST
 3 save current IP and Y-reg on stack,
 4 put return address (from JSR .NEST)

```

4,806,916

87

5 IP LDA, PHA, IP 1+ LDA, PHA,
6 XO LDA, IP STA, XO 1+ LDA, IP 1+ STA,
7 1 #B LDY, TNEXT,
8
9 LABEL .VARIAB
10 IP)Y LDA, INY, YSAVE STY, 0 #B LDY,
11 VB STA, DEX, DEX.
12 VB)Y LDA, 0 SP) STA, INY,
13 VB)Y LDA, 1 SP) STA,
14 YSAVE LDY, TNEXT.
15
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113
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88

5 into IP, initialize Y-reg = 1,
6 then JMP NEXT.
7
8 LABEL .VARIAB
9 store page number (\$08) and offset (next
10 number) in VB; get value pointed to in
11 variable table and put on stack.
12
13 remember that IP and Y-reg point to
14 current token (controlled by NEXT)
15 and that the token for .variab is \$08
16 which is also the page for variables.
17 note that y-reg incremented, saved and
18 restored.
19
20 LABEL .CALL
21 PURPOSE: jump to the address in the two
22 bytes compiled following this token
23

scr # 114

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| 21 | 21 |
| 22 | 22 |
| 23 | 23 |
| 115 | |
| 0 (CHAR. TRANSLATION TABLE) HEX | 0 (CHAR. TRANSLATION TABLE) HEX |
| 1 | 1 |
| 2 FRAG .XLAT | 2 FRAG .XLAT |
| 3 del C, (DELETE :: RUBOUT) | 3 PURPOSE: used to translate a control |
| 4 7 C, (01,^A :: PASTE) | 4 character into an index. The index |
| 5 00 C, (02,^B :: was PRINT) | 5 is an offset into .LTABLE (the command |
| 6 00 C, (03,^C :: was SEND) | 6 table) which contains addresses for |
| 7 5 C, (04,^D :: SEND) | 7 executable functions. Since .XLAT |
| 8 00 C, (05,^E) | 8 is downloaded into ram the functions |
| 9 00 C, (06,^F) | 9 can be reassigned (see ?RAMKEYS and |
| 10 8 C, (07,^G :: BASIC) | 10 RAMKEYS). |
| 11 00 C, (08,^H) | 11 |
| 12 tab C, (09,^I :: TAB) | 12 |
| 13 00 C, (0A,^J :: was PRINT) | 13 |
| 14 00 C, (0B,^K,UP-ARROW) | 14 |
| 15 4 C, (0C,^L :: DISK) . | 15 |
| 16 cr C, (0D,^m,CARRIAGE RETURN) | 16 |
| 17 2 C, (0E,^N :: PRINT) | 17 |
| 18 00 C, (0F,^O :: NOOP - was GET) | 18 |
| 19 00 C, (10,^P :: was BASIC) | 19 |
| 20 00 C, (11,^Q) | 20 |
| 21 00 C, (12,^R :: was 6 - GET, CUT) | 21 |
| 22 00 C, (13,^S) | 22 |
| 23 | 23 |
| scr # 116 | |
| 0 (CHARACTER TRANSLATION TABLE) HEX | 0 |
| 1 | 1 |
| 2 00 C, (14,^T) | 2 |
| 3 00 C, (15,^U) | 3 |
| 4 00 C, (16,^V) | 4 |
| 5 00 C, (17,^W :: was DISK) | 5 |
| 6 00 C, (18,^X) | 6 |
| 7 00 C, (19,^Y :: was PASTE) | 7 |
| 8 C C, (1A,^Z) | 8 |
| 9 ff C, (1B,ESCAPE :: PAGE) | 9 |
| 10 00 C, (1C,^`) | 10 |
| 11 9 C, (1D,^] :: MON) | 11 |
| 12 3 C, (1E,^6 :: SORT, was OLDLOAD) | 12 |
| 13 B C, (1F,^-) | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
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| 20 | 20 |
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| 22 | 22 |
| 23 | 23 |

117

| | |
|--------------------------------|---------------|
| 0 (DISPLAY ARRAY) HEX | 0 FRAG .DISPO |
| 1 | 1 |
| 2 FRAG .DISPO | 2 |
| 3 | 3 |
| 4 400 C, 480 C, 500 C, 580 C, | 4 |
| 5 600 C, 680 C, 700 C, 780 C, | 5 |
| 6 428 C, 4A8 C, 528 C, 5A8 C, | 6 |
| 7 628 C, 6A8 C, 728 C, 7A8 C, | 7 |
| 8 450 C, 4D0 C, 550 C, 5D0 C, | 8 |
| 9 650 C, 6D0 C, 750 C, 7D0 C, | 9 FRAG .DISP1 |
| 10 | 10 |
| 11 FRAG .DISP1 | 11 |
| 12 | 12 |
| 13 400 H, 480 H, 500 H, 580 H, | 13 |
| 14 600 H, 680 H, 700 H, 780 H, | 14 |
| 15 428 H, 4A8 H, 528 H, 5A8 H, | 15 |
| 16 628 H, 6A8 H, 728 H, 7A8 H, | 16 |
| 17 450 H, 4D0 H, 550 H, 5D0 H, | 17 |
| 18 650 H, 6D0 H, 750 H, 7D0 H, | 18 |
| 19 | 19 |
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scr # 118

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|------------------------------------|---|
| 0 (BUFFER FOR ALT SCREEN) HEX | 0 FRAG .SCR1 |
| 1 | 1 PURPOSE: buffer for alternate screen. |
| 2 FRAG .SCR1 | 2 |
| 3 SCREEN H, SCREEN 28 + H, | 3 |
| 4 SCREEN 050 + H, SCREEN 78 + H, | 4 |
| 5 SCREEN 0A0 + H, SCREEN 0C8 + H, | 5 |
| 6 SCREEN 0F0 + H, SCREEN 118 + H, | 6 |
| 7 SCREEN 140 + H, SCREEN 168 + H, | 7 |
| 8 SCREEN 190 + H, SCREEN 1B8 + H, | 8 |
| 9 SCREEN 1E0 + H, SCREEN 208 + H, | 9 |
| 10 SCREEN 230 + H, SCREEN 258 + H, | 10 |
| 11 SCREEN 280 + H, SCREEN 2A8 + H, | 11 |
| 12 SCREEN 2D0 + H, SCREEN 2F8 + H, | 12 |
| 13 SCREEN 320 + H, SCREEN 348 + H, | 13 |
| 14 SCREEN 370 + H, SCREEN 398 + H, | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

119

| | |
|-----------------------------------|---|
| 0 (BUFFER FOR ALT SCREEN) HEX | 0 FRAG .SCRO |
| 1 | 1 PURPOSE: buffer for alternate screen. |
| 2 FRAG .SCRO | 2 |
| 3 SCREEN C, SCREEN 28 + C, | 3 |
| 4 SCREEN 050 + C, SCREEN 78 + C, | 4 |
| 5 SCREEN 0A0 + C, SCREEN 0C8 + C, | 5 |
| 6 SCREEN 0F0 + C, SCREEN 118 + C, | 6 |
| 7 SCREEN 140 + C, SCREEN 168 + C, | 7 |
| 8 SCREEN 190 + C, SCREEN 1B8 + C, | 8 |
| 9 SCREEN 1E0 + C, SCREEN 208 + C, | 9 |

| | | |
|----|---------------------------------|----|
| 10 | SCREEN 230 + C, SCREEN 258 + C, | 10 |
| 11 | SCREEN 280 + C, SCREEN 2A8 + C, | 11 |
| 12 | SCREEN 2D0 + C, SCREEN 2F8 + C, | 12 |
| 13 | SCREEN 320 + C, SCREEN 348 + C, | 13 |
| 14 | SCREEN 370 + C, SCREEN 398 + C, | 14 |
| 15 | . | 15 |
| 16 | | 16 |
| 17 | | 17 |
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| 23 | | 23 |

scr # 120

| | | |
|----|----------------------------|--|
| 0 | (calls to 2nd bank) HEX | |
| 1 | | |
| 2 | XFER REVERSE - 2.REVERSE | |
| 3 | XFER SEEK> 2.SEEK> | |
| 4 | XFER SEEK< 2.SEEK< | |
| 5 | XFER ADJUST 2.ADJUST | |
| 6 | XFER TOBUFF 2.TOBUFF | |
| 7 | XFER PRESET 2.PRESET | |
| 8 | XFER .40COL 2.40COL | |
| 9 | XFER ABOOT 2.ABOOT | |
| 10 | XFER .MON 2.MON | |
| 11 | XFER <READ> 2.<READ> | |
| 12 | XFER <SEEK> 2.<SEEK> | |
| 13 | XFER <WRITE> 2.<WRITE> | |
| 14 | XFER ?EDDE 2.?EDDE | |
| 15 | XFER ?APPLE 2.?APPLE | |
| 16 | XFER CHECKSUM 2.CHECKSUM | |
| 17 | XFER ENDWRAP 2.ENDWRAP | |
| 18 | XFER ?UPDATE 2.?UPDATE | |
| 19 | XFER PAGEPRINT 2.PAGEPRINT | |
| 20 | XFER SHOWPAGE 2.SHOWPAGE | |
| 21 | XFER SERIAL# 2.SERIAL# | |
| 22 | XFER V 2.V | |
| 23 | | |

0 XFER creates a 7 byte structure which
 1 will transfer control to the code in
 2 the alternate bank at D000 to DDFF.
 3 All routines in bank 2 return to bank
 4 1 by exiting through <XNEXT>.

| | | |
|----|----------------------------------|--|
| 5 | | |
| 6 | For example, XFER will cause any | |
| 7 | reference REVERSE to access the | |
| 8 | routine 2.REVERSE in bank 2. | |
| 9 | | |
| 10 | | |
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121

| | | |
|----|---------------------------|----|
| 0 | (calls to 2nd bank) HEX | 0 |
| 1 | | 1 |
| 2 | XFER @K 2.@K | 2 |
| 3 | XFER ?X 2.?X | 3 |
| 4 | XFER SETMODEM 2.SETMODEM | 4 |
| 5 | XFER CONTROL 2.CONTROL | 5 |
| 6 | XFER WRITEO 2.WRITEO | 6 |
| 7 | XFER HARDPAGE 2.HARDPAGE | 7 |
| 8 | XFER SOFTPAGE 2.SOFTPAGE | 8 |
| 9 | XFER STOP? 2.STOP? | 9 |
| 10 | XFER INCPAGES 2.INCPAGES | 10 |
| 11 | | 11 |
| 12 | ;S | 12 |
| 13 | | 13 |
| 14 | XFER @M 2.@M | 14 |
| 15 | XFER CMOVE2 2.CMOVE2 | 15 |
| 16 | XFER WRAP 2.WRAP | 16 |
| 17 | XFER LOCLIN 2.LOCLIN | 17 |
| 18 | XFER LOCCHR 2.LOCCHR | 18 |
| 19 | | 19 |
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```

scr # 122
0 ( .QUE ) HEX
1
2 FRAG .QUE C010 STA,
3 FF #B CMP, 0 #B ADC,
4 7F #B AND, 20 #B CMP, NC
5 IF, TAY, HIMEM ,Y LDA, ENDIF,
6 CHAR LDY, PL
7 IF, 80 #B ORA, CHAR STA,
8 ELSE, QIN LDY, KQUE ,Y STA, DEY, MI
9 IF, 4 #B LDY, ENDIF, QIN STY,
10 ENDIF, RTS,
11
12
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123
0 ( EXIT ) HEX
1
2 LABEL EXIT
3 PLA, IP 1+ STA, PLA, IP STA,
4 PLA, PLA, TAY, TNEXT,
5
6 LABEL .2BYTERS IP )Y LDA, .A ASL, INY,
7 NEXT 11 + STA, NEXT 10 + JMP,
8
9
10
11
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23

0 .QUE ( --)
1 PURPOSE: put keyboard character into
2 key queue.
3
4 it looks to see if it is
5 a control or special character, and if
6 not then puts it in the key queue.
7 the queue offset is pointed to by QIN.
8 the value in TIMER (-1, -2, and -3)
9 is initialized, from value in TIMER.

10
11 NOTE: A-reg holds byte read from SC000
12 before calling this routine.

0 LABEL EXIT
1 restores previous IP and y-reg for NEXT
2
3
4 LABEL .2BYTERS
5 this word modifies NEXT
6
7
8
9
10
11
12 note that IP for any one word is the
13 address left by JSR next and that the
14 y register is used to increment within
15 that word (see screen 110).

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scr # 124

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2
3
4

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```

```

125
0 ( .LIT ) HEX
1
2 LABEL .LIT DEX, DEX,
3 IP )Y LDA, 0 SP) STA, INY,
4 IP )Y LDA, 1 SP) STA, INY, TNEXT,
5
6 LABEL .BLIT DEX, DEX,
7 IP )Y LDA, 0 SP) STA, INY,
8 0 #B LDA, 1 SP) STA, TNEXT,
9
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```

scr # 126
0 ( .BRAN .OBRA ) HEX
1
2 LABEL .BRAN -IP )Y LDA, TAY, TNEXT,
3
4 LABEL .OBRA
5 0 SP) LDA, INX, 0 SP) ORA, NE
6 IF, INY, INX, TNEXT,
7 ENDIF, INX,
8 IP )Y LDA, TAY, TNEXT,
9
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11
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13
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15

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```

0 LABEL .LIT
1 PURPOSE: compile a word sized literal.
2
3
4 LABEL .BLIT
5 PURPOSE: compile a byte sized literal.
6
7
8
9
10
11
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13
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```

```

0 LABEL .BRAN
1 PURPOSE: force a branch. used, e.g., by
2 ELSE, by REPEAT.
3
4 LABEL .OBRA
5 PURPOSE: conditional branch. used, e.g.,
6 by IF, WHILE.
7
8
9
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| 16 | 16 |
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| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |
| 127 | |
| 0 (.DO .LOOP) HEX | 0 LABEL .DO (to from --) |
| 1 | 1 PURPOSE: initialize a loop. |
| 2 LABEL .DO TYA, PHA, PHA, SEC, | 2 |
| 3 3 SP) LDA, PHA, 2 SP) LDA, PHA, | 3 |
| 4 0 SP) LDA, 2 SP) SBC, X0 STA, | 4 LABEL DROP (n --) |
| 5 1 SP) LDA, 3 SP) SBC, PHA, | 5 PURPOSE: remove element from stack. |
| 6 X0 LDA, PHA, | 6 |
| 7 INX, INX, INX, INX, TNEXT, - | 7 |
| 8 | 8 LABEL .LOOP (--) |
| 9 LABEL .LOOP XSAVE STX, TSX, | 9 PURPOSE: end a loop when the count has |
| 10 0 RP) INC, EQ IF, 1 RP) INC, ENDIF, EQ | 10 been reached. |
| 11 IF, TXA, 6 #B ADC, TAX, TXS, | 11 |
| 12 ELSE, 4 RP) LDY, | 12 |
| 13 ENDIF, XSAVE LDX, TNEXT, | 13 LABEL I (-- i) |
| 14 | 14 PURPOSE: place count of do-loop on stack |
| 15 LABEL .LEAVE | 15 |
| 16 PLA, PLA, PLA, PLA, PLA, PLA, | 16 |
| 17 IP)Y LDA, TAY, TNEXT, | 17 |
| 18 | 18 |
| 19 LABEL I DEX, DEX, XSAVE STX, TSX, CLC, | 19 |
| 20 0 RP) LDA, 2 RP) ADC, PHA, | 20 |
| 21 1 RP) LDA, 3 RP) ADC, XSAVE LDX, | 21 |
| 22 1 SP) STA, PLA, 0 SP) STA, TNEXT, | 22 |
| 23 | 23 |

| | |
|---|---|
| scr # 128 | |
| 0 (.+LOOP) HEX | 0 LABEL .LEAVE |
| 1 | 1 PURPOSE: exit a do-loop unconditionally |
| 2 LABEL .+LOOP -YSAVE STY, | 2 |
| 3 1 SP) LDY, | 3 |
| 4 0 SP) LDA, INX, INX, XSAVE STX, TSX, | 4 LABEL .+LOOP (n --) |
| 5 0 RP) ADC, 0 RP) STA, TYA, | 5 PURPOSE: exit a loop when the count has |
| 6 1 RP) ADC, 1 RP) STA, TYA, MI | 6 been reached (increment each loop by |
| 7 IF, CS | 7 the n). |
| 8 IF, 4 RP) LDY, XSAVE LDX, TNEXT, | 8 |
| 9 ENDIF, | 9 |
| 10 ELSE, NC | 10 FRAG XYNEXT |
| 11 IF, 4 RP) LDY, XSAVE LDX, TNEXT, | 11 PURPOSE: an alternate exit from LABEL |
| 12 ENDIF, | 12 definitions: restore X and Y registers |
| 13 ENDIF, CLC, TXA, 6 #B ADC, TAX, TXS, | 13 |
| 14 XSAVE LDX, YSAVE LDY, TNEXT, | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

129

| | |
|------------------------------------|----------------------|
| 0 (0 1 2 -1 NOOP) HEX | 0 LABEL 0 (-- 0) |
| 1 | 1 |
| 2 LABEL 0 DEX, DEX, 0 #B LDA, | 2 |
| 3 0 SP) STA, 1 SP) STA, | 3 LABEL 1 (-- 1) |
| 4 TNEXT, | 4 |
| 5 | 5 |
| 6 LABEL 1 DEX, DEX, 0 #B LDA, | 6 LABEL 2 (-- 2) |
| 7 1 SP) STA, 1 #B LDA, 0 SP) STA, | 7 |
| 8 TNEXT, | 8 |
| 9 | 9 LABEL -1 (-- -1) |
| 10 LABEL 2 DEX, DEX, 0 #B LDA, | 10 |
| 11 1 SP) STA, 2 #B LDA, 0 SP) STA, | 11 |
| 12 TNEXT, | 12 LABEL NOOP (--) |
| 13 | 13 |
| 14 LABEL -1 DEX, DEX, OFF #B LDA, | 14 |
| 15 0 SP) STA, 1 SP) STA, | 15 |
| 16 TNEXT, | 16 |
| 17 | 17 |
| 18 LABEL NOOP TNEXT, | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

scr # 130

| | |
|--|-------------------------------------|
| 0 (CMOVE) HEX | 0 LABEL CMOVE (from to # --) |
| 1 | 1 PURPOSE: move # of bytes from to. |
| 2 LABEL CMOVE XSAVE STX, YSAVE STY, | 2 |
| 3 5 SP) LDA, X0 1+ STA, | 3 |
| 4 4 SP) LDA, X0 STA, | 4 |
| 5 3 SP) LDA, X1 1+ STA, | 5 |
| 6 2 SP) LDA, X1 STA, 0 #B LDY, | 6 |
| 7 1 SP) LDA, NE | 7 |
| 8 IF, BEGIN, | 8 |
| 9 BEGIN, X0)Y LDA, X1)Y STA, INY, EQ | 9 |
| 10 UNTIL, X0 1+ INC, X1 1+ INC, | 10 |
| 11 1 SP) DEC, EQ | 11 |
| 12 UNTIL, | 12 |
| 13 ENDIF, 0 SP) LDA, NE | 13 |
| 14 IF, TAX, | 14 |
| 15 BEGIN, X0)Y LDA, X1)Y STA, INY, | 15 |
| 16 DEX, EQ | 16 |
| 17 UNTIL, | 17 |
| 18 ENDIF, XSAVE LDA, CLC, 6 #B ADC, TAX, | 18 |
| 19 YSAVE LDY, TNEXT, | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

131

| | |
|---------------------------------|---|
| 0 (CMOVE>) HEX | 0 |
| 1 | 1 |
| 2 LABEL CMOVE> YSAVE STY, | 2 |
| 3 1 SP) LDA, X2 STA, | 3 |
| 4 5 SP) ADC, X0 1+ STA, CLC, | 4 |
| 5 3 SP) LDA, X2 ADC, X1 1+ STA, | 5 |
| 6 4 SP) LDA, X0 STA, | 6 |
| 7 2 SP) LDA, X1 STA, | 7 |
| 8 0 SP) LDA, NE | 8 |
| 9 IF, TAY, DEY, NE | 9 |

```

10 IF, BEGIN, X0 )Y LDA, X1 )Y STA,      10
11 DEY, EQ UNTIL,                         11
12 ENDIF, X0 )Y LDA, X1 )Y STA,          12
13 ENDIF, X2 LDA, NE                     13
14 IF, BEGIN, OFF #B LDY,                14
15 X0 1+ DEC, X1 1+ DEC,                15
16 BEGIN, X0 )Y LDA, X1 )Y STA, DEY, EQ 16
17 UNTIL, X0 )Y LDA, X1 )Y STA,          17
18 X2 DEC, EQ                           18
19 UNTIL,                                19
20 ENDIF, YSAVE LDY,                   20
21 CLC, TXA, 6 #B ADC, TAX, TNEXT,     21
22                                         22
23                                         23

```

```

scr # 132
0 ( AND OR XOR ) HEX
1
2 LABEL AND -
3 0 SP) LDA, 2 SP) AND, 2 SP) STA,
4 1 SP) LDA, 3 SP) AND, 3 SP) STA,
5 INX, INX, TNEXT,
6
7 LABEL OR
8 0 SP) LDA, 2 SP) ORA, 2 SP) STA,
9 1 SP) LDA, 3 SP) ORA, 3 SP) STA,
10 INX, INX, TNEXT,
11
12 LABEL XOR
13 0 SP) LDA, 2 SP) EOR, 2 SP) STA,
14 1 SP) LDA, 3 SP) EOR, 3 SP) STA,
15 INX, INX, TNEXT,
16
17
18
19
20
21
22
23
133
0 ( DUP 2DUP DROP ) HEX
1
2 LABEL DUP
3 DEX, DEX,
4 2 SP) LDA, 0 SP) STA,
5 3 SP) LDA, 1 SP) STA,
6 TNEXT,
7
8 LABEL 2DUP
9 DEX, DEX, DEX, DEX,
10 4 SP) LDA, 0 SP) STA,
11 5 SP) LDA, 1 SP) STA,
12 6 SP) LDA, 2 SP) STA,
13 7 SP) LDA, 3 SP) STA,
14 TNEXT,
15
16 LABEL DROP INX, INX, TNEXT,
17
18
19
20
0 LABEL AND ( n1 n2 -- n3 )
1 PURPOSE: logical AND n1 with n2 leaving
2 n3.
3
4
5 LABEL OR ( n1 n2 -- n3 )
6 PURPOSE: logical OR n1 with n2 leaving
7 n3.
8
9
10 LABEL XOR ( n1 n2 -- n3 )
11 PURPOSE: logical exclusive OR n1 with n2
12 leaving n3.
13
14
15
16
17
18
19
20
21
22
23
0 LABEL DUP ( n -- n n )
1 PURPOSE: duplicate n.
2
3
4 LABEL 2DUP ( n1 n2 -- n1 n2 n1 n2 )
5 PURPOSE: duplicate n1 n2.
6
7
8
9
10
11
12
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21
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23

scr # 134
 0 (SWAP ROT) HEX
 1
 2 LABEL SWAP -
 3 2 SP) LDA, PHA, 0 SP) LDA,
 4 2 SP) STA, PLA, 0 SP) STA,
 5 3 SP) LDA, PHA, 1 SP) LDA,
 6 3 SP) STA, PLA, 1 SP) STA,
 7 TNEXT,
 8
 9 LABEL ROT
 10 4 SP) LDA, PHA, 2 SP) LDA,
 11 4 SP) STA, 0 SP) LDA,
 12 2 SP) STA, PLA, 0 SP) STA,
 13 5 SP) LDA, PHA, 3 SP) LDA,
 14 5 SP) STA, 1 SP) LDA,
 15 3 SP) STA, PLA, 1 SP) STA,
 16 TNEXT,
 17
 18
 19
 20
 21
 22
 23

135

0 (OVER ?DUP) HEX
 1
 2 LABEL OVER
 3 DEX, DEX,
 4 4 SP) LDA, 0 SP) STA,
 5 5 SP) LDA, 1 SP) STA,
 6 TNEXT,
 7
 8 LABEL ?DUP
 9 0 SP) LDA, 1 SP) ORA, NE
 10 IF, DEX, DEX,
 11 3 SP) LDA, 1 SP) STA,
 12 2 SP) LDA, 0 SP) STA,
 13 ENDIF,
 14 TNEXT,
 15
 16
 17
 18
 19
 20
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 22
 23

scr # 136

0 (I R> >R R@) HEX
 1
 2 LABEL R> DEX, DEX,
 3 PLA, 0 SP) STA,
 4 PLA, 1 SP) STA, TNEXT,

21
22
23

0 LABEL SWAP (n1 n2 -- n2 n1)
 1 PURPOSE: switch order of top two
 2 elements on stack.
 3
 4
 5 LABEL ROT (n1 n2 n3 -- n2 n3 n1)
 6 PURPOSE: bring third element on stack to
 7 the top.

8
 9
 10
 11
 12
 13
 14
 15
 16
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 22
 23

0 LABEL OVER (n1 n2 -- n1 n2 n1)
 1 PURPOSE: duplicate second element on the
 2 stack to the top.
 3
 4 LABEL ?DUP (n1 -- 0 | n1 n1)
 5 PURPOSE: duplicate element on the stack
 6 if not zero.
 7
 8
 9
 10
 11
 12
 13
 14
 15
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 23

0 LABEL R> (-- n)
 1 PURPOSE: remove n from return stack.
 2
 3
 4 LABEL >R (n --)

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107

```

5
6 LABEL >R
7 1 SP) LDA, PHA,
8 0 SP) LDA, PHA,
9 INX, INX, TNEXT,
10
11 LABEL R@ DEX, DEX,
12 PLA, 0 SP) STA,
13 PLA, 1 SP) STA, PHA,
14 0 SP) LDA, PHA, TNEXT,
15
16
17
18
19
20
21
22
23
137

```

108

```

5 PURPOSE: place n on return stack.
6
7
8 LABEL R@ ( -- n )
9 PURPOSE: copy element from return stack.
10
11
12
13
14
15
16
17
18
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20
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22
23

```

```

0 ( LEAVE ) HEX ;S
1
2 LABEL LEAVE
3 XSAVE STX, TSX,
4 1 RP) LDY,
5 0 RP) LDA, 1 #B ADC, 2 RP) STA, EQ
6 IF, INY, ENDIF, TYA,
7 3 RP) STA,
8 XSAVE LDX, TNEXT,
9
10
11
12
13
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16
17
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20
21
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23

```

```

scr # 138
0 ( 1+ 1- )
1
2 LABEL 1+
3 0 SP) INC, EQ
4 IF, 1 SP) INC, ENDIF,
5 TNEXT,
6
7 LABEL 1-
8 0 SP) LDA, EQ
9 IF, 1 SP) DEC, ENDIF,
10 0 SP) DEC,
11 TNEXT,
12
13
14
15

```

```

0 LABEL 1+ ( n -- n+1 )
1 PURPOSE: add one to element on stack.
2
3
4 LABEL 1- ( n -- n-1 )
5 PURPOSE: subtract one from element on
6 stack.
7
8
9
10
11
12
13
14
15

```

```

16
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22
23
139
 0 ( @ C@ ) HEX
 1
 2 LABEL @
 3 0 X) LDA, PHA,
 4 0 SP) INC, EQ
 5 IF, 1 SP) INC, ENDIF,
 6 0 X) LDA,
 7 1 SP) STA, PLA,
 8 0 SP) STA, TNEXT,
 9
10 LABEL C@
11 0 X) LDA, 0 SP) STA,
12 0 #B LDA, 1 SP) STA,
13 TNEXT.
14
15
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21
22
23

```

```

16
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22
23
 0 LABEL @ ( address -- word-value )
 1 PURPOSE: given address, return the value
 2 residing there.
 3
 4
 5 LABEL C@ ( address -- byte-value )
 6 PURPOSE: given address, return the value
 7 residing there.
 8
 9
10
11
12
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23

```

```

scr # 140
 0 ( ! C! +! )
 1
 2 LABEL !
 3 2 SP) LDA, 0 X) STA,
 4 0 SP) INC, EQ
 5 IF, 1 SP) INC, ENDIF,
 6 3 SP) LDA, 0 X) STA,
 7 INX, INX, INX, INX, TNEXT,
 8
 9 LABEL C!
10 2 SP) LDA, 0 X) STA,
11 INX, INX, INX, INX, TNEXT,
12
13 LABEL +!
14 2 SP) LDA, 0 X) ADC, 0 X) STA,
15 0 SP) INC, EQ
16 IF, 1 SP) INC, ENDIF,
17 3 SP) LDA, 0 X) ADC, 0 X) STA,
18 INX, INX, INX, INX, TNEXT,
19
20
21
22
23

```

```

 0 LABEL ! ( n address -- )
 1 PURPOSE: store the value at the address.
 2
 3
 4 LABEL C! ( b address -- )
 5 PURPOSE: store the byte value at the
 6 address.
 7
 8
 9 LABEL +! ( n address -- )
10 PURPOSE: increment the value at the
11 address by the value n.
12
13
14
15
16
17
18
19
20
21
22
23

```

41

```

0 ( TO ADDR +TO ) HEX
1
2 LABEL TO YSAVE STY, 0 #B LDY,
3 2 SP) LDA, VB )Y STA, INY,
4 3 SP) LDA, VB )Y STA, YSAVE LDY,
5 INX, INX, INX, INX, TNEXT,
6
7 LABEL ADDR
8 VB LDA, 0 SP) STA,
9 VB 1+ LDA, 1 SP) STA,
10 TNEXT,
11
12 LABEL +TO YSAVE STY, 0 #B LDY,
13 VB )Y LDA, 2 SP) ADC, VB )Y STA, INY,
14 VB )Y LDA, 3 SP) ADC, VB )Y STA,
15 YSAVE LDY, INX, INX, INX, INX, TNEXT,
16
17
18
19
20
21
22
23

```

```

0 LABEL TO ( value constant -- )
1 PURPOSE: store the value in place of
2 the value normally returned by the
3 constant.
4
5 LABEL +TO ( value constant -- )
6 PURPOSE: replace the constant with the
7 sum of the value and the constant.
8
9 LABEL ADDR ( constant -- address )
10 PURPOSE: put the address of the last
11 constant on the stack in place of the
12 value returned by the constant.
13
14
15
16
17
18
19
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21
22
23

```

scr # 142

```

0 ( + - NEGATE ) HEX
1
2 LABEL +
3 0 SP) LDA, 2 SP) ADC, 2 SP) STA,
4 1 SP) LDA, 3 SP) ADC, 3 SP) STA,
5 INX, INX, TNEXT,
6
7 LABEL -
8 2 SP) LDA, 0 SP) SBC, 2 SP) STA,
9 3 SP) LDA, 1 SP) SBC, 3 SP) STA,
10 INX, INX, TNEXT,
11
12 LABEL NEGATE SEC,
13 0 #B LDA, 0 SP) SBC, 0 SP) STA,
14 0 #B LDA, 1 SP) SBC, 1 SP) STA,
15 TNEXT,
16
17
18
19
20
21
22
23

```

```

0 LABEL + ( n1 n2 -- n3 )
1 PURPOSE: add n1 to n2 leaving n3.
2
3
4 LABEL - ( n1 n2 -- n3 )
5 PURPOSE: subtract n2 from n3 leaving n3.
6
7
8 LABEL NEGATE ( n1 -- n2 )
9 PURPOSE: subtract n1 from zero leaving
10 n2.
11
12
13
14
15
16
17
18
19
20
21
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23

```

143

```

0 ( BEEP FILL ) HEX
1
2 T: BEEP 100 0
3 DO 1 0 DO LOOP 1 C030 C! LOOP ;
4
5 T: FILL SWAP >R OVER C!
6 DUP 1+ R> 1- CMOVE ;
7
8
9

```

```

0 FILL ( address # value -- )
1 PURPOSE: fill from address for # bytes
2 with the value.
3
4 .ERRORIS ( -- )
5 PURPOSE: take next byte from word,
6 store it in ERROR, and beep.
7
8 BEEP ( -- )
9 PURPOSE: sound the Apple speaker.

```

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scr # 144

0
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23

145

0 { UM/MOD } HEX
1
2 LABEL UM/MOD YSAVE STY,
3 0 SP) LDA, X0 STA,
4 1 SP) LDA, X1 STA,
5 2 SP) LDA, X4 STA,
6 3 SP) LDA, X5 STA,
7 4 SP) LDA, .A ASL, X2 STA,
8 5 SP) LDA, .A ROL, X3 STA,
9 XSAVE STX, 10 #B LDX,
10 BEGIN, X4 ROL, X5 ROL, SEC,
11 X4 LDA, X0 SBC, TAY,
12 X5 LDA, X1 SBC, CS
13 IF, X4 STY, X5 STA, ENDIF,
14 X2 ROL, X3 ROL, DEX, EQ
15 UNTIL, XSAVE LDX,
16 X5 LDA, 5 SP) STA,
17 X4 LDA, 4 SP) STA,
18 X3 LDA, 3 SP) STA,
19 X2 LDA, 2 SP) STA,
20 INX, INX, YSAVE LDY, TNEXT,

0 LABEL UM/MOD
1 { double-number
2 unsigned-divisor -- remainder quotient)
3 PURPOSE: return the remainder and
4 quotient of the unsigned mixed number
5 division.
6
7 NOTE: this has been used in a number of
8 places to determine the maximum that a
9 number can be divided by plus one.
10 e.g., (n1 0 n2 -- n3)
11 UM/MOD SWAP IF 1+ ENDIF
12 see, for example, MARGIN-CHANGES.
13
14
15
16
17
18
19
20

21
22
23

```
scr # 146
0 ( 2* U2/ SWAB ) HEX
1
2 LABEL 2*
3 0 SP) ASL, 1 SP) ROL, TNEXT,
4
5 LABEL U2/
6 1 SP) LSR, 0 SP) ROR, TNEXT,
7
8 LABEL SWAB 0 SP) LDA, PHA, 1 SP) LDA,
9 0 SP) STA, PLA, 1 SP) STA, TNEXT,
10
11
12
13
14
15
16
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23
```

147

```
0 ( = 0= ) HEX
1
2 LABEL = YSAVE STY, 0 #B LDY,
3 2 SP) LDA, 0 SP) CMP, EQ
4 IF, 3 SP) LDA, 1 SP) CMP, ENDIF, EQ
5 IF, DEY, ENDIF,
6 INX, INX, 1 SP) STY, 0 SP) STY,
7 YSAVE LDY, TNEXT,
8
9
10 LABEL 0= YSAVE STY, 0 #B LDY,
11 0 SP) LDA, 1 SP) ORA, EQ
12 IF, DEY, ENDIF,
13 0 SP) STY, 1 SP) STY,
14 YSAVE LDY, TNEXT,
15
16
17
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19
20
21
22
23
```

scr # 148

```
0 ( U< 0< ABS ) HEX
1
2 LABEL U<
3 2 SP) LDA, 0 SP) CMP,
4 3 SP) LDA, 1 SP) SBC,
```

21
22
23

116

```
0 LABEL 2* ( n -- n*2 )
1 PURPOSE: multiply n by 2.
2
3
4 LABEL U2/ ( n -- n/2 )
5 PURPOSE: unsigned divide n by 2.
6
7
8 LABEL SWAB ( n1 -- n2 )
9 PURPOSE: swap the upper and lower bytes
10 of n1 to give n2.
11
12
13
14
15
16
17
18
19
20
21
22
23
```

```
0 LABEL = ( n1 n2 -- flag )
1 PURPOSE: leave a true flag if n1 equals
2 n2.
3
4 FRAG .YE
5 PURPOSE: an alternate exit from
6 LABEL definitions: stores Y register
7 onto stack, jumps to YNEXT
8
9 LABEL 0= ( n -- flag )
10 PURPOSE: leave a true flag if n equals
11 zero.
12
13
14
15
16
17
18
19
20
21
22
23
```

```

5 INX, INX, OFF #B LDA, 0 #B ADC,
6 0 SP) STA, 1 SP) STA,
7 TNEXT,
8
9 LABEL 0< YSAVE STY,
10 0 #B LDY, 1 SP) LDA, MI
11 IF, DEY, ENDIF,
12 0 SP) STY, 1 SP) STY,
13 YSAVE LDY, TNEXT,
14
15
16 LABEL ABS 1 SP) LDA, MI
17 IF, SEC,
18 0 #B LDA, 0 SP) SBC, 0 SP) STA,
19 0 #B LDA, 1 SP) SBC, 1 SP) STA,
20 ENDIF, TNEXT,
21
22
23
149
0 ( UMIN UMAX OMAX ) HEX
1
2 LABEL UMIN
3 2 SP) LDA, 0 SP) CMP,
4 3 SP) LDA, 1 SP) SBC, CS
5 IF, 0 SP) LDA, 2 SP) STA,
6 1 SP) LDA, 3 SP) STA,
7 ENDIF, INX, INX,
8 TNEXT,
9
10 LABEL UMAX
11 2 SP) LDA, 0 SP) CMP,
12 3 SP) LDA, 1 SP) SBC, NC
13 IF, 0 SP) LDA, 2 SP) STA,
14 1 SP) LDA, 3 SP) STA,
15 ENDIF, INX, INX,
16 TNEXT,
17
18 LABEL OMAX 1 SP) LDA, MI
19 IF, 0 #B LDA, 0 SP) STA, 1 SP) STA,
20 ENDIF,
21 TNEXT,
22
23

```

scr # 150

| | |
|----|----|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |

```

5 PURPOSE: leave a true flag if n is less
6 than zero.
7
8 LABEL ABS ( n -- u )
9 PURPOSE: leave the unsigned (absolute)
10 value of n.
11
12
13
14
15
16
17
18
19
20
21
22
23
0 LABEL UMIN ( u1 u2 -- umin )
1 PURPOSE: leave the unsigned minimum of
2 u1 and u2.
3
4 LABEL UMAX ( u1 u2 -- umax )
5 PURPOSE: leave the unsigned maximum of
6 u1 and u2.
7
8 LABEL OMAX ( n -- 0 | n )
9 PURPOSE: leave the greater positive
10 integer comparing n with zero.
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

16
17
18
19
20
21
22
23
151   ...
0 ( ?K QUE ?A ?S ) HEX
1
2 LABEL ?K YSAVE STY, DEX, DEX,
3 0 #B LDY, CHAR LDA, MI
4 IF, DEY, ENDIF, 0 SP) STY,
5 1 SP) STY, YSAVE LDY, TNEXT,
6
7 LABEL QUE YSAVE STY, C000 LDA, MI
8 IF, \ .QUE JSR, ENDIF, YSAVE LDY,
9 TNEXT,
10
11 LABEL ?A ( AGAIN? ) YSAVE STY,
12 DEX, DEX, 0 #B LDY,
13 CHAR LDA, tab 80 OR #B CMP, EQ
14 IF, DEY, 07F AND, CHAR STA, ENDIF,
15 0 SP) STY, 1 SP) STY, YSAVE LDY,
16 TNEXT,
17
18 LABEL ?S ( SEARCH FOR CHAR ? )
19 YSAVE STY, DEX, DEX, 0 #B LDY,
20 CHAR LDA, ff 80 OR #B CMP, CS
21 IF, DEY, ENDIF, 0 SP) STY,
22 1 SP) STY, YSAVE LDY, TNEXT,
23

```

```

scr # 152
0 ( ?E ?D ) HEX
1
2 LABEL ?E ( EXPAND SELECTION? )
3 YSAVE STY, DEX, DEX, 0 #B LDY,
4 XFLAG LDA, 3 #B CMP, EQ IF, DEY, ENDIF,
5 0 SP) STY, 1 SP) STY, YSAVE LDY,
6 TNEXT,
7
8 LABEL ?D ( DELETE FROM PATTERN? )
9 YSAVE STY, DEX, DEX,
10 0 #B LDY, CHAR LDA,
11 del 80 OR #B CMP, EQ IF, DEY, ENDIF,
12 0 SP) STY, 1 SP) STY, YSAVE LDY,
13 TNEXT,
14
15
16
17
18
19
20
21
22
23

```

```

16
17
18
19
20
21
22
23
0 LABEL ?K ( -- flag )
1 PURPOSE: detect if a key has been
2 pressed.
3
4 LABEL ?A ( -- flag )
5 PURPOSE: detect if "again" key has been
6 pressed.
7 true means "Tab" key pressed.
8 this is the EDDE "again" key.
9
10 LABEL ?S ( -- flag )
11 PURPOSE: valid search for character(?).
12 true means normal character typed.
13
14
15
16
17
18
19
20
21
22
23

```

```

0 LABEL ?E ( -- flag )
1 PURPOSE: return true if both lex keys
2 are being pressed.
3 used to expand selection.
4 forth equivalent : ?E XFLAG C@ 3 = ;
5
6 LABEL ?D ( -- flag )
7 PURPOSE: return true if delete key has
8 been pressed.
9 used to delete from the search pattern.
10
11 LABEL QUE ( -- )
12 PURPOSE: fetch character from keyboard
13 and place in keyboard queue.
14 also jump to the subroutine at .QVEC
15 keyboard uses C000 and .QUE.
16
17
18
19
20
21
22
23

```

153

```

0 ( MSG ) HEX
1
2 LABEL MSGO YSAVE STY, 0 #B LDA, X1 STA,
3 \ .MSG0 OFF AND #B LDA,
4 \ .MSG0 SWAB OFF AND #B LDY,
5 XO STA, XO 1+ STY,
6 0 #B LDY,
7 XO )Y LDA, TAY,
8 BEGIN, XO )Y LDA, 80 #B ORA,
9 CURR 1-, Y STA, DEY, EQ
10 UNTIL,
11 XO )Y LDA, TAY, AO #B LDA,
12 BEGIN, CURR ,Y STA, INY, 50 #B CPY, EQ
13 UNTIL,
14 DEX, DEX, X1 LDA, 0 SP) STA,
15 YSAVE LDY,
16
17
18
19
20
21
22
23

```

```

0 LABEL MSGO ( -- 0 )
1 PURPOSE: puts signon message in CURR,
2 places a zero on the stack, and then
3 executes DISP (next word in dictionary)
4
5 save y-reg, set X1 to zero.
6 store the address of .MSG0 at XO.
7 put length of .MSG0 in y-reg.
8 set high bit of each element of .MSG0
9 and store in CURR (excluding count).
10 put blanks after at the end of CURR.
11 leaves a zero on the stack.
12 ...
13
14
15
16
17
18 NOTE: next word (disp) is executed
19 immediately after this word.
20
21
22
23

```

scr # 154

```

0 ( DISP ) HEX
1
2 LABEL DISP YSAVE STY,
3 0 SP) LDA, INX, INX, XSAVE STX,
4 TAY, 1 #B LDA, UPDATE ,Y STA,
5 \ .DISP0 ,Y LDA, XO STA,
6 \ .DISP1 ,Y LDA, XO 1+ STA,
7 \ .SCRO ,Y LDA, X1 STA,
8 \ .SCR1 ,Y LDA, X1 1+ STA,
9 C001 STA, C055 STA,
10 4F #B LDX, 27 #B LDY,
11 BEGIN,
12 CURR ,X LDA, X1 )Y STA, DEX,
13 CURR ,X LDA, XO )Y STA, DEX, DEY,
14 CURR ,X LDA, X1 )Y STA, DEX,
15 CURR ,X LDA, XO )Y STA, DEX, DEY, MI
16 UNTIL,
17 CLIN LDA, XSAVE LDX, YSAVE LDY, TNEXT,
18
19
20
21
22
23

```

155

```

0 ( AUXIL ) HEX
1
2 LABEL AUXIL YSAVE STY,
3 XSAVE STX, 0 #B LDX,
4 BEGIN, UPDATE ,X LDA, NE
5 IF, 0 #B LDA, UPDATE ,X STA,
6 \ .SCRO ,X LDA, XO STA,
7 \ .SCR1 ,X LDA, XO 1+ STA,
8 \ .DISPO ,X LDA, X1 STA,
9 \ .DISP1 ,X LDA, X1 1+ STA,

```

```

0 LABEL DISP ( n -- )
1 PURPOSE: distribute text in CURR for
2 display.
3
4 clear keyboard buffer, set soft switch
5 (C055).
6 save x-reg.
7 put stack element in y-reg.
8 store 1 in UPDATE array.
9 put .DISP element into XO.
10 put .SCRO element into X1.
11 set x-reg for 79 ($4f) columns,
12 set y-reg for 39 ($27) columns.
13 take every other element in CURR and
14 store in position pointed to by .DISP,
15 and the other elements and store into
16 the position pointed to by .SCRO.
17 load a-reg with CLIN.
18 restore x-reg.
19
20
21
22
23

```

```

0 LABEL AUXIL ( -- )
1 PURPOSE: update screen/display elements.
2
3 save x-reg, load x-reg with zero.
4 if an element needs updating (UPDATE
5 array) then clear UPDATE element.
6 store .SCRO element in XO and .DISPO
7 element in X1.
8 attend to modem if necessary. waiting
9 for C019 eliminates screen flicker.

```

```

10 BEGIN, C019 LDA, PL
11 UNTIL, ROM? LDA, NE
12 IF, C000 STA,
13 ELSE, C001 LDA,
14 ENDIF, C054 STA, 27 #B LDY,
15 BEGIN,
16 X0 )Y LDA, X1 )Y STA, DEY,
17 X0 )Y LDA, X1 )Y STA, DEY,
18 X0 )Y LDA, X1 )Y STA, DEY,
19 X0 )Y LDA, X1 )Y STA, DEY, MI
20 UNTIL,
21 ENDIF, INX, 18 #B CPX, EQ
22 UNTIL, XSAVE LDY, YSAVE LDY, TNEXT,
23

```

```

10 clear keyboard strobe, set soft
11 switch (C054).
12 set y-reg to 39 ($27).
13 move elements from .SCRO to .DISPO.
14 attend to modem if necessary. waiting
15 for C019 eliminates screen flicker.
16 restore x-reg.
17
18
19
20
21
22
23

```

scr # 156

```

0 ( LEXLEN ROM? ) HEX
1
2 LABEL LEXLEN -DEX, DEX,
3 0 #B LDA, 1 SP) STA,
4 PATT LDA, 0 SP) STA, TNEXT,
5
6 LABEL ROM? DEX, DEX,
7 ROM? LDA, 0 SP) STA,
8 ROM? 1+ LDA, 1 SP) STA,
9 TNEXT,
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

157

```

0 ( SETDISP CLEAR SIGNON FLUSH ) HEX
1
2 LABEL SETDISP
3 C001 STA, C051 LDA, C054 LDA,
4 C00D STA, COOF STA, TNEXT,
5
6 T: CLEAR CURR 50 AO FILL
7 DO I DISP LOOP AUXIL ;
8
9 T: SIGNON MSG0 18 1 CLEAR ;
10
11 ( FLUSHES KEYBOARD BUFFER )
12 T: FLUSH
13 0 CHAR TO
14 QIN QOUT TO
15 0 C010 C! ;
16
17
18
19
20

```

```

0 LABEL LEXLEN ( -- n )
1 PURPOSE: put length of search pattern
2 onto the stack.
3 forth equivalent : LEXLEN PATT C@ ;
4
5 LABEL ROM? ( -- n )
6 PURPOSE: the returned value is used to
7 determine whether the disk version or
8 the rom version of Swyft is being
9 used; different FRAGMENTS are used
10 depending on the version.
11 the value is zero if using the disk
12 version.
13 forth equivalent : ROM? ROM? C@ ;
14
15
16
17
18
19
20
21
22
23

```

```

0 LABEL SETDISP ( -- )
1 PURPOSE: adjust display switches.
2
3 C00D 80 column display on
4 COOF alternate character set on
5 C051 text mode on
6 C054 page 2 off, main memory
7
8 T: CLEAR (a b -- )
9 PURPOSE: clear screen lines a to b-1.
10
11 T: SIGNON ( -- )
12 PURPOSE: clear screen, display message.
13
14 T: FLUSH ( -- )
15 PURPOSE: flush Swyft (CHAR, QOUT,
16 QIN) and Apple (C010) keyboard buffers.
17
18
19
20

```

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125

| | |
|----|----|
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

126

scr # 158

| | |
|---|----|
| 0 (.40COL .MON ABOOT) HEX ;S | 0 |
| 1 | 1 |
| 2 FRAG .40COL - | 2 |
| 3 C051 LDA, C00E STA, | 3 |
| 4 C056 LDA, C00C STA, | 4 |
| 5 C054 LDA, C000 STA, | 5 |
| 6 F0 #B LDA, 36 STA, | 6 |
| 7 FD #B LDA, 37 STA, | 7 |
| 8 FF #B LDA, 32 STA, | 8 |
| 9 0 #B LDA, 24 STA, 25 STA, RTS, | 9 |
| 10 | 10 |
| 11 LABEL ABOOT \ .40COL JSR, | 11 |
| 12 0 #B LDA, 3F4 STA, 39E STA, 3E0 JMP, | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

159

| | |
|---|----|
| 0 (.MON) HEX ;S | 0 |
| 1 | 1 |
| 2 (copy text & variables to main ram) | 2 |
| 3 FRAG .MON \ .40COL JSR, FFF8 LDA, EQ | 3 |
| 4 IF, 3C STA, 3D STA, 42 STA, 43 STA, | 4 |
| 5 EBOT LDA, 3E STA, | 5 |
| 6 EBOT 1+ LDA, 3F STA, | 6 |
| 7 CLC, C311 JSR, | 7 |
| 8 BEOT LDA, 3C STA, 42 STA, | 8 |
| 9 BEOT 1+ LDA, 3D STA, 43 STA, | 9 |
| 10 FF LDA, 3E STA, | 10 |
| 11 BF #B LDA, 3F STA, | 11 |
| 12 CLC, C311 JSR, | 12 |
| 13 ENDIF, <MON> JMP, | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

scr # 160

| | |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |

```

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
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21
22
23
161

```

```

0 ( <SCR> ) HEX
1
2 FRAG .SCR 0 #B LDX,
3 BEGIN, 27 #B LDY,
4 \ .DISPO ,X LDA, X0 STA,
5 \ .DISPO 1+ ,X LDA, X1 STA,
6 \ .DISP1 ,X LDA, X0 1+ STA,
7 \ .DISP1 1+ ,X LDA, X1 1+ STA,
8 BEGIN, X1 )Y LDA, X0 )Y STA, DEY,
9 X1 )Y LDA, X0 )Y STA, DEY, MI
10 UNTIL, INX, 17 #B CPX, EQ
11 UNTIL, RTS,
12
13
14
15
16
17
18
19
20
21
22
23

```

scr # 162

```

0 ( SCROLL ) HEX
1
2 LABEL SCROLL -YSAVE STY,
3 XSAVE STX, 0 #B LDY,
4 CLIN DEC, TOP INC, EQ
5 IF, TOP 1+ INC, ENDIF,
6 BEGIN, WND0 1+ ,Y LDA, WND0 ,Y STA,
7 WND1 1+ ,Y LDA, WND1 ,Y STA,
8 WND2 1+ ,Y LDA, WND2 ,Y STA,
9 WND3 1+ ,Y LDA, WND3 ,Y STA,
10 INY, 17 #B CPY, EQ
11 UNTIL, C001 STA,
12 C055 STA, \ .SCR JSR,
13 BEGIN, C019 LDA, PL UNTIL,
14 C054 LDA, \ .SCR JSR,
15 XSAVE LDX, YSAVE LDY, TNEXT,

```

```

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
0 FRAG .SCR
1 PURPOSE: from X1 to X0, move 40 bytes
2 at a time, for 24 lines of the screen
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 LABEL SCROLL
1 PURPOSE: scroll the text up if you are
2 on the last character of the display
3 window.
4
5
6
7
8
9
10
11
12
13
14
15

```

```

16
17
18
19
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21
22
23
163
0 ( .ON/OFF .ON ON OFF ) HEX
1 FRAG .ON/OFF YPOS LDY,
2 \ .DISP0 ,Y LDA, XO STA,
3 \ .DISP1 ,Y LDA, XO 1+ STA,
4 BEGIN, C019 LDA, PL
5 UNTIL, XPOS LDY, BANK LDA, EQ
6 IF, C001 STA, C055 STA,
7 ELSE, ROM? LDA, NE
8 IF, C000 STA, ELSE, C001 LDA, ENDIF,
9 C054 STA, ENDIF, RTS,
10
11 FRAG .ON YSAVE LDY,
12 LABEL ON YSAVE STY, \ .ON/OFF JSR,
13 XO )Y LDA, OFF #B CMP, NE
14 IF, SAVECHAR STA, OFF #B LDA,
15 XO )Y STA, ENDIF,
16 ROM? LDA, NE
17 IF, C000 STA, ELSE, C001 LDA, ENDIF,
18 C054 STA, YSAVE LDY, TNEXT,
19
20 LABEL OFF YSAVE STY, \ .ON/OFF JSR,
21 SAVECHAR LDA, XO )Y STA, ROM? LDA, NE
22 IF, C000 STA, ELSE, C001 LDA, ENDIF,
23 C054 STA, YSAVE LDY, TNEXT,

```

```

scr # 164
0 ( <CURSOR> ) HEX
1
2 FRAG .CURSOR -XO STA, XO 1+ STY,
3 18 #B LDY,
4 BEGIN, DEY,
5 XO LDA, WND0 ,Y CMP,
6 XO 1+ LDA, WND1 ,Y SBC, CS
7 UNTIL, NE
8 IF, XO LDA, GAP SBC, SEC,
9 ELSE, XO LDA,
10 ENDIF, WND0 ,Y SBC, YPOS STY,
11 .A LSR, XPOS STA, O #B LDA, O #B ADC,
12 BANK STA, BLO LDA, CTR STA,
13 BLO 1+ LDA, CTR 1+ STA, RTS,
14
15
16
17
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19
20
21
22
23

```

```

16
17
18
19
20
21
22
23
0 FRAG .ON/OFF ( -- )
1 PURPOSE: calculates cursor position.
2
3 XO=address of beginning of display line
4 picks up characters from the modem
5 placing them into the modem que
6 regY=YPOS
7 sets the proper ram video bank
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 FRAG ON ( -- )
1 PURPOSE: save Y-reg before doing .ON
2
3 FRAG .ON ( -- )
4 PURPOSE: display cursor on screen.
5
6 do the following if the character on
7 the screen is not a del character:
8 put del character on screen (into ram)
9 (little checkerboard),
10 saving current character in SAVECHAR
11 turn regular ram back on.
12
13 FRAG OFF ( -- )
14 PURPOSE: turn cursor off.
15
16 put character on screen (into ram)
17 turn regular ram back on
18
19
20
21
22
23

```

165

```

0 ( RENCUR ) HEX
1 LABEL RENCUR YSAVE STY, BEOT LDA,
2 BEOT 1+ LDY, \ .CURSOR JSR, SEC,
3 WND0 ,Y LDA, BEOT SBC, X2 STA, SEC,
4 WND1 ,Y LDA, BEOT 1+ SBC, X2 ORA, EQ
5 IF, EOS 1+ LDA, X1 1+ STA, 0 #B LDY,
6 EOS LDA, EQ IF, X1 1+ DEC, ENDIF,
7 1 #B SBC, X1 STA, X1 )Y LDA,
8 20 #B CMP, CS
9 IF, YPOS LDY, YPOS DEC, SEC,
10 EOS LDA, WND0 1-,Y SBC,
11 .A LSR, XPOS STA, 0 #B LDA, 0 #B ADC,
12 BANK STA,
13 ENDIF, ENDIF, 0 #B LDA, NARROW 1+ STA,
14 NARROW STA, XPOS LDY, W/2 CPY, CS
15 IF, XPOS STA, YPOS INC, ENDIF,
16 BEOT LDA, YPOS LDY, WND0 ,Y CMP, EQ
17 IF, BEOT 1+ LDA, WND1 ,Y CMP, EQ
18 IF, BEGIN, WND0 1-,Y LDA,
19 WND0 ,Y CMP, NE IF, \ .ON JMP, ENDIF,
20 WND1 ,Y LDA, WND1 1-,Y CMP, NE
21 IF, \ .ON JMP, ENDIF, DEY, YPOS DEC,
22 AGAIN,
23 ENDIF, ENDIF, \ .ON JMP,

```

```

0 FRAG .CURSOR ( -- )
1 PURPOSE: calculates cursor position
2 given address in regs A,Y.
3
4 output:
5 X0=address
6 YPOS=line number
7 XPOS=column number divided by 2
8 BANK=column number (even or odd)
9 CTR=blinking rate counter value (BL0)
10
11 looks in window table for entry that
12 is less than or equal to that address
13
14
15
16
17
18
19
20
21
22
23

```

scr # 166

```

0 ( LEXCUR ) HEX
1
2 LABEL LEXCUR - YSAVE STY,
3 0 #B LDA, LOCAL1 DUP 1+ STA, STA,
4 OFF #B LDA, NARROW DUP 1+ STA, STA,
5 EOS 1+ LDY, EOS LDA, EQ
6 IF, DEY, ENDIF, 0 #B SBC,
7 \ .CURSOR JSR,
8 0 #B LDY, X0 )Y LDA, ff #B CMP, EQ
9 IF, X0 1+ DEC, DEY, X0 )Y LDA,
10 X0 1+ INC, 20 #B CMP, CS
11 IF, SEC, YPOS LDY, NE
12 IF, WND0 ,Y LDA, DEY, WND0 ,Y SBC,
13 PHA, SEC,
14 WND1 1+,Y LDA, WND1 ,Y SBC,
15 OFE #B AND, NE
16 IF, PLA, CLC, GAP SBC, PHA, ENDIF,
17 PLA, WIDE CMP, NE
18 IF, YPOS STY, .A LSR, XPOS STA,
19 0 #B LDA, 0 #B ADC, BANK STA,
20 ENDIF, ENDIF, ENDIF, ENDIF,
21 \ .ON JMP,
22
23

```

167

```

0
1
2
3
4
5
6
7
8
9

```

```

0 LABEL RENCUR ( -- )
1 PURPOSE: put a "fat" cursor on screen.
2 "Fat" means a checkerboard on character
3 and a highlight to the left.
4
5 calculates cursor position from BEOT
6 if cursor is at beginning of line
7 look at last character in selection
8 if it isn't a control character
9 place the blinker on the line above
10 where the next character will go
11 if it is a control character
12 place the blinker at the beginning
13 of the next line
14 set LEXXED to zero: fat cursor
15 if cursor is in last display position
16 place blinker at beginning next line
17 >>> *** why isn't BANK set? *** <<<
18 if cursor is at beginning of line
19 and just follows an implicit page brk
20 then: place the blinker at the
21 implicit page break, in the first cell
22
23

```

```

0 LABEL LEXCUR ( -- )
1 PURPOSE: put a "thin" cursor on the
2 character. "Thin" means a checkerboard
3 and a highlight alternate on the same
4 character.
5
6 set LEXXED to -1: thin cursor
7 calculate cursor position from EOS-1
8 if character is an explicit page break
9 and previous character is normal

```

```

10
11
12
13
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17
18
19
20
21
22
23

```

```

10 and not first line in display
11 and previous line isn't full
12 calculate XPOS by subtracting
13 low order bytes in window table
14 if previous line starts below gap
15 (high order difference isn't -2)
16 then: subtract GAP from window diff
17 (fixes "dal" bug: 9Jan85)
18 then: place blinker on previous line
19
20
21
22
23

```

scr # 168

```

0
1
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3
4
5
6
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8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
169

```

```

0 ( FLIP FLIP/TRIM SEL BOW ) HEX
1
2 ( STR LEN1 LEN2 --- )
3 T: FLIP
4 ROT >R 2DUP + R@ SWAP REVERSE
5 R@ OVER REVERSE
6 R> + SWAP REVERSE ;
7
8 ( STR LEN1 LEN2 LEN3 --- )
9 T: FLIP/TRIM
10 2DUP SWAP >R >R + + OVER >R REVERSE
11 R> DUP R@ REVERSE
12 R> + R> REVERSE ;
13
14 LABEL SEL SEC, DEX, DEX,
15 EOS LDA, BOS SBC, 0 SP) STA,
16 EOS 1+ LDA, BOS 1+ SBC, 1 SP) STA,
17 TNEXT,
18
19 LABEL BOW DEX, DEX,
20 WND0 LDA, 0 SP) STA,

```

```

0 T: FLIP ( start len1 len2 -- )
1 PURPOSE: from start, swap the bytes so
2 that the positions of length1 and
3 length2 are swapped.
4
5 T: FLIP/TRIM ( start len1 len2 len3 -- )
6 PURPOSE: store cut.
7
8 T: SEL ( -- EOS-BOS )
9 PURPOSE: returns length of selected
10 text.
11
12 T: BOW { -- addr )
13 PURPOSE: returns address of beginning of
14 display window.
15
16
17
18
19
20

```

4,806,916

135

21 WND1 LDA, 1 SP) STA, TNEXT,
 22
 23

136

21
 22
 23

scr # 170
 0 (?BLINK ?LBLINK ?LEXXED) HEX
 1
 2 T: ?BLINK -1 CTR +TO CTR
 3 IF CTR BL1 DIRTY 0= IF U2/ U2/ ENDIF =
 4 IF OFF ENDIF
 5 ELSE ON
 6 BLO DIRTY 0= IF U2/ U2/ ENDIF CTR TO
 7 ENDIF ;
 8
 9 T: ?LBLINK SEL 2 U< IF ?BLINK ENDIF ;
 10
 11 T: ?LEXXED NARROW
 12 IF -1 BEOT +TO EBOT 1- C@ BEOT C!
 13 -1 EOS +TO -1 EBOT +TO
 14 -1 BOS +TO
 15 0 NARROW TO
 16 ENDIF ;
 17
 18
 19
 20
 21
 22
 23

171 0 (.WRAP) HEX
 1
 2 FRAG .WRAP SEC, WR LDA, YWRAP SBC,
 3 X5 STA, WR 1+ LDA, 0 #B SBC,
 4 X5 1+ STA, YWRAP LDY, cr #B LDA,
 5 BEGIN, X5)Y CMP, CS
 6 IF, EQ IF, INY, ENDIF,
 7 TYA, YWRAP SBC, WC STA, EQ
 8 IF, WC INC, ENDIF, RTS,
 9 ENDIF, INY, MI
 10 UNTIL, 20 #B LDA, WIDE LDY,
 11 DEY, WR)Y CMP, NE
 12 IF, INY,
 13 BEGIN, DEY, MI
 14 IF, WIDE LDA, WC STA, RTS,
 15 ENDIF, WR)Y CMP, EQ
 16 UNTIL, INY, WC STY, RTS,
 17 ENDIF, DEY, WR)Y CMP, EQ
 18 IF, WIDE LDA, WC STA, RTS,
 19 ENDIF,
 20
 21
 22
 23

scr # 172
 0 (.WRAP ... WRAP BMP) HEX
 1
 2 WIDE LDY, WR-)Y CMP, EQ
 3 IF, DEY, DEY,
 4 BEGIN, DEY, MI

0 T: ?BLINK (--) blink cursor
 1 PURPOSE: toggle for the cursor to make
 2 it blink.
 3 if the text is not dirty then blink the
 4 cursor at 4 times its normal speed.
 5 decrement CTR.
 6 when it is BL1, turn blinker off.
 7 when it is 0, turn blinker on
 8 and set CTR to BLO.
 9
 10 T: ?LBLINK (--)
 11 PURPOSE: if less than two characters are
 12 selected, blink cursor.
 13
 14 T: ?LEXXED (--)
 15 PURPOSE: if LEXXED is true then move
 16 a character from EBOT 1- across gap to
 17 new BEOT.
 18
 19
 20
 21
 22
 23
 0 FRAG .WRAP (--)
 1 PURPOSE: given character at wrap
 2 address (WR) return wrap count (WC)
 3 for line.
 4
 5 X5+YWRAP initially equal to WR.
 6 UNTIL either a cr or ff or end of line
 7 if a cr or ff
 8 if a cr, increment count by one
 9 increment wrap count by count
 10 if wrap count is 0, increment to one
 11 exit
 12 else increment count.
 13 if there are 1 or 2 blanks at end of
 14 line then wrap the last word by
 15 decrementing until a blank is found,
 16 increment to first character of word,
 17 and exit.
 18 if the line is full of blanks or
 19 characters then do not wrap line
 20 (ie, WC set equal to WIDE).
 21
 22
 23

0 LABEL WRAP (--)
 1 PURPOSE: call .WRAP.
 2
 3 FRAG BMP (--)
 4 PURPOSE: add the wrap count to the wrap

```

5   IF, WIDE LDA, WC STA, RTS,
6   ENDIF, WR )Y CMP, EQ
7   UNTIL, INY, WC STY, RTS,
8   ENDIF, WIDE LDA, WC STA, RTS,
9
10 LABEL WRAP YSAVE STY,
11 \ .WRAP JSR, YSAVE LDY, TNEXT,
12
13 FRAG BMP CLC,
14 WC LDA, WR ADC, WR STA, CS
15 IF, WR 1+ INC, ENDIF,
16 EBOT CMP, WR 1+ LDA, EBOT 1+ SBC, NC
17 IF, RTS, ENDIF,
18 WR LDA, BEOT CMP,
19 WR 1+ LDA, BEOT 1+ SBC, NC
20 IF, WR LDA, GAP ADC, WR STA,
21 WR 1+ LDA, GAP 1+ ADC, WR 1+ STA,
22 ENDIF, RTS,
23

```

173

```

0 ( LOCLIN ) HEX
1
2 LABEL LOCLIN YSAVE STY,
3 0 SP) LDA, XO STA,
4 1 SP) LDA, XO 1+ STA, INX, INX,
5 PAGES LDY, INY,
6 BEGIN, DEY,
7 XO LDA, PGS2 ,Y CMP,
8 XO 1+ LDA, PGS3 ,Y SBC, CS
9 UNTIL, PAGE# STY,
10 PGS0 ,Y LDA, WR STA,
11 PGS1 ,Y LDA, WR 1+ STA,
12 XO LDA, PGS2 ,Y SBC, LINREL STA,
13 OFF #B LDY, X3 STY,
14 BEGIN, X3 INC, X3 LDA, LINREL CMP, NE
15 IF, \ .WRAP JSR, \ BMP JSR, CLC,
16 COOO LDA, MI IF, \ .QUE JSR, ENDIF,
17 ENDIF, CS
18 UNTIL,
19 WR LDA, LINADR STA,
20 WR 1+ LDA, LINADR 1+ STA,
21 YSAVE LDY, TNEXT,
22
23

```

scr # 174

```

0 ( LOCCHR ) HEX
1
2 LABEL LOCCHR YSAVE STY,
3 0 SP) LDA, XO STA,
4 1 SP) LDA, XO 1+ STA, INX, INX,
5 PAGES LDY, INY,
6 BEGIN, DEY,
7 XO LDA, PGS0 ,Y CMP,
8 XO 1+ LDA, PGS1 ,Y SBC, CS
9 UNTIL,
10 PGS0 ,Y LDA, WR STA,
11 PGS1 ,Y LDA, WR 1+ STA,
12 PGS2 ,Y LDA, LINE# STA,
13 PGS3 ,Y LDA, LINE# 1+ STA,
14 PAGE# STY, 0 #B LDY, X3 STY,
15 BEGIN, X3 INC, \ .WRAP JSR,

```

```

5 address. if EBOT < wrap address < BEOT
6 then also add the GAP to the wrap
7 address.
8
9 add wrap count to wrap address.
10 if the new wrap address exceeds EBOT
11 then exit.
12 otherwise if new wrap address is less
13 than BEOT
14 then add gap to the new wrap address.
15
16
17
18
19
20
21
22
23

```

```

0 LABEL 2.LOCLIN ( line-number -- )
1 PURPOSE: given cumulative line number
2 return with LINREL, LINADR, and PAGE#
3 for that line-number.
4
5 store line# in XO.
6 store total # of pages in Y-reg.
7 search backwards in page table from
8 y-reg 1+ until the page is found for
9 the line address in XO.
10 store this page# (y-reg) in PAGE#.
11 store the address of the page in WR.
12 calculate offset within page (LINREL).
13 .WRAP this page until line LINREL,
14 BMPing across gap if necessary.
15 attend to key queue if necessary.
16 store wrap address for the beginning of
17 the line containing the line-number
18 in LINADR.
19
20
21
22
23

```

```

0 LABEL 2.LOCCHR ( character-address -- )
1 PURPOSE: given an address for a
2 character in text this word then
3 returns PAGE#, LINADR, LINREL and LINE#
4 where the address was found.
5
6 store address in XO.
7 load y-reg with total # of pages (PAGES)
8 search backwards in page array for wrap
9 address that contains the value in XO.
10 when it is found then update WR and
11 LINE# from page table.
12 store y-reg in PAGE#.
13 wrap lines and bump across gap if
14 necessary.
15 update LINADR, LINREL, LINE#.

```

| | | |
|-----|-------------------------------------|----|
| 16 | C000 LDA, MI IF, \ .QUE JSR, ENDIF, | 16 |
| 17 | WR LDA, X2 STA, | 17 |
| 18 | WR 1+ LDA, X2 1+ STA, | 18 |
| 19 | \ BMP JSR, SEC, | 19 |
| 20 | WR LDA, X0 SBC, X4 STA, | 20 |
| 21 | WR 1+ LDA, X0 1+ SBC, CS | 21 |
| 22 | UNTIL, | 22 |
| 23 | | 23 |
| 175 | ... | |
| 0 | (LOCCHR,) HEX | 0 |
| 1 | | 1 |
| 2 | X4 ORA, EQ | 2 |
| 3 | IF, WR LDA, WR 1+ LDY, | 3 |
| 4 | ELSE, X2 LDA, X2 1+ LDY, X3 DEC, | 4 |
| 5 | ENDIF, | 5 |
| 6 | LINADR STA, LINADR 1+ STY, | 6 |
| 7 | X3 LDA, LINREL STA, CLC, | 7 |
| 8 | LINE# ADC, LINE# STA, CS | 8 |
| 9 | IF, LINE# 1+ INC, ENDIF, | 9 |
| 10 | YSAVE LDY, TNEXT, | 10 |
| 11 | | 11 |
| 12 | | 12 |
| 13 | | 13 |
| 14 | | 14 |
| 15 | | 15 |
| 16 | | 16 |
| 17 | | 17 |
| 18 | | 18 |
| 19 | | 19 |
| 20 | | 20 |
| 21 | | 21 |
| 22 | | 22 |
| 23 | | 23 |

scr # 176

| | | | |
|----|----------------------------------|----|--|
| 0 | (WC@ WR@ WR! REWINDOW) HEX | 0 | LABEL WC@ (-- n) |
| 1 | | 1 | PURPOSE: return the wrap count. |
| 2 | LABEL WC@ DEX, DEX, | 2 | |
| 3 | WC LDA, 0 SP) STA, | 3 | LABEL WR@ (-- n) |
| 4 | 0 #B LDA, 1 SP) STA, TNEXT, | 4 | PURPOSE: return the wrap address. |
| 5 | | 5 | |
| 6 | LABEL WR@ DEX, DEX, | 6 | LABEL WR! (address --) |
| 7 | WR LDA, 0 SP) STA, | 7 | PURPOSE: store the address from the |
| 8 | WR 1+ LDA, 1 SP) STA, TNEXT, | 8 | stack into the wrap address. |
| 9 | | 9 | |
| 10 | LABEL WR! 0 SP) LDA, WR STA, | 10 | LABEL REWINDOW (address --) |
| 11 | 1 SP) LDA, WR 1+ STA, | 11 | PURPOSE: initialize the window table. |
| 12 | INX, INX, TNEXT, | 12 | set up first line on screen with |
| 13 | | 13 | address on stack (WND0,WND1 with the |
| 14 | LABEL REWINDOW YSAVE STY, | 14 | Y-reg = 0). |
| 15 | 0 SP) LDA, WND0 STA, | 15 | put zeroes into rest of the WND0,WND1 |
| 16 | 1 SP) LDA, WND1 STA, INX, INX, | 16 | elements (Y-reg decrementing from \$17 |
| 17 | 0 #B LDA, OLIN STA, 17 #B LDY, | 17 | to 1). |
| 18 | BEGIN, WND0 ,Y STA, WND1 ,Y STA, | 18 | clear OLIN. |
| 19 | DEY, EQ | 19 | |
| 20 | UNTIL, YSAVE LDY, TNEXT, | 20 | |
| 21 | | 21 | |
| 22 | | 22 | |
| 23 | | 23 | |

177

```

0 ( FIXEND ?SCROLL ENDScreen? AFTERGAP )
1 HEX
2
3 T: FIXEND
4 BEOT EOT =
5 IF -1 BEOT +TO 1C BEOT C! ENDIF ;
6
7 T: ?SCROLL CLIN 18 =
8 IF WR@ EOT U< DUP 0=
9 IF DROP NARROW 0= ENDIF
10 IF AUXIL SCROLL ENDIF ENDIF ;
11
12 T: ENDScreen?
13 WR@ BEOT = IF ?SCROLL ENDIF ;
14
15 LABEL AFTERGAP YSAVE STY,
16 CLIN LDA, 0 #B SBC, OLIN STA,
17 DEX, DEX, 0 #B LDY, 17 #B CMP, NE
18 IF, DEY, ENDIF,
19 0 SP) STY, 1 SP) STY, YSAVE LDY,
20 TNEXT,
21
22
23

```

```

0 T: FIXEND ( -- )
1 PURPOSE: if the last character of text
2 was deleted then replace it with
3 another form feed character.
4
5 T: ?SCROLL ( -- )
6 PURPOSE: scroll the display.
7 scroll one line up
8 if the current line is 18 and
9 if the wrap address < EOT or
10 if wrap address = EOT and you did not
11 lex to the end.
12
13 T: ENDScreen? ( -- )
14 PURPOSE: scroll display until wrap
15 address equals the BEOT.
16
17 LABEL AFTERGAP ( -- flag )
18 PURPOSE: is current line offscreen?
19 set OLIN=CLIN-1.
20 if OLIN is not the last line then the
21 flag is true.
22 otherwise OLIN is the last line and the
23 flag is false.

```

scr # 178

```

0 ( XYNEXT YNEXT STOP? ) HEX
1
2 FRAG XYNEXT XSAVE LDX,
3 FRAG YNEXT YSAVE LDY, TNEXT,
4 ;S
5 LABEL STOP?
6 DEX, DEX, 0 #B LDA,
7 0 SP) STA, 1 SP) STA,
8 C061 LDA, C062 ORA, MI
9 IF, TNEXT, ENDIF,
10 0 SP) DEC, 1 SP) DEC,
11 TEOS 1+ LDA, WR 1+ CMP,
12 TEOS LDA, WR SBC, NC
13 IF, TNEXT, ENDIF,
14 MQIN LDA, MQOUT CMP, NE
15 IF, TNEXT, ENDIF,
16 CHAR LDA, del 80 OR #B CMP, EQ
17 IF, TNEXT, ENDIF,
18 CHAR LDA, tab 80 OR #B CMP, CS
19 IF, LEXXING LDA, EQ
20 IF, TNEXT, ENDIF,
21 ENDIF,
22 0 SP) INC, 1 SP) INC,
23 TNEXT,

```

```

0
1
2
3
4
5
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7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

179

```

0 ( SAVEPAGE NEXTPAGE ) HEX
1
2 LABEL SAVEPAGE ( -- ) YSAVE STY,
3 LCT LDY, EQ
4 IF, PCT LDY,
5 WR LDA, PGS0 ,Y STA,
6 WR 1+ LDA, PGS1 ,Y STA,
7 LCTR LDA, PGS2 ,Y STA,
8 LCTR 1+ LDA, PGS3 ,Y STA,
9 ENDIF, YSAVE LDY, TNEXT,

```

```

0 LABEL SAVEPAGE ( -- )
1 PURPOSE: if the line count for the page
2 (LCT) is zero then update a page in the
3 page table.
4
5 INPUTS: LCT PCT WR LCTR
6 OUTPUTS: PGS0 PGS1 PGS2 PGS3
7
8 NOTE: previously called PAGEBOUND.
9

```

```

10
11 ;S
12
13 LABEL NEXTPAGE ( addr -- page# )
14 YSAVE STY, FF #B LDY,
15 BEGIN,
16 BEGIN, INY,
17 A00 )Y LDA, X0 STA, O SP) CMP,
18 B00 )Y LDA, X0 1+ STA, 1 SP) SBC, NC
19 UNTIL, Y0 STY,
20 O #B LDY, X0 )Y LDX, ff #B CPX, EQ
21 UNTIL, O #B LDA, 1 SP) STA,
22 Y0 LDA, O SP) STA, YSAVE LDY, TNEXT,
23

```

```

10
11
12
13
14 ;S
15
16 LABEL NEXTPAGE ( addr -- page# )
17
18 this is part of Jonathan's routine to
19 speed up the updating of the page table
20
21
22
23

```

scr # 180

```

0 ( PAGEWRAP ) HEX ;S
1
2 LABEL PAGEWRAP ( -- ) YSAVE STY,
3 BEGIN, \ .WRAP JSR,
4 LCT INC, CLC, WC LDA, NE
5 IF, WR ADC, WR STA, CS
6 IF, WR 1+ INC, ENDIF, ENDIF,
7 O #B LDY, WR )Y LDA, ff #B CMP, EQ
8 IF, INY, WR INC, CS
9 IF, WR 1+ INC, ENDIF,
10 ELSE, LCT LDA, LONG CMP, EQ
11 IF, INY, ENDIF,
12 ENDIF, DEY, EQ
13 UNTIL,
14 PCT INC, CLC, LCT LDA, LCTR ADC, CS
15 IF, LCTR 1+ INC, ENDIF,
16 O #B LDA, LCT STA, YSAVE LDY, TNEXT,
17
18
19
20
21
22
23

```

```

0 ;S LABEL PAGEWRAP
1
2
3
4 this is part of Jonathan's routine to
5 speed up the updating of the page table
6
7
8
9
10
11
12
13
14
15
16
17
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21
22
23

```

181

```

0 ( NOTMATCH? ) HEX ;S
1
2 LABEL NOTMATCH? ( addr -- flag )
3 XSAVE STX, YSAVE STY, OFF #B LDY,
4 SEC, O #B LDA, CUTPAGES SBC, TAX,
5 D00 ,S LDA, 1 SP) CMP, EQ
6 IF, CO0 ,X LDA, O SP) CMP, EQ
7 IF, INY, ENDIF, ENDIF,
8 XSAVE LDX, O SP) STY, 1 SP) STY,
9 YSAVE LDY, TNEXT,
10
11 LABEL FIXTABLE ( -- ) YSAVE STY,
12 SEC, O #B LDA, CUTPAGES SBC, TAY,
13 SEC, LCTR LDA, CO0 ,Y SBC, X0 STA,
14 LCTR 1+ LDA, D00 ,Y SBC, X0 1+ STA,
15 BEGIN, CLC,
16 CO0 ,Y LDA, X0 ADC, CO0 ,Y STA,
17 D00 ,Y LDA, X0 1+ ADC, D00 ,Y STA,
18 INY, EQ
19 UNTIL,
20 CLC, LINES LDA, X0 ADC, LINES STA,

```

```

0 ;S LABEL NOTMATCH?
1
2 LABEL FIXTABLE
3
4 these are part of Jonathan's routine to
5 speed up the updating of the page table
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

```

```

21 LINES 1+ LDA, XO 1+ ADC, LINES 1+ STA,      21
22 CLC, PCT LDA, CUTPAGES ADC, PAGES STA,      22
23 YSAVE LDY, TNEXT,                          23

```

```

scr # 182
0 ( DOPAGING ) HEX ;S
1
2 T: DOPAGING -
3 PRESET WRAPDONE
4 IF BEOT NEXTPAGE OLDPAGE TO
5 PAGES OLDPAGE - 1+ CUTPAGES TO
6 EOO A00
7 DO I OLDPAGE +
8   I 100 + PAGES OLDPAGE - 1+ DUP >R -
9     R> CMOVE
10   100 +LOOP
11   O WRAPDONE TO
12 ENDIF
13 BEGIN WR@ BEOT U<
14 WHILE SAVEPAGE PAGEWRAP
15 REPEAT
16 BEGIN STOP? IF EXIT ENDIF
17 SAVEPAGE WR@ NOTMATCH?
18 WHILE PAGEWRAP
19 REPEAT FIXTABLE -1 WRAPDONE TO
20 EOO A00
21 DO I PCT + I 100 + CUTPAGES CMOVE
22 100 +LOOP ;
23

183
0 ( SAVEPAGE ?ONPAGE ) HEX
1
2 LABEL ?ONPAGE DEX, DEX,
3 YSAVE STY, 0 #B LDY,
4 WC STY, WR )Y LDA, ff #B CMP, EQ
5 IF, INY, WC INC,
6 ELSE, LCT LDA, LONG CMP, EQ
7 IF, INY, ENDIF,
8 ENDIF, DEY, PAGEFLAG STY,
9 O SP) STY, 1 SP) STY, YSAVE LDY,
10 TNEXT,
11
12
13
14
15
16
17
18
19
20
21
22
23

scr # 184
0 ( ?MORETEXT LASTPAGE ) HEX
1
2 LABEL ?MORETEXT DEX, DEX,
3 YSAVE STY, FF #B LDY,
4 WR LDA, EOT CMP,

```

0 ;S T: DOPAGING
1
2 this is part of Jonathan's routine to
3 speed up the updating of the page table
4
5
6
7
8
9
10
11
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13
14
15
16
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22
23

0 LABEL ?ONPAGE (-- flag)
1 PURPOSE: detect if currently on a page.
2
3 false = first character is a formfeed
4 or an implicit page break belongs
5 sets the wrap count WC accordingly
6 true = don't change WC
7
8 NOTE: PAGEFLAG retains value of flag.
9
10
11
12
13
14
15
16
17
18
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22
23

0 LABEL ?MORETEXT (-- flag)
1 PURPOSE: flag indicates if wrapping has
2 reached the end of text.
3
4 if the wrap address >= EOT then true

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```
5 WR 1+ LDA, EOT 1+ SBC, CS
6 IF, INY, ENDIF.
7 0 SP) STY, 1 SP) STY, YSAVE LDY,
8 TNEXT,
9
10 LABEL LASTPAGE YSAVE STY, PCT LDY,
11 OFF #B LDA,
12 BEGIN, INY, NE
13 WHILE, PGS0 ,Y STA, PGS1 ,Y STA,
14 PGS2 ,Y STA, PGS3 ,Y STA,
15 REPEAT, YSAVE LDY, TNEXT,
16
17
18
19
20
21
22
23
185
0 ( INCPAGES ) HEX ;S
1
2 ( endaddress increase startpage -- )
3 LABEL INCPAGES YSAVE STY, 0 SP) LDY,
4 INX, INX,
5 BEGIN, INY, 2 SP) LDA, PGS0 ,Y CMP,
6 3 SP) LDA, PGS1 ,Y SBC, NC
7 IF, DEY, PCT STY, 0 #B LDA, LCT STA,
8 PGS2 ,Y LDA, LCTR STA,
9 PGS3 ,Y LDA, LCTR 1+ STA,
10 YSAVE LDY, INX, INX, INX, INX,
11 TNEXT,
12 ENDIF, CLC, 0 SP) LDA, PGS0 ,Y ADC,
13 PGS0 ,Y STA, WR STA,
14 1 SP) LDA, PGS1 ,Y ADC,
15 PGS1 ,Y STA, WR 1+ STA,
16 AGAIN,
17
18
19
20
21
22
23
```

148

```
5 flag.
6 otherwise false flag.
7
8
9 LABEL LASTPAGE ( -- )
10 PURPOSE: fills elements at the end of
11 the page table with $FF.
12 The value $FF is used by other words
13 when scanning backwards from the end
14 of the page table to find valid page
15 table elements.
16
17 from PCT+1 to the end of the page table
18 fill all page table elements with FF.
19
20
21
22
23
```

scr # 186

```
0 ( <ENDFORM> ENDFORM ) HEX
1
2 LABEL ENDFORM- YSAVE STY, OLIN LDY,
3 WND0 ,Y LDA, WR STA,
4 WND1 ,Y LDA, WR 1+ STA,
5 WND2 ,Y LDA, LCT STA,
6 WND3 ,Y LDA, PCT STA,
7 TOP LDA, OLIN ADC, LCTR STA,
8 TOP 1+ LDA, 0 #B ADC, LCTR 1+ STA,
9 YSAVE LDY,
10
11 T: <ENDFORM>
12 BEGIN ?MORETEXT
13 WHILE SAVEPAGE
14 ?ONPAGE IF WRAP ENDIF
15 ENDWRAP DROP
```

```
0 LABEL ENDFORM ( -- )
1 PURPOSE: set up parameters then call
2 <ENDFORM>.
3 set up WR, LCT and PCT with
4 values of the last line changed (OLIN)
5 in window table (WND0,1,2,3) and
6 update LCTR.
7
8 NOTE: no TNEXT, executes <ENDFORM>
9
10 T: <ENDFORM> ( -- )
11 PURPOSE: update page table by wrapping
12 from the current line until the end of
13 text or until interrupted by any key.
14
15 while there is still text to wrap
```

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```

16 QUE THOROUGH? O-
17 IF ?BLINK STOP? IF EXIT ENDIF ENDIF
18 REPEAT O THOROUGH? TO
19 SAVEPAGE
20 LCTR LINES TO PCT PAGES TO
21 LASTPAGE ;
22
23
187
0 ( PREALIGN +ALIGN ) HEX
1
2 T: PREALIGN 80 WIDE - YWRAP TO
3 WIDE U2/ W/2 TO BEOT EBOT - GAP TO
4 BEOT EBOT 51 CMOVE
5 O LCT TO O LCTR TO O PCT TO
6 -1 THOROUGH? TO BOT WR! ;
7
8 ( old-EBOT old-BOT -- )
9 T: +ALIGN PREALIGN
10 BOT SWAP - -1 INCPAGES <ENDFORM> ;
11
12
13
14
15
16
17
18
19
20
21
22
23

```

scr # 188

```

0 ( ENDWINDOW SETLINE ) HEX
1
2 LABEL ENDWINDOW EFLAG LDA, NE
3 IF, WR LDA, EOW STA,
4 WR 1+ LDA, EOW 1+ STA,
5 ENDIF, TNEXT,
6
7 LABEL SETLINE INX, INX,
8 YSAVE STY, O SP) LDY,
9 WND0 ,Y LDA, WR STA,
10 WND1 ,Y LDA, WR 1+ STA,
11 WND2 ,Y LDA, LCT STA,
12 WND3 ,Y LDA, PCT STA,
13 17 #B CPY, EQ
14 IF, EOW LDA,
15 ELSE, WND0 1+ ,Y LDA,
16 ENDIF, SEC, WR SBC, WC STA,
17 YSAVE LDY, TNEXT,
18
19
20
21
22
23

```

150

```

16 update page table if first line.
17 if not at a page break, wrap line.
18 point WR to beginning of next line.
19 if an interrupt event occurs exit
20 unless desire to thoroughly update.
21 update page table for last break.
22 update LINES and PAGES.
23 clear remainder of page table.

0 T: PREALIGN ( -- )
1 PURPOSE: prepare to update page table
2 from the beginning of text.
3
4 initialize YWRAP, W/2, GAP,
5 LCT, LCTR, PCT, LINES, PAGES.
6 move $51 text elements to EBOT for
7 wrapping.
8
9
10 T: +ALIGN ( old-EBOT old-BOT -- )
11 PURPOSE: update page table in minimum
12 amount of time by adding offset to
13 page table elements before gap.
14
15 set up for 'align (PREALIGN).
16 calculate endaddress and increase.
17 -1 will start INCPAGES at the beginning
18 of the page table.
19 add increase to early pages.
20 wrap lines to end of text (<ENDFORM>).
21
22
23

```

```

0 T: ENDWINDOW ( -- )
1 PURPOSE: set end of window (EOW) if
2 necessary.
3 set end of window (EOW) to
4 the wrap address (WR) if EFLAG (end
5 flag?) is true.
6
7 LABEL SETLINE ( line# -- )
8 PURPOSE: updates WR, LCT, PCT, and WC
9 from line# element in window table.
10 if last line on screen update WC from
11 EOW else from window table.
12
13 <<<** bug **>>>
14 if a line contains gap
15 WC will be set incorrectly
16
17
18
19
20
21
22
23

```

180

```

0 ( FRESH SHOWLINE REFRESH ) HEX
1
2 T: SHOWLINE QUE ?ONPAGE
3 IF WRAP ADJUST TOBUFF
4 ELSE SHOWPAGE
5 ENDIF DISP QUE ENDWRAP :
6
7 T: FRESH PRESET
8 BEGIN CLIN ?UPDATE DROP
9 SAVEPAGE CLIN SHOWLINE
10 WHILE ?SCROLL
11 REPEAT
12 1 EFLAG TO ENDScreen?
13 AFTERGAP
14 IF 18 CLIN
15 DO I ?UPDATE
16 IF I SHOWLINE DROP
17 ELSE 0 EFLAG TO LEAVE
18 ENDIF
19 LOOP
20 ENDIF AUXIL ENDWINDOW :
21
22 T: REFRESH OFF FRESH RENCUR ENDFORM ;
23

```

```

0 T: SHOWLINE ( -- flag ) display a line.
1 true=end of selection displayed.
2 if line is not a page break or CR then
3 wrap this line, adjust, move to buffer
4 else construct pagebreak symbols.
5 display the line, adjust page table.
6
7 T: FRESH ( -- ) refresh screen
8 and update page table re: display.
9 prepare text, CLIN, LCT PCT, LCTR
10 BEGIN update element in window array.
11 if page brk update page array.
12 display line.
13 WHILE eos not displayed
14 if this is last line then scroll.
15 REPEAT eos is last screen char scroll
16 set OLIN to CLIN-1
17 if not on last line.
18 then for each line changed
19 update window table, display line.
20 update auxiliary half of video.
21 update EOW if change beyond screen.
22
23

```

scr # 190

```

0 ( REFRESHER SHOW RESHOW ) HEX
1
2 T: RESHOW DUP SETLINE
3 DO I ?UPDATE DROP I SHOWLINE DROP
4 LOOP AUXIL ;
5
6 T: SHOW 18 0 RESHOW WR# EOW TO ;
7
8 ( # -- | redisplay # lines before EOS )
9 T: REFRESHER
10 OLIN SWAP - 1- OMAX OLIN TO
11 EOS TEOS TO ENDFORM -1 TEOS TO
12 FRESH ;
13
14
15
16
17
18
19
20
21
22
23

```

191

```

0 ( TOPLINE NEWND ) HEX
1
2 LABEL TOPLINE
3 LINREL LDA, WND2 STA,
4 PAGE# LDA, WND3 STA,
5 0 #B LDA, WND2 1+ STA,
6 0 #B LDA, WND3 1+ STA,
7 TNEXT,
8
9 T: NEWND E# TOP U< TOP 17 + E# U< OR

```

```

0 T: REFRESH refresh screen, wrap pages.
1
2 T: RESHOW ( end-line# start-line# -- )
3 PURPOSE: show each line and then show
4 the auxilliary video.
5
6 T: SHOW ( -- )
7 PURPOSE: display new screen using new
8 parameters.
9 updates LCT, PCT, and WR
10 for each line on screen
11 and until end of selection displayed
12 update element in window array
13 and display line or page break
14 if end of selection is displayed
15 and there are more lines to be shown
16 show remaining lines on screen
17 display auxiliary video
18 store wrap address into EOW
19
20 T: REFRESHER ( n -- )
21 PURPOSE: redisplay n lines before EOS.
22
23

```

```

0 LABEL TOPLINE ( -- )
1 PURPOSE: set beginning of window array
2 to LINREL and PAGE# and zero next byte.
3
4 T: NEWND ( -- )
5 PURPOSE: if new window then update
6 parameters.
7 if eos is not on screen or EOS = BOW
8 then: set NUFLAG = true
9 else: set NUFLAG = false

```

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```

10 EOS BOW = OR DUP NUFLAG TO
11 IF B# 17 + E# U<
12 IF E# OB -
13 ELSE E# B# OB + U<
14 IF E# OB - ELSE B# ENDIF
15 ENDIF OMAX
16 LINES 18 - OMAX UMIN
17 DUP LOCLIN TOP TO
18 LINADR REWINDOW
19 TOPLINE
20 ENDIF ;
21
22 ;S
23 LINES TOP 18 + U< TOP 0= 0= AND OR

```

154

```

10 if entire selection won't fit
11 or will fit in less than half screen
12 put eos in middle of screen
13 if entire select takes more than half
14 set top line to be bos
15 prevent negative or too large text
16 pointers
17 update LINREL, LINADR, PAGE#, and TOP
18 initialize window table with
19 LINADR, LINREL, and PAGE#
20 NOTE1: returns flag in NUFLAG, true =
21 display must be changed.
22 NOTE2: E# and B# determine the new
23 selection.

```

scr # 192

```

0 ( NEWMARK OLDSHOW SHOWMARK ) HEX
1
2 ( lowside highside -- )
3 T: NEWMARK E# OLDE# TO B# OLDB# TO
4 DUP EOS -
5 IF DROP
6 ELSE DUP LOCCHR LINE# E# TO EOS TO
7 ENDIF DUP BOS -
8 IF DROP
9 ELSE DUP EOS 1- -
10 IF E# 1-
11 ELSE DUP LOCCHR LINE#
12 ENDIF B# TO BOS TO
13 ENDIF ;
14
15 T: OLDSHOW
16 E# OLDE# UMAX TOP - 2 + 18 UMIN
17 B# OLDB# UMIN TOP - 2 - OMAX
18 OVER 1- UMIN RESHOW ;
19
20 ( lowside highside -- )
21 T: SHOWMARK NEWMARK NEWND NUFLAG
22 IF SHOW ELSE OLDSHOW ENDIF ;
23

```

193

```

0 ( ?UNSCROLL ) HEX ;S
1
2 T: ?UNSCROLL
3 E# TOP - DUP 18 U<
4 IF DUP OLIN TO PRESET
5 18 CLIN
6 DO CLIN ?UPDATE DROP PAGEBOUND
7 ?ONPAGE
8 IF WRAP ENDIF
9 ENDWRAP DROP
10 ?MORETEXT 0=
11 IF PAGEBOUND
12 CLIN 18 = 0= TOP AND
13 IF -1 TOP +TO TOP LOCLIN
14 LINADR REWINDOW TOPLINE
15 DROP 0
16 ENDIF LEAVE
17 ENDIF
18 LOOP OFF 18 OVER 1- OMAX RESHOW
19 WR@ EOT TO
20 ENDIF DROP ;

```

```

0 T: NEWMARK ( lowside highside -- )
1 PURPOSE: update E# and B# (the line
2 numbers for the EOS and BOS).
3 save E# and B# in OLDE# and OLDB#.
4 if EOS or BOS are new then update E# and
5 B# using LOCCHR (which updates LINREL,
6 PAGE#, LINE#, E#).
7
8
9 T: OLDSHOW ( -- )
10 PURPOSE: show all lines in which
11 selection may have changed keeping old
12 display window.
13
14 T: SHOWMARK ( lowside highside -- )
15 PURPOSE: show selection on screen.
16 update parameters (NEWMARK) for new
17 selection.
18 NUFLAG set true if EOS not on the
19 current display (NEWND).
20 if new text is to be displayed
21 SHOW new selection.
22 else show old selection (OLDSHOW).
23

```

```

0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

```

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155

21
22
23

156

21
22
23

scr # 194

```

0          0 T: CUT ( -- )
1          1 PURPOSE: move selection to cut buffer.
2          2 refresh screen, update as quickly as
3          3 possible.
4
5          5 save BOT and BOS for +ALIGN.
6          6 update B# since selection is deleted.
7          7 delete old cut and move selection
8          8 to the cut buffer.
9          9 adjust for the old cut being removed:
10         10 decrement BOS, OEOS, and BOT
11         11 and update window table.
12         12 if bos is not bot, decrement BOS.
13         13 make sure bot has a form feed.
14         14 update EOS and EBOT.
15         15 put form feed at end of text.
16         16 +align page table using BOT & BOS
17         17 (initialize YWRAP, W/2, GAP, LCT,
18         18 LCTR ,PCT, LINES, PAGES).
19         19 force TOP to be too large for NEWND.
20         20 set E# to B#
21         21 update selection related variables:
22         22 LINREL, LINADR, PAGE#, TOP
23         23 cursor off, fresh screen, rrecur.

```

195

```

0 ( CUT ) HEX
1
2 T: CUT BOT >R BOS >R
3 BOS LOCCHR LINE# B# TO
4 BOC BOT BOC -
5 BOS BOT - SEL FLIP/TRIM
6 SEL BOC + BOT - DUP BOS +TO
7 DUP OEOS +TO
8 DUP BOT +TO
9 BOW + REWINDOW
10 BOT BOS U< BOS +TO
11 1C BOT C!
12 BOS 1+ DUP EOS TO EBOT TO
13 FIXEND
14 R> R> +ALIGN
15 B# E# TO NEWND
16 0 OLIN TO OFF FRESH RENCUR OFF
17 FLUSH ;
18
19
20
21
22
23

```

```

0 T: NIBBLE ( -- )
1 PURPOSE: delete one character
2
3 operate on one character only
4 if at beginning of text then move up
5 one character like creeper
6 else (not at beginning)
7 if narrow cursor and not at end of
8 text then (remove char from right)
9 delete character if not at end
10 update BEOT if not at end
11 update screen
12 else (fat cursor) so move 1 character
13 to the left and
14 if at end of screen then display new
15 put form feed at end of text (FIXEND)
16 and refresh screen
17 if OEOS is anywhere within gap, set
18 OEOS to BOS
19
20
21
22
23

```

scr # 196

```

0 ( DELETE ) HEX
1
2 T: DELETE EBOT BOT - EOT BEOT - + 2 =
3 IF EXIT ENDIF
4 OEOS EOS 1+ U< BOS OEOS U< AND

```

```

0 T: CREEPDOWN
1 PURPOSE: copy char, update BEOT, EBOT
2
3 T: DELETE ( -- )
4 PURPOSE: delete character or selection

```

```

5 IF BOS OEOS TO ENDIF
6 BOS 1+ EOS -
7 IF CUT
8 ELSE BOT BOS =
9 IF BEOT C@ EBOT C! 1 EOS +TO
10 1 BOS +TO 1 BEOT +TO 1 EBOT +TO
11 OFF FRESH LEXCUR ENDFORM
12 ELSE NARROW EOT BEOT = 0= AND
13 IF EOT BEOT = 0=
14 IF BEOT C@ BOS C! ENDIF
15 BEOT EOT - IF 1 BEOT +TO ENDIF
16 OFF FRESH LEXCUR ENDFORM
17 ELSE -1 EOS +TO -1 EBOT +TO
18 -1 BOS +TO EOS BOW =
19 IF TOP DC - OMAX DUP TOP TO
20 LOCLIN LINADR REWINDOW
21 TOPLINE
22 ENDIF FIXEND REFRESH
23 ENDIF ENDIF ENDIF -1 DIRTY TO ;

```

197

```

0 ( ?COLLAPSE <ENTER> ENTER ) HEX
1
2 T: ?COLLAPSE 1 SEL U< EXTENDED OR
3 IF 0 OLIN TO EOS OEOS TO
4   0 EXTENDED TO ENDIF ;
5
6 T: <ENTER> EOS 100 + BEOT U<
7 OVER 01C = 0= PAGES OCA U< OR AND
8 IF ?LEXXED ?COLLAPSE
9 LONG 4 U< 80 PAGES U< AND
10 OVER 01D = AND OVER 01C = OR
11 IF -1 THOROUGH? TO ENDIF
12 EOS C! 1 EOS +TO 1 EBOT +TO
13 EOS 1- BOS TO
14 FIXEND FRESH -1 DIRTY TO
15 ELSE DROP BEEP
16 ENDIF ;
17
18 T: ENTER
19 OFF <ENTER> RENCUR OFF ENDFORM
20 PAGES OCA U< 0=
21 IF DELETE BEEP ENDIF ;
22
23

```

scr # 198

```

0 ( TAB ) HEX
1
2 T: TAB EOS 100 + BEOT U<
3 IF ?LEXXED ?COLLAPSE
4 XPOS 25 U<
5 IF 5 XPOS 2* BANK +
6 0 5 UM/MOD DROP -
7 EOS OVER 20 FILL
8 DUP EOS +TO DUP EBOT +TO
9 EOS 1- BOS TO FIXEND
10 REFRESH -1 DIRTY TO
11 PAGES OCA U< 0=
12 IF EOS OVER - BOS TO
13 DUP NEGATE EBOT +TO

```

```

5
6 exit if text is empty
7 if a selection is made (ie, more than
8 one character) then CUT
9 else (operate on one character only)
10 if at beginning of text then move up
11 one character like creeper
12 else (not at beginning)
13 if narrow cursor and not at end of
14 text then (remove char from right)
15 delete character if not at end
16 update BEOT if not at end
17 update screen
18 else (fat cursor) so move 1 character
19 to the left and
20 if at end of screen then display new
21 put form feed at end of text (FIXEND)
22 and refresh screen
23 set dirty bit

```

```

0 T: ?COLLAPSE ( -- )
1 PURPOSE: reset OEOS.
2 if selection contains 1 or more
3 characters or EXTENDED then set OLIN
4 and EXTENDED to 0 and set OEOS to EOS.
5
6 T: <ENTER> ( char -- )
7 PURPOSE: enter character into text and
8 the screen.
9 if there is enough room for adding
10 characters or new pages then
11 ?LEXXED, collapse selection.
12 if less than 4 lines/page and more than
13 $80 pages or page character and pages
14 >= $C0 then set THOROUGH? to true.
15 place char at end of selection and
16 move EOS and EBOT up one.
17 set BOS to EOS-1.
18 make certain page char at end of text.
19 FRESH screen.
20 else (no room) ignore and beep.
21
22 T: ENTER ( char -- )
23 PURPOSE: enter character to text.

```

```

0 T: TAB ( -- )
1 PURPOSE: add spaces to next tab stop.
2
3 if there is enough room then
4 reset lexced and OEOS states.
5 if the horizontal position < $25 then
6 calculate next tab position, add
7 spaces to text, update EOS and EBOT,
8 make certain a form feed is at the
9 end of the text, refresh screen.
10 else add a carriage return to the text.
11 else (not enough room) beep.
12
13

```

4,806,916

159

```

14   DELETE BEEP ENDIF DROP          14
15   ELSE 1D ENTER                 15
16   ENDIF                         16
17   ELSE BEEP                      17
18   ENDIF ;                       18
19                               19
20                               20
21                               21
22                               22
23                               23

```

199

```

0 ( NEWPAGES ) HEX
1
2 ( old-EBOT old-BOT -- )
3 T: NEWPAGES
4 FIXEND
5 +ALIGN
6 PAGES OCA U< 0=
7 IF DELETE BEEP
8 ELSE EOS LOCCHR
9 LINE# E# TO NEWND
10 BOS EOS TO
11 0 OLIN TO
12 OFF FRESH RENCUR OFF
13 -1 DIRTY TO
14 ENDIF ;
15
16
17
18
19
20
21
22
23

```

160

```

0 T: NEWPAGES ( old-EBOT old-BOT -- )
1 PURPOSE: update page table.
2
3 put form feed at end of text.
4 redo page table.
5 if there are not enough pages then
6 delete selection.
7 else display new selected area (NEWND).
8 update OEOS.
9 force FRESH to begin at OLIN = 0.
10 fat cursor.
11 set dirty bit.
12
13
14
15
16
17
18
19
20
21
22
23

```

scr # 200

```

0 ( PASTE ) HEX
1
2 T: PASTE ?LEXXED BOC BOT =
3 IF BEEP EXIT ENDIF
4 EOS U2/ BOT BOC - U2/ + 80 +
5 BEOT U2/ U<
6 IF
7 EOS BOS TO
8 BOC BOT BOC - >R EOS R@ CMOVE
9 R> DUP EOS +TO EBOT +TO
10 EBOT BOT NEWPAGES
11 ELSE
12 BOC BOT BOC - EBOT BOT - FLIP
13 EBOT BOT BOC - - BOS TO
14 7000 TOP TO
15 EBOT BOT BOC BOT TO NEWPAGES
16 BEEP
17 ENDIF FLUSH ;
18
19
20
21
22
23

```

```

0 T: INSERT ( -- )
1 PURPOSE: move from cut buffer to EOS.
2
3 ?LEXXED insures that LEXXED is 0.
4 if enough room and there is something
5 in the cut buffer then copy from cut
6 buffer to EOS, update page table.
7 else not enough room so actually move
8 cut buffer to EOS by removing cut
9 buffer entirely (FLIP), update page
10 table and BOT.
11 clear keyboard queue and strobe.
12
13
14
15
16
17
18
19
20
21
22
23

```

201

```

0 ( LEX REX [SEARCH] ) HEX
1
2 T: LEX EOS EBOT 1+ U<
3 IF BOT EBOT 1-
4 EOS UMIN SEEK<
5 ?DUP IF EXIT ENDIF
6 ENDIF BEOT EOS BEOT U<
7 IF EOT LEXLEN - 1+
8 ELSE EOS ENDIF SEEK< ;
9
10 T: REX EBOT EOS 1+ U<
11 IF BEOT EOS 1- UMAX EOT SEEK>
12 ?DUP IF EXIT ENDIF
13 ENDIF EOS EBOT U<
14 IF EOS 1- ELSE BOT ENDIF
15 EBOT LEXLEN - 1+ SEEK> ;
16
17 T: [SEARCH] RESEEK
18 IF EBOT EOS TO 0 RESEEK TO ENDIF
19 XFLAG 1 =
20 IF LEX ELSE REX ENDIF
21 ?DUP 0= IF EBOT 1- ENDIF DUP 1+
22 QUE SHOWMARK ;
23

```

```

0 T: LEX ( -- addr | 0 )
1 PURPOSE: search left for pattern.
2 if EOS is in lower partition then
3 search backwards starting PATT
4 below EBOT/EOS 1-.
5 if pattern is found then exit.
6 if not found search upper partition
7 if EOS is in lower partition
8 then search entire upper partition.
9 else search from EOS to BEOT.

10
11 T: REX ( -- addr | 0 )
12 PURPOSE: search right for PATTern.
13 if not found search lower partition.
14 similar to LEX.

15
16 T: [SEARCH] ( -- )
17 PURPOSE: search for character and
18 display (one character selected).
19 in the current direction
20 search until the pattern is found.
21 if the pattern wasn't found
22 put fat cursor at original selection.
23 show screen with one char selected.

```

scr # 202

```

0 ( LXX RXX REP ) HEX
1
2 T: LXX EOS EBOT 1+ U<
3 IF BOT EBOT 1-
4 EOS 1- UMIN
5 SEEK< ?DUP IF EXIT ENDIF
6 ENDIF BEOT EOS BEOT U<
7 IF EOT LEXLEN - 1+
8 ELSE EOS 1- ENDIF SEEK< ;
9
10 T: RXX EBOT EOS 1+ U<
11 IF BEOT EOS UMAX EOT SEEK>
12 ?DUP IF EXIT ENDIF
13 ENDIF EOS EBOT U<
14 IF EOS ELSE BOT ENDIF
15 EBOT LEXLEN - 1+ SEEK> ;
16
17 T: REP LEXLEN DUP
18 IF DROP @K DROP XFLAG 1 =
19 IF LXX ELSE RXX ENDIF
20 ENDIF ?DUP 0= IF EBOT 1- ENDIF DUP 1+
21 QUE SHOWMARK ;
22 ;S
23 -1 RESEEK TO

```

203

```

0 ( SEARCH <SEARCH> ) HEX
1
2 LABEL <SEARCH> YSAVE STY,
3 CHAR LDA, 7F #B AND, LRFLAG LDY, EQ
4 IF, PATT LDY, 1F #B CPY, NE
5 IF, INY, ENDIF,
6 ENDIF,
7 PATT STY, PATT ,Y STA, 0 #B LDY,

```

```

0 T: LXX ( -- addr | 0 )
1 PURPOSE: repeat left search (again).
2
3 false = searched all of text, not found
4 same as LEX except that search starts
5 with EOS-1.

6
7
8 T: RXX ( -- addr | 0 )
9 PURPOSE: repeat right search (again).
10
11 false = searched all of text, not found
12 same as REX except that search starts
13 with EOS.

14
15
16 T: REP ( -- )
17 PURPOSE: repeat search (again key).
18
19 discard the again keystroke
20 search in same direction as before
21 show one character selection
22
23

0 LABEL <SEARCH> ( -- )
1 PURPOSE: adds a character to pattern for
2 searching.
3
4 goes to get a character to PATT.
5 if there are already 32 chars in PATT
6 then overwrite the last character.
7

```

```

8 LRFLAG STY, YSAVE LDY, TNEXT,
9
10 T: SEARCH
11 <SEARCH> @K DROP [SEARCH] ;
12
13
14
15
16
17
18
19
20
21
22
23

```

```

8
9 T: SEARCH ( -- )
10 PURPOSE: search for character pattern in
11 the text.
12
13 get a character to PATT.
14 discard character from key queue.
15 lex to character, and display.
16
17
18
19
20
21
22
23

```

scr # 204

```

0 ( DEL EXPAND ) HEX
1
2 T: DEL @K DROP 1 LEXLEN U<
3 IF EBOT EOS TO EBOT 1- BOS TO
4 -1 PATT +! [SEARCH]
5 ELSE 0 PATT ! EBOT 1- EBOT SHOWMARK
6 ENDIF ;
7
8 T: EXPAND
9 0 LOCAL1 TO 5 XFLAG TO
10 EOS EBOT -
11 IF EOS EBOT U<
12 IF BOS EBOT ELSE EBOT 1- EOS ENDIF
13 NEWMARK OLDSHOW
14 ELSE OEOS EBOT -
15 IF OEOS BEOT U<
16 IF OEOS EBOT
17 ELSE EBOT 1- OEOS
18 ENDIF 0 EOS TO 0 BOS TO
19 SHOWMARK
20 ENDIF ENDIF
21 BEOT EOT = NARROW TO BOS OEOS TO ;
22
23

```

205

```

0 ( HARDPAGE SOFTPAGE ) HEX ;S
1
2 LABEL HARDPAGE ( addr -- )
3 YSAVE STY, PAGE# LDY, INY,
4 0 SP) LDA, PGSO ,Y STA,
5 1 SP) LDA, PGS1 ,Y STA,
6 INX, INX, YSAVE LDY, TNEXT,
7
8 LABEL SOFTPAGE ( flag -- ) YSAVE STY,
9 0 SP) LDA, NE
10 IF, LOCAL2 LDA, 1 #B CMP, EQ
11 IF,
12 YPOS LDY, WND3 2 + ,Y LDA, TAY, CLC,
13 PGSO ,Y LDA, GAP ADC, PGSO ,Y STA,
14 PGS1 ,Y LDA, GAP 1+ ADC, PGS1 ,Y STA,
15 ELSE,
16 YPOS LDY, WND3 ,Y LDA, TAY, SEC,

```

```

0 T: DEL ( -- )
1 PURPOSE: during a LEXREX search delete
2 a char from PATT.
3
4 discard delete keystroke.
5 if PATT has more than one character
6 decrements PATT, select char at EBOT-1
7 search anew.
8 else clear PATT, show current select.
9
10
11 T: EXPAND ( -- )
12 PURPOSE: if both lex keys pressed then
13 select and show text (ie, highlight).
14
15 set XFLAG to 5 (both lex keys down,
16 and selection is already expanded).
17 if selecting during a lex
18 show selected text.
19 else select new text block
20 and show new selection.
21 use fat cursor except at end of text.
22 store BOS into OEOS.
23

```

```

17    PGSO ,Y LDA, GAP     SBC, PGSO ,Y STA,   17
18    PGS1 ,Y LDA, GAP 1+ SBC, PGS1 ,Y STA,   18
19    ENDIF,                                19
20    ENDIF,                                20
21    INX, INX, YSAVE LDY, TNEXT,           21
22                                22
23                                23

```

scr # 206

```

0 ( OUTLEX ) HEX
1
2 T: OUTLEX  TÓP 17 + E# U<
3 IF BOS EOS SHOWMARK ENDIF
4 EOS EBOT -
5 IF EOS EBOT U< DUP
6 IF EOS EBOT GAP
7 ELSE EBOT EOS GAP NEGATE
8 ENDIF ROT LOCCHR PAGE#
9 INC PAGES
10 IF EBOT EOS - >R
11 EOS BEOT R@ - R@ CMOVE>
12 R> NEGATE BEOT +TO
13 EOS EBOT TO
14 ELSE EOS BEOT - >R
15 EBOT BOW U<
16 IF BOW GAP - REWINDOW ENDIF
17 BEOT EBOT R@ CMOVE
18 BOS BEOT U< O=
19 IF GAP NEGATE BOS +TO ENDIF
20 R@ BEOT +TO R> EBOT +TO
21 EBOT EOS TO
22 ENDIF ENDIF NARROW BOT 1+ EOS U< AND
23 BEOT EOT = OR NARROW TO ;

```

207

```

0 ( PRELEX POSTLEX ) HEX
1
2 T: PRELEX
3 -1 LEXXING TO XFLAG LOCAL2 TO
4 1 LRFLAG TO -1 LOCAL1 TO
5 1 SEL U< OFF
6 IF LOCAL2 1 =
7 IF BOS DUP 1+ SHOWMARK LEXCUR
8 ELSE EOS DUP 1- SWAP SHOWMARK
9 BEOT EOT =
10 IF LEXCUR ELSE RENCUR ENDIF
11 ENDIF
12 -1 EXTENDED TO 0 LOCAL1 TO
13 -1 RESEEK TO
14 ENDIF
15 EOS LOCCHR LINE# E# TO
16 BOS LOCCHR LINE# B# TO ; ( --)
17
18 T: POSTLEX
19 NARROW EXTENDED OR EXTENDED TO QUE
20 QIN QOUT TO
21 CHAR 9B = IF 0 CHAR TO ENDIF
22 0 LEXXING TO ; ( --)
23

```

0 T: MOVEGAP (--)
1 PURPOSE: moves gap and updates
2 appropriate pointers to account for
3 the completed leap
4
5 if selection doesn't end past screen
6 then display selection.
7 if lex moved toward beginning of text
8 then move text, update BEOT, EBOT.
9 else if screen no longer displays
10 old cursor position then initialize
11 window table, recalculate page table,
12 and move text.
13 if this selection begins after the
14 old cursor position then
15 subtract GAP from BOS.
16 update BEOT, EBOT, and EOS.
17 set cursor to previous state unless at
18 beginning then use thin cursor.
19
20 NOTE1: after OUTLEX then EOS = EBOT.
21 NOTE2: the key control feature of OUTLEX
22 is if EOS is altered (ie, EOS <> EBOT),
23 e.g., by a lexing operation.

0 T: PRELEX (--)
1 PURPOSE: prepare for LEXREX operations.
2
3 set LEXXING flag.
4 set up other flags used by LEXREX:
5 AXFLAG saves direction of lex key,
6 LRFLAG used by <SEARCH>, set LOCAL1
7 (reset by any LEXREX operation).
8 if a selection is highlighted then
9 collapse to left or right depending
10 upon which lex key was pressed after
11 turning cursor off, then lexcur.
12 set up E# and B# (used by SHOWMARK ?).
13
14
15 T: POSTLEX (--)
16 PURPOSE: necessary housekeeping after
17 LEXREX.
18
19 setup EXTENDED.
20 clear the lex keys.
21 if an escape character then discard.
22 clear LEXXING flag.
23

```

0 ( CREEPSHOW ) HEX
1
2 T: CREEPSHOW YPOS LOCAL2 1 =
3 IF BOT BOS U<
4 IF NARROW
5 IF EBOT 1- C@ BEOT 1- C! -1 BEOT +TO
6 -1 EBOT +TO BEOT C@ 1C =
7 IF BEOT 1+ EBOT LOCCHR HARPAGE
8 O LOCAL1 TO
9 ELSE EBOT 1- C@ 1C =
10 IF O LOCAL1 TO ENDIF
11 ENDIF EBOT 1- EBOT SHOWMARK
12 ENDIF ENDIF
13 ELSE BEOT EOT U<
14 IF BEOT 50 + C@ EBOT 50 + C!
15 1 BEOT +TO 1 EBOT +TO
16 EBOT 1- C@ 1C =
17 IF EBOT BEOT 1- LOCCHR HARPAGE
18 O LOCAL1 TO
19 ELSE EBOT 2 - C@ 1C =
20 IF O LOCAL1 TO ENDIF
21 ENDIF EBOT 1- EBOT SHOWMARK
22 ENDIF ENDIF ;
23
209
0 ( CREEPER )
1
2 T: CREEPER CREEPSHOW
3 OEOS 1- BEOT U< EBOT 2 - OEOS U< AND
4 IF LOCAL2 1 -
5 IF BEOT ELSE EBOT 1-
6 ENDIF OEOS TO
7 ENDIF POSTLEX LOCAL1
8 >R BOT 1+ EOS U<
9 IF LEXCUR ELSE RENCUR ENDIF
10 YPOS 2DUP
11 2 + = RG AND SOFTPAGE
12 2 - = RG AND SOFTPAGE
13 NUFLAG R> AND DUP
14 YPOS 09 = AND SOFTPAGE
15 YPOS OC = AND SOFTPAGE
16 O OLIN TO ;
17
18
19
20
21
22
23

```

scr # 210

```

0 ( MOVE-GAP LEXREX ) HEX
1
2 T: MOVE-GAP FLUSH EOS EBOT -
3 IF EOS EBOT U<
4 IF BEOT ELSE EBOT 1- ENDIF
5 OEOS TO
6 ENDIF OUTLEX
7 QUE O OLIN TO FRESH POSTLEX
8 NARROW IF LEXCUR ELSE RENCUR ENDIF ;

```

```

0 T: CREEPSHOW ( -- )
1 PURPOSE: adds single keystroke cursor
2 movement left or right using lex keys.
3
4 if left cursor pressed then move 1 space
5 to left if not below text and if
6 previous cursor was LEXCUR (thin)
7 (determined by the state of NARROW);
8 if previous cursor was RENCUR (fat)
9 then do nothing because POSTLEX will
10 set cursor with LEXCUR.
11 if a hard page character has been
12 passed then update page table.
13 otherwise right cursor has been pressed;
14 move right 1 space if not above text.
15 also, move 1 character from BEOT+$50 to
16 EBOT+$50 so that wrapping will work
17 properly (this mimicks part of FRESH).
18 if a hard page character has been
19 passed then update page table.
20 scroll screen if ipb at bottom
21
22
23
0 T: CREEPER ( -- )
1 PURPOSE: move cursor one character and
2 maintain pagetable.
3
4 adjust OEOS so that it is not left in
5 the gap (ie, maintains selection).
6 housekeeping (POSTLEX).
7 if at the very beginning of text use a
8 fat cursor (RENCUR); all other times
9 use a thin cursor (LEXCUR).
10 if a softpage has been passed on the
11 current display then update the page
12 table.
13 if a softpage has been passed on a new
14 display then update the page table.
15 set OLIN to zero so that the next
16 word that uses FRESH will result in
17 fixing a number of problems related to
18 the creeper mechanism. (Note: FRESH was
19 once a part of creeper but was taken
20 out to speed creeper up.)
21
22
23

```

```

0 T: LEAPER ( -- )
1 PURPOSE: perform the operations needed
2 by DEL, SEARCH, REP and EXPAND.
3 update OEOS.
4 move text (OUTLEX).
5 update screen (FRESH).
6 housekeeping (POSTLEX).
7 show thin cursor if lexed, show fat
8 cursor if expanded selection.

```

```

9
10 T: LEXREX PRELEX
11 NARROW >R
12 BEGIN QUE ?LBLINK ?X WHILE
13 ?S IF OFF SEARCH QUE LEXCUR ELSE
14 ?D IF OFF DEL QUE LEXCUR ELSE
15 ?A IF OFF REP QUE LEXCUR ELSE
16 ?E IF OFF EXPAND R> DROP O >R
17 ENDIF ENDIF ENDIF ENDIF
18 REPEAT R> EBOT EOS =
19 IF NARROW TO ELSE DROP ENDIF
20 OFF
21 LOCAL1
22 IF CREEPER ELSE MOVE-GAP ENDIF ;
23
211
0 ( AUTOEXTEND ) HEX
1
2 T: AUTOEXTEND SEL 2 U<
3 IF EOS OEOS U<
4 OFF EXPAND
5 IF OUTLEX ENDIF
6 NARROW IF LEXCUR ELSE RENCUR ENDIF
7 ENDIF -1 EXTENDED TO ;
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

scr # 212

| | |
|----|----|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |
| 17 | 17 |

9
10 T: LEXREX (--) pattern search
11 PURPOSE: interpret and act upon lex
12 key press(es).
13 PRELEX sets flags and collapses if a
14 selection exits.
15 pole for searching, editting, repeating.
16 highlighting (highest priority to the
17 lowest priority).
18 if a search has failed then restore the
19 cursor to the same it was before the
20 search (i.e., fat or thin).
21 if no other operation has occurred then
22 move cursor (ie, CREEP cursor).
23 else move the gap.

0 T: AUTOEXTEND
1 PURPOSE: to automatically highlight
2 ("select", EXPAND) a section of text
3 if BOS is not next to EOS.
4
5 if a selection can exist then turn off
6 the cursor and expand the selection.
7 if EOS < OEOS then outlex.
8 if lexked then show thin cursor
9 (LEXCUR) else fat cursor (RENCUR).
10 set extended true.

11
12
13
14
15
16
17
18
19
20
21
22
23

```

18
19
20
21
22
23
213
0 ( MS MEMIT ) HEX
1
2 LABEL MS ( # -- ) YSAVE STY,
3 0 SP) INC, 1 SP) INC,
4 BEGIN, CA #B LDY,
5 BEGIN, DEY, EQ UNTIL,
6 0 SP) DEC, EQ IF, 1 SP) DEC, ENDIF, EQ
7 UNTIL, INX, INX, YSAVE LDY, TNEXT,
8
9 LABEL MEMIT YSAVE STY, 0 SP) LDY,
10 INX, INX, SSC? LDA, NE
11 IF, ff #B CPY, EQ IF, OC #B LDY, ENDIF,
12 cr #B CPY, EQ IF, OD #B LDY, ENDIF,
13 BEGIN, COA9 LDA, 10 #B AND, NE
14 UNTIL, COA8 STY,
15 ENDIF, YSAVE LDY, TNEXT,
16
17
18
19
20
21
22
23

```

```

18
19
20
21
22
23
0 LABEL MS ( # -- )
1 PURPOSE: wait # milliseconds.
2
3 LABEL MEMIT ( char -- )
4 PURPOSE: send char to a super serial
5 card in slot 2.
6
7 load character into Y-reg.
8 if super serial card exists then
9 if character is form feed then change
10 character value to $OC.
11 if character is a return then change
12 character value to $OD.
13 wait until status bit clear (bit $10
14 at $COA9) then send character
15 (store character at $COA8).
16
17 LABEL ?EMPTYBUF ( -- )
18 PURPOSE: send a control-S if full.
19
20 if RSTAT is true: clear RSTAT
21 wait for status to clear.
22 send a control-S
23

```

scr # 214

```

0 ( ?M ?LE CONTROL ) HEX
1
2 LABEL ?M
3 YSAVE STY, 0 #B LDY, DEX, DEX,
4 MQOUT LDA, MQIN CMP, NE
5 IF, DEY, ENDIF,
6 0 SP) STY, 1 SP) STY, YSAVE LDY, TNEXT,
7
8 T: ?LE LINEND% 0< 0=
9 IF BOS C@ LINEND% 2DUP
10 OFF AND SWAP OVER -
11 IF DUP MEMIT ENDIF DROP
12 SWAB OFF AND ?DUP
13 IF SWAP OVER -
14 IF DUP MEMIT ENDIF
15 ENDIF DROP
16 ENDIF ;
17
18 LABEL CONTROL YSAVE STY,
19 BEGIN, C000 LDY, 7F #B CPY, CS
20 UNTIL, C010 STA, SSC? LDA, NE
21 IF, BEGIN, COA9 LDA, 10 #B AND, NE
22 UNTIL, TYA, 1F #B AND, COA8 STA,
23 ENDIF, YSAVE LDY, TNEXT,
215
0 ( ?SEND SEND ) HEX
1

```

```

0 ( ?M ?LE CONTROL ) HEX
1
2 LABEL ?M ( -- flag )
3 PURPOSE: indicate whether modem needs
4 attention.
5
6 false if modem buffer is empty. other
7 typed chars are placed in key queue.
8
9
10 T: ?LE ( -- )
11 PURPOSE: send the line end character(s).
12 NOTE: LINEND% can be 1 or 2 characters.
13
14
15 LABEL CONTROL ( -- )
16 PURPOSE: send a character entered from
17 the keyboard to the modem.
18
19 wait for a key.
20 convert it to a control character.
21 send it.
22
23 NOTE: this is the control-Z function.

0 LABEL ?SEND ( -- )
1 PURPOSE: used in SEND to stall until

```

```

2 LABEL ?SEND
3 BEGIN, TSTAT LDA, EQ UNTIL, TNEXT,
4
5 T: SEND AUTOEXTEND
6 BOS LOCCHR LINADR WR!
7 WRAP ENDWRAP DROP WR@ 
8 SEL 0
9 DO ?SEND
10 BOS OVER =
11 IF ?LE 4 MS
12 BOS 1- LOCCHR LINE# TOP - OMAX
13 DUP 2 + SWAP RESHOW
14 WR! WRAP ENDWRAP DROP WR@ 
15 ENDIF
16 BOS C@ MEMIT
17 1 BOS +TO
18 LOOP EOS 1- BOS TO
19 DROP ?LE
20 0 OLIN TO FRESH
21 BEOT EOT = IF LEXCUR ELSE RENCUR ENDIF
22 -1 EXTENDED TO ;
23

```

```

2 a control-Q is received.
3
4
5 T: SEND ( -- )
6 PURPOSE: send text to modem.
7
8 autoextend selection.
9 set modem for transmission.
10 send entire selection
11 at baud rate set by (BASIC) SE%
12 and display text after each line sent.
13 stall if receiver sends back a control
14 S, so wait for control-Q.
15 FRESH screen.
16 leave cursor fat at the end of the
17 transmission unless at the end of the
18 text (then thin cursor).
19
20
21
22
23

```

scr # 216

```

0 ( .SWYFT .SENSWYFT ?RECFULL ) HEX
1
2 FRAG .SWYFT 16 C, 13 C, 0D C.
3 53 C, 77 C, 79 C, 66 C, 74 C.
4 43 C, 61 C, 72 C, 64 C, 20 C,
5 31 C, 30 C, 34 C, 33 C, 20 C,
6 2F C, 2F C, 65 C, 0D C, 11 C,
7
8 FRAG .SENDSWYFT 0 #B LDY, YO STY,
9 BEGIN, \ .SWYFT 1+ ,Y LDA, TAY,
10 BEGIN, COA9 LDA, 10 #B AND, NE
11 UNTIL, COA8 STY,
12 YO INC, YO LDY, \ .SWYFT CPY, CS
13 UNTIL, RTS,
14
15 LABEL ?RECFULL ( -- ) RSTAT LDA, NE
16 IF, 0 #B LDA, RSTAT STA,
17 BEGIN, COA9 LDA, 10 #B AND, NE
18 UNTIL, 11 #B LDA, COA8 STA,
19 ENDIF, TNEXT, ( send control Q )
20
21
22
23

```

217

```

0 ( .INTERRUPT ) HEX
1
2 FRAG .INTERRUPT PHA, TYA, PHA,
3 COA9 LDA, 08 #B AND, NE
4 IF, COA8 LDA, 7F #B AND,
5 13 #B CMP, NE ( control S )
6 IF, 11 #B CMP, NE ( control Q )
7 IF, 20 #B CMP, NC
8 IF, DC #B CMP, EQ
9 IF, ( send control S )
10 BEGIN, COA9 LDA, 10 #B AND, NE
11 UNTIL, 13 #B LDA, COA8 STA,
12 FF #B LDA, RSTAT STA,

```

```

0
1 FRAG .MEMIT
2 PURPOSE: send the character that is in
3 the Y register
4
5 FRAG .MQUE
6 PURPOSE: grab a character from the
7 modem and place it in the Accumulator
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 FRAG .VQUE ( -- )
1 PURPOSE: receive a character from modem
2
3 FRAG .INTERRUPT ( -- )
4 PURPOSE: process interrupts from modem
5
6 if there is a character to be read and
7 if it is not a 'S and
8 if it is not a 'Q then
9 if a form feed then
10 send 'S, set RSTAT and set A-reg
11 with ff.
12 else (not a form feed)

```

```

13 ff #B LDA,
14 ELSE, 0D #B CMP, EQ
15 IF, cr #B LDA,
16 ELSE, 05 #B CMP, EQ
17 IF, \ .SENDSWYFT JSR,
18 ELSE, 07 #B CMP, EQ
19 IF, OFF #B LDA, BELL? STA,
20 ENDIF, ENDIF,
21 PLA, TAY, PLA, RTI,
22 ENDIF, ENDIF, ENDIF,
23

```

```

13 if a carriage return load cr value.
14 else (not a carriage return)
15 if it is a ^C then return "SWYFT".
16 else (not a ^C)
17 if it is a ^G then BEEP endif
18 endif
19 return from interrupt if ^C or ^G.
20 endif
21 endif endif
22
23

```

scr # 218

```

0 ( .INTERRUPT ... ) HEX
1
2 MQIN LDY, MQUE ,Y STA, MQIN INC,
3 SEC, MQOUT LDA, MQIN SBC,
4 B #B CMP, NC
5 IF, ( send control S )
6 BEGIN, COA9 LDA, 10 #B AND, NE
7 UNTIL, 13 #B LDA, COA8 STA,
8 FF #B LDA, RSTAT STA,
9 ENDIF,
10 ELSE, 0 #B LDA, TSTAT STA,
11 ENDIF,
12 ELSE, FF #B LDA, TSTAT STA,
13 ENDIF, ENDIF,
14 PLA, TAY, PLA, RTI,
15
16
17
18
19
20
21
22
23

```

219

```

0 ( old .INTERRUPT ) HEX ;S
1
2 FRAG .INTERRUPT PHA, TYA, PHA,
3 COA9 LDA, OF #B AND, NE
4 IF, 07 #B AND, NE
5 IF, 13 #B LDY, ( error: send ^S )
6 BEGIN, COA9 LDA, 10 #B AND, NE
7 UNTIL, COA8 STY,
8 32 #B LDA, Y0 STA, ( wait 32 ms )
9 BEGIN, CA #B LDY,
10 BEGIN, DEY, EQ UNTIL,
11 ( while also reading data line )
12 COA9 LDA, TAY, 08 #B AND, NE
13 IF, TYA, 07 #B AND, EQ
14 IF, 11 #B LDY, ( char, no error )
15 BEGIN, COA9 LDA, 10 #B AND, NE
16 UNTIL, COA8 STY, ( send ^Q )
17 \ .RECEIVE JMP,
18 ENDIF, ENDIF, Y0 DEC, EQ
19 UNTIL, 11 #B LDY, ( send ^Q )
20 BEGIN, COA9 LDA, 10 #B AND, NE
21 UNTIL, COA8 STY,

```

```

0 otherwise load char into MQUE if room
1 else wait till clear, send ^S,
2 set RSTAT.
3 else it is a ^Q, reset TSTAT
4 else it is a ^S, set TSTAT
5 restore A-reg and Y-reg
6
7 NOTE1:
8 if a ^Z^C then send back SWYFT message.
9 if a ^Z^G then give a beep.
10 if a ^Z^S then do not allow
11 interruption.
12 if a ^Z^Q then allow interruption.
13 other control characters are ignored.
14 if a character then put into MQUE.
15
16 NOTE2:
17 RSTAT receiver status; set if no room
18 in MQUE to put character or a page
19 character received.
20 TSTAT transmitter status; set if a ^S,
21 reset if a ^Q.
22
23

```

```

0 T: MAPPEND ( -- )
1 PURPOSE: transfer entire contents of
2 modem buffer to text at OEOS.
3
4 collapse the selection.
5 set OEOS.
6 update MQOUT.
7 make sure there is enough room for text
8 and for pages.
9 if OEOS is below EOS then move text up
10 and move modem que text in place.
11 update EOS and OEOS.
12 determine if a NEWMARK exits.
13 FIXEND, set dirty, update screen.
14 if the last character was a page' and
15 there are more than $47 pages then
16 THOROUGHLY update page table in
17 ENDFORM.
18 if there are less than $C7 pages then
19 check for full receive buffer.
20 else not enough room, BEEP and stop the
21 sender from transmitting any more.

```

```
22 ENDIF, \ .RECEIVE JMP,
23 ENDIF, PLA, TAY, PLA, RTI,
```

| | |
|--|--|
| scr # 220 | |
| 0 (MAPPEND) HEX | 0 |
| 1 | 1 |
| 2 T: MAPPEND ?COLLAPSE | 2 |
| 3 EOS OEOS UMIN BOT 1+ UMAX OEOS TO | 3 |
| 4 MQUE MQOUT + | 4 |
| 5 MQIN DUP MQOUT U< | 5 |
| 6 IF DROP 0 100 ELSE DUP ENDIF | 6 |
| 7 MQOUT - SWAP MQOUT TO | 7 |
| 8 BEOT EBOT 100 + - UMIN 0 OVER U< | 8 |
| 9 PAGES OC9 U< AND | 9 |
| 10 IF OEOS EOS U< | 10 |
| 11 IF OEOS 2DUP + EBOT OEOS - CMOVE> | 11 |
| 12 ENDIF SWAP OVER OEOS SWAP CMOVE | 12 |
| 13 OEOS LOCCHR LINE# >R | 13 |
| 14 DUP EBOT +TO DUP OEOS +TO | 14 |
| 15 EOS + DUP 1- SWAP NEWMARK | 15 |
| 16 FIXEND OFF -1 DIRTY TO | 16 |
| 17 E# R> - REFRESHER RENCUR | 17 |
| 18 OEOS 1- C@ 01C = 47 PAGES U< AND | 18 |
| 19 IF -1 THOROUGH? TO ENDIF ENDFORM | 19 |
| 20 PAGES OC7 U< IF ?RECFULL ENDIF | 20 |
| 21 ELSE DROP DROP BEEP 13 MEMIT | 21 |
| 22 C7 PAGES U< IF -1 THOROUGH? TO ENDFORM | 22 |
| 23 ENDIF ENDIF ; | 23 |
| 221 | |
| 0 (.STARTU .ENDU STARTU ENDU) HEX | 0 FRAG .STARTU |
| 1 | 1 PURPOSE: print USTART string from USTART |
| 2 FRAG .STARTU USTART 2 + LDA, NE | 2 string. |
| 3 IF, 0 #B LDY, (print USTART \$) | 3 NOTE: USTART 2+ has length of string. |
| 4 BEGIN, USTART 3 + ,Y LDX, YO STY, | 4 |
| 5 <LEMIT> JSR, YO LDY, INY, | 5 |
| 6 USTART 2 + CPY, EQ UNTIL, ENDIF, RTS, | 6 FRAG .ENDU |
| 7 | 7 PURPOSE: print UEND string from UEND |
| 8 FRAG .ENDU UEND 2 + LDA, 1 #B CMP, NE | 8 string. |
| 9 IF, 1 #B LDY, (print UEND \$) | 9 NOTE: UEND 2+ has length of string. |
| 10 BEGIN, UEND 3 + ,Y LDX, YO STY, | 10 |
| 11 <LEMIT> JSR, YO LDY, INY, | 11 LABEL STARTU |
| 12 UEND 2 + CPY, EQ UNTIL, ENDIF, RTS, | 12 PURPOSE: start underline if UEND 3+ is |
| 13 | 13 not zero and UFLAG is set. |
| 14 LABEL STARTU UEND 3 + LDA, NE IF, | 14 |
| 15 UFLAG LDA, NE IF, YSAVE STY, XSAVE STX, | 15 LABEL ENDU |
| 16 \ .STARTU JSR, XSAVE LDX, YSAVE LDY, | 16 PURPOSE: end underline if UEND 3+ is |
| 17 ENDIF, ENDIF, TNEXT, | 17 not zero and UFLAG is set. |
| 18 | 18 |
| 19 LABEL ENDU UEND 3 + LDA, NE IF, | 19 |
| 20 UFLAG LDA, NE IF, YSAVE STY, XSAVE STX, | 20 |
| 21 \ .ENDU JSR, XSAVE LDX, YSAVE LDY, | 21 |
| 22 ENDIF, ENDIF, TNEXT, | 22 |
| 23 | 23 |
| scr # 222 | |
| 0 (LEMIT LCR LTYPE LMARGIN .USINGLE) HEX | 0 LABEL LEMIT (char --) |
| 1 | 1 PURPOSE: print character. |
| 2 LABEL LEMIT YSAVE STY, | 2 save y-reg. |

```

3 0 SP) LDA, INX, INX,
4 XSAVE STX, TAX, <LEMIT> JSR,
5 XSAVE LDX, YSAVE LDY, TNEXT,
6
7 T: LCR 0D LEMIT
8 .LF IF 0A LEMIT ENDIF ;
9
10 T: LCRS 0MAX ?DUP
11 IF 0 DO LCR LOOP ENDIF ;
12
13 T: LMARGIN .BL MARGIN% + ?DUP
14 IF 0 DO 20 LEMIT LOOP
15 ENDIF ;
16
17 FRAG .USINGLE
18 Y1 STX, \ .STARTU JSR, Y1 LDX,
19 <LEMIT> JSR, \ .ENDU JSR,
20 YSAVE LDY, XSAVE LDX, TNEXT,
21
22
23

```

223

```

0 ( ULEMIT ) HEX
1 LABEL ULEMIT ( n -- ) YSAVE STY,
2 1 SP) LDA, Y0 STA, 0 SP) LDA,
3 INX, INX, XSAVE STX, TAX, UFLAG LDA, EQ
4 IF, 5F #B CPX, EQ ( UFLAG not set)
5 IF, OFF #B LDA, ( underline char )
6 UFLAG DUP STA, 1+ STA, ( set UFLAG )
7 20 #B LDX, <LEMIT> JSR, ( space )
8 UEND 3 + LDA, NE ( group u'line? )
9 IF, \ .STARTU JSR, ENDIF, ( start )
10 ELSE, <LEMIT> JSR, ENDIF,
11 ELSE, 5F #B CPX, EQ ( UFLAGset, not_? )
12 IF, Y0 LDX, 5F #B CPX, EQ
13 IF, 20 #B LDX, UEND 3 + LDA, EQ
14 IF, \ .USINGLE JMP, ENDIF, ( 1 )
15 ELSE, 0 #B LDA, ( end _ )
16 UFLAG DUP STA, 1+ STA, ( clrUFLAG )
17 UEND 3 + LDA, NE ( group? )
18 IF, \ .ENDU JSR, ENDIF, 20 #B LDX,
19 ENDIF,
20 ELSE, UEND 3 + LDA, EQ
21 IF, \ .USINGLE JMP, ENDIF,
22 ENDIF, <LEMIT> JSR,
23 ENDIF, YSAVE LDY, XSAVE LDX, TNEXT,

```

scr # 224

```

0 ( LTYPE V@ V! ) HEX
1
2 T: LTYPE LMARGIN STARTU
3 CURR DUP DUP 50 + SWAP
4 DO 20 I C@ 7F AND U<
5 IF DROP I ENDIF
6 LOOP 1+ CURR
7 DO I C@ 7F U<
8 IF I @ ULEMIT
9 ELSE ENDU 20 LEMIT STARTU
10 ENDIF
11 LOOP ENDU ;
12
13 T: V! V ?DUP

```

```

3 remove character from stack
4 save x-reg.
5 transfer a-reg to x-reg and call <LEMIT>
6 restore x and y registers.
7
8 T: LCR ( -- )
9 PURPOSE: print a carriage return and
10 also print a line feed if .LF is true.
11
12 T: LCRS ( n -- )
13 PURPOSE: print n carr returns.
14 n can be zero.
15
16 T: LMARGINS
17 PURPOSE: print the left margin. also
18 prevents margins from being underlined
19 if underline is turned on.
20
21 T: .USINGLE
22 PURPOSE: single underline.
23

```

```

0 LABEL ULEMIT
1 PURPOSE: this word controls underlining
2 sent to the printer.
3
4 underlining is turned on by an underline
5 character (a space is printed in its
6 place) and turned off by another
7 underline unless there are two
8 underlines right next to each other
9 in which case an underline is printed,
10 and also turned off by two carriage
11 or by a pagebreak.
12
13 UFLAG true indicates that underlining
14 is currently in operation.
15 USTART is string for turning on u'line.
16 UEND is string for turning off u'line.
17 the first element contains a group flag
18 for backspace underlining: 0 means that
19 the printer must backup to underline
20 each character.
21
22
23

```

```

0 T: LTYPE ( -- )
1 PURPOSE: print a line from CURR until
2 control character encountered.
3
4 print leading blanks (LMARGIN).
5 start underline.
6 examine 80 characters in CURR buffer
7 for control characters and for
8 1D=carriage return.
9 return address of control character.
10 print all characters substituting the
11 control character with a blank.
12
13

```

```

14 IF SWAP SWAB SWAP ! ELSE DROP ENDIF ;
15
16 T: V@ V @ SWAB ;
17
18
19
20
21
22
23

```

225

```

0 ( ENDPAGE SETPRINTER ) HEX
1
2 T: ENDPAGE UFLAG
3 IF WR@ C@ 1C = 0= UFLAG TO ENDIF
4 42 LPAGE% - ABOVE% - LINESCOUNT - LCRS
5 PCT 8000 + PAGE% + PFLAG% 8000 + U< 0=
6 IF PAGEPRINT ENDIF
7 0 LINESCOUNT TO OC LEMIT ;
8
9 T: SETPRINTER
10 PBUF ADDR DUP 3 + >R
11 R@ 2 + C@ HEAD% TO
12 2 + C@ 3 - OMAX ?DUP
13 IF R@ 3 + SWAP OVER + SWAP
14 DO I, C@ LEMIT LOOP
15 ENDIF
16 R@ 1+ C@ .BL TO
17 R> C@ .LF TO
18 .LF IF OD LEMIT ENDIF ;
19
20
21
22
23

```

scr # 226

```

0 ( PRINT ) HEX
1 T: PRINT AUTOEXTEND
2 SETPRINTER
3 BOS LOCCHR LINADR WR!
4 LINREL LCT TO PAGE# PCT TO
5 0 PRINTBREAK TO 0 UFLAG TO
6 BEGIN LINESCOUNT 0=
7 IF WR@ C@ 1C -
8 IF ABOVE% HEAD% OMAX - LCRS
9 ENDIF ENDIF ?ONPAGE
10 IF WRAP ADJUST -1 PRINT? TO TOBUFF
11 0 PRINT? TO LTYPED LCR
12 1 SPACING 2 = IF LCR DROP 2 ENDIF
13 LINESCOUNT +TO
14 WR@ C@ 1D = IF 0 UFLAG TO ENDIF
15 ELSE PRINTBREAK IF ENDPAGE ENDIF
16 ENDIF ENDWRAP 0=
17 WR@ EBOT 1- UMIN DUP BOS TO
18 BOS BOW U< 0=
19 IF 0 OLIN TO LCT PCT
20 FRESH PCT TO LCT TO
21 ENDIF WR! -1 PRINTBREAK TO
22 UNTIL SHOW BEOT EOT =
23 IF LEXCUR ELSE RENCUR ENDIF ;

```

```

14 T: V! ( # char-pair -- )
15 PURPOSE: store a number in the BASIC
16 variable; if it isn't found, do nothing
17
18
19 T: V@ ( char-pair -- # )
20 PURPOSE: fetch a value from a BASIC
21 variable; if it isn't found, return
22 value stored at 0 < ** bug? ** >.
23

```

```

0 T: ENDPAGE ( -- )
1 PURPOSE: print page number.
2 turn off underlining if a hard page
3 break is encountered.
4 advance to line to print page# on
5 print the page number only if
6 page# is greater than (BASIC) PFX
7 form feed to next page,
8 clear LINESCOUNT
9 inputs: LPAGE% ABOVE% LINESCOUNT
10 PFLAG%
11
12 T: SETPRINTER ( -- )
13 PURPOSE: initialize the printer.
14 emit printer string from that saved by
15 user (see SAVESTRINGS and LOADSTRINGS)
16 to printer, skipping the first 3 bytes.
17 store first three bytes in:
18 .LF false if cr does a line feed
19 .BL # spaces needed for left margin
20 HEAD% # lines past tear-off line a
21 form feed brings print head
22 emit a carriage return if it won't
23 send a linefeed to the printer

```

```

0 T: PRINT ( -- )
1 PURPOSE: print selected area, line by
2 line, to printer in slot 1.
3
4 allows a print job to be stopped and
5 restarted and still look contiguous
6 as long as it stops at the end of a
7 line and starts on the next
8 allows double spacing (BASIC: SP% = 2)
9 if there is a second carriage return
10 then turn underline flag off.
11 won't print a leading pagebreak
12
13 Inputs:
14 VECT points to printer rom code.
15 .LP holds printer initialization.
16 BOS points to start of desired text.
17
18 Outputs:
19 BOS points to last character printed.
20 EXTENDED holds -1
21 WR points to ???
22
23

```

227

```

0 ( save, load BASIC strings ) HEX
1
2   ( $name buffer max -- )
3 T: SAVE$  OVER ADDR >R >R
4 SWAP V DUP 1+ @ ROT -
5 IF DUP C@ R> UMIN DUP R@ 2 + C!
6 SWAP 1+ @ DUP R@ !
7 R> 3 + ROT CMOVE
8 ELSE R> R> DROP DROP DROP ENDIF ;
9
10  ( $name buffer -- )
11 T: LOAD$  ADDR >R V DUP 1+ @ R@ @ -
12 IF R@ 2 + C@ DUP >R OVER C!
13 BASIC0 6F + DUP @ R@ - DUP ROT !
14 DUP ROT 1+ ! R> ?DUP
15 IF R@ 3 + ROT ROT CMOVE 1 ENDIF
16 ENDIF R> DROP DROP ;
17
18
19
20
21
22
23

```

scr # 228

```

0 ( save, load PR$ string at PBUF ) HEX
1
2 T: SAVESTRINGS
3 55D3 USTART 5 SAVES
4 55C5 UEND    5 SAVES
5 50D2 PBUF    1D SAVES ;
6
7 T: LOADSTRINGS
8 55D3 USTART LOADS
9 55C5 UEND    LOADS
10 50D2 PBUF   LOADS ;
11
12
13
14
15
16
17
18
19
20
21
22
23

```

229

```

0 ( DEFAULT PRINTER STRINGS ) HEX
1
2 FRAG .PRINT
3 ( UEND ) 1 C, 1B C, 2D C, 30 C,
4 ( USTART ) 1B C, 2D C, 31 C,
5 ( FX80 ) 0 C, 0 C, 5 C,
6 1B C, 4D C, 1B C, 6C C, 8 C,
7

```

```

0 T: SAVES ( $name buffer max -- )
1 PURPOSE: save a string entered by user
2 so that when a NEW or RUN is invoked
3 this string can be restored instead of
4 the default string.
5
6 if the BASIC string and the user string
7 do not match then store the length and
8 move the contents from BASIC to the
9 user string.
10 else drop all parameters.
11
12 T: LOAD$ ( $name buffer -- )
13 PURPOSE: load a string back into the
14 BASIC string area.
15
16 if the BASIC string and the user string
17 do not match then store the length and
18 move the contents from the user string
19 to the BASIC string.
20 and drop all parameters.
21
22
23

```

```

0 T: SAVESTRINGS ( -- )
1 PURPOSE: to save the user strings for
2 underline start, underline end, and
3 printer initialization.
4
5
6 T: LOADSTRINGS ( -- )
7 PURPOSE: to restore the user strings
8 for underline start, underline end,
9 and printer initialization.
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 ( DEFAULT PRINTER STRINGS )
1
2 LABEL .PRINT
3 PURPOSE: default printer strings for
4 EPSON FX80.
5
6
7

```

| | |
|----------------------------------|----|
| 8 ;S. | 8 |
| 9 (IMAGEWRITER) 0 C, 0 C, 6 C, | 9 |
| 10 1B C, 45 C, | 10 |
| 11 1B C, 4C C, 30 C, 30 C, 38 C, | 11 |
| 12 (IDS) 0 C, 0 C, | 12 |
| 13 1E C, 1B C, 4A C, 2C C, | 13 |
| 14 36 C, 30 C, 2C C, 24 C, | 14 |
| 15 1B C, 52 C, 2C C, 31 C, | 15 |
| 16 2C C, 24 C, | 16 |
| 17 (QANTX) 1 C, 0 C, | 17 |
| 18 1B C, 5B C, 36 C, 73 C, | 18 |
| 19 1B C, 5B C, 32 C, 77 C, | 19 |
| 20 (QUME) 1 C, 0C C, | 20 |
| 21 (MX80) 0 C, 10 C, 0F C, | 21 |
| 22 (PARALLEL CARD) 0 C, 0 C, | 22 |
| 23 9 C, 38 C, 30 C, 4E C, 9 C, | 23 |

scr # 230

```

0 ( DEFAULT BASIC zero page ) HEX
1
2 FRAG .DEFAULT- 100 ALLOT
3 11 BLOCK HERE 100 - 100 CMOVE
4
5 LOMEM 1+      HERE 100 - 67 + !
6 LOMEM 3+      HERE 100 - 69 + !
7 LOMEM 3+ 10 7 *+ HERE 100 - 6B + !
8 LOMEM 3+ 10 7 *+ HERE 100 - 6D + !
9 HIMEM 1F -    HERE 100 - 6F + !
10 HIMEM        HERE 100 - 73 + !
11 LOMEM 3+      HERE 100 - AF + !
12 4000         HERE 100 - FB + !
13 0            HERE 100 - FD + !
14 OFF          HERE 100 - FF + C!
15
16
17
18
19
20
21
22
23

```

231

```

0 ( DEFAULT BASIC variables ) HEX
1
2 0 C, 0 C, 0 C,
3 C1CD , 0000 , 0 C, 0 , ( MARGIN% )
4 CFD2 , 2001 , 0 C, 0 , ( ROOM% )
5 C2C1 , 0600 , 0 C, 0 , ( ABOVE% )
6 C9D7 , 5000 , 0 C, 0 , ( WIDE )
7 C1D0 , 0000 , 0 C, 0 , ( PAGE% )
8 C5C2 , 0600 , 0 C, 0 , ( BELOW% )
9 DOCC , 0300 , 0 C, 0 , ( LPAGE% )
10 C6D0 , 0200 , 0 C, 0 , ( PFLAG% )
11 D0D3 , 0100 , 0 C, 0 , ( SPACING )
12 C5CC , FFFF , 0 C, 0 , ( LINEND% )
13 C5D3 , FFFF , 0 C, 0 , ( SEND% )
14 CCDO , 4200 , 0 C, 0 , ( PLEN% )
15 D4C2 , BOV SWAB , 0 C, 0 , ( BOC )
16

```

0 FRAG .DEFAULT (-- a)
 1 PURPOSE: used to set up page 0 and
 2 variables for BASIC.
 3
 4 copy image of BASIC page 0 from Lyon's
 5 disk. this image of BASIC was retrieved
 6 by Mino with his Wildcard.
 7 adjust it for these variables
 8 from byte 3 to 5B (hex)
 9 and the position of EDDE.
 10 position of string is at HIMEM 18 -.
 11 and some mysterious things:
 12 4000 HERE 100 - FB + !
 13 0 HERE 100 - FD + !
 14 OFF HERE 100 - FF + C!
 15 the value \$10 represents the number of
 16 variables in BASIC.

17
18
19
20
21
22
23

0 .DEFAULT continued...

1
 2 define the following BASIC variables:
 3 include variables (ascii)
 4 MARGIN% = 0 C1CD left margin
 5 ROOM% = 201 CFD2 text available
 6 ABOVE% = 0 C2C1 top margin
 7 WIDE% = 50 C9D7 no. columns
 8 PAGE% = 0 C1D0 page number
 9 BELOW% = C C5C2 bottom margin
 10 LPAGE% = 8 DOCC
 11 PFLAG% = 2 C6D0 page flag
 12 SPACING = 1 D0D3 single/double
 13 LINEND% = -1 C5CC send end line
 14 SEND% = -1 C5D3 modem initial.
 15 PLEN% = 42 CCDO page length
 16 BOC = BOV D4C2 bottom of text

```

17 D250 , 8 C, HIMEM 18 - , 0 , ( PR$ )      17
18 D355 , 3 C, HIMEM 1B - , 0 , ( USS )       18  PR$          D250 printer initial
19 C555 , 4 C, HIMEM 1F - , 0 , ( UES )       19  USS          D355 u'line start
20 0 , 0 , 0 , 0 , 0 , 0 ,                   20  UES          C555 u'line end
21
22
23  NOTE: variable space is led by three
     zeroes and trailed by five zeroes.

```

scr # 232

```

0 ( INITBASIC DEFVARS ) HEX
1
2 ( BELONGS IN COLD START )
3 LABEL INITBASIC YSAVE STY, 0 #8 LDY,
4 BEGIN, \ .DEFAULT ,Y LDA,
5 BASIC0 ,Y STA, INY, EQ
6 UNTIL, YSAVE LDY,
7
8 LABEL DEFVARS YSAVE STY,
9 BASIC0 69 + LDA, X0 STA,
10 BASIC0 6A + LDA, X0 1+ STA,
11 10 7 * 3 + 5 + #8 LDY,
12 BEGIN, \ .DEFAULT 103 + ,Y LDA,
13 X0 )Y STA, DEY, MI
14 UNTIL,
15 OF #8 LDY, ( bytes in .PRINT )
16 HIMEM 1F - DUP OFF AND #8 LDA, X0 STA,
17 BASIC0 6F + STA,
18 SWAB OFF AND #8 LDA, X0 1+ STA,
19 BASIC0 70 + STA,
20 BEGIN, \ .PRINT ,Y LDA, X0 )Y STA,
21 DEY, MI
22 UNTIL, YSAVE LDY, TNEXT,
23

```

233

```

0 ( RESETVARS ) HEX
1
2 T: RESETVARS
3 GAP 100 - D2CF V!
4 WIDE    D7C9 V!
5 ABOVE%   C1C2 V!
6 BELOW%   C2C5 V!
7 PAGE%    DOC1 V!
8 MARGIN%   CDC1 V!
9 LPAGE%    CCDO V!
10 PFLAG%   DOC6 V!
11 SPACING  D3DO V!
12 LINEND%   CCC5 V!
13 SEND%    D3C5 V!
14 PLEN%    DOCC V!
15 BOC      C2D4 V! ; .
16
17
18
19
20
21
22
23

```

```

0 LABEL INITBASIC ( -- )
1 PURPOSE: copy DEFAULT to BASIC0 ($1000)
2 then do DEFVARS.
3
4 copy BASIC page 0 from .DEFAULT to
5 BASIC0. later this is moved into page
6 zero before calling BASIC.
7
8
9 LABEL DEFVARS ( -- )
10 PURPOSE: define BASIC variables.
11
12 move BASIC variables ($42 bytes)
13 from DEFAULT + $103 to BASIC0 + $69.
14 force change in zero page values so
15 that user strings can be preserved.
16 move printer strings to BASIC area.
17
18
19 NOTE: the value $10 represents the
20 number of BASIC variables present.
21
22
23

```

```

0 T: RESETVARS ( -- )
1 PURPOSE: place Swyft default values into
2 the BASIC variables.
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

scr # 234
0 ( VALIDATE ) HEX
1
2 T: VALIDATE -
3   D2CF V
4 IF CDC1 V IF C1C2 V IF C2C5 V
5 IF D7C9 V IF D0C1 V IF CC0D V
6 IF D0C6 V IF D3D0 V IF CCC5 V
7 IF D3C5 V IF DOCC V IF C2D4 V
8 IF 50D2 V IF 55D3 V IF 55C5 V
9 IF 1 EXIT ENDIF
10 ENDIF ENDIF ENDIF ENDIF ENDIF
11 ENDIF ENDIF ENDIF ENDIF ENDIF
12 ENDIF ENDIF ENDIF ENDIF ENDIF
13 DEFVARS
14 RESETVARS
15 LOADSTRINGS
16 BASIC0 69 + @ 70 + DUP
17 BASIC0 6B +
18 BASIC0 6D + ! 0 ;
19
20
21
22
23

```

235

```

0 ( F>B ) HEX
1
2 LABEL F>B ( FORTH TO BASIC )
3 XSAVE STX, TSX, SSAVE STX,
4 YSAVE STY,
5
6 4F #B LDX,
7 BEGIN, 50 ,X LDA, FORTH0 ,X STA,
8 BASIC0 50 + ,X LDA, 50 ,X STA,
9 DEX, MI
10 UNTIL, 3F #B LDX,
11 BEGIN, 1C0 ,X LDA, FORTH1 ,X STA,
12 BASIC1 ,X LDA, 1C0 ,X STA, DEX, MI
13 UNTIL,
14
15 CLC, <ZPMOVE> JSR,
16 SSAVE LDX, TXS, SEI, RETN LDA, MI
17 IF, <D444> JMP,
18 ENDIF, OFF #B LDA, RETN STA,
19 XSAVE LDX, YSAVE LDY, PSAV LDA,
20 PHA, ASAVAL LDA, PLP,
21 <RTS> JMP,
22
23

```

scr # 236

```

0 ( CH>F ) HEX
1
2 FRAG .CH>F
3 7F #B AND, RETNCHR STA,
4 SEC, <ZPMOVE> JSR,
5 SEC, CH LDA, COL# SBC, RETN STA,
6 RETNCHR LDA, OD #B CMP, EQ
7 IF, 0 #B LDA, CH STA, 57B STA,

```

```

0 T: VALIDATE ( -- flag )
1 PURPOSE: checks to see if all the
2 proper BASIC values have been set.
3 true = all required variables present.
4 false = something missing.
5
6 if all the values are not there then
7 redefine all variables (DEFVARS).
8 reset their value (RESETVARS and
9 'LOADSTRINGS').
10 tell basic where to find them.
11
12 NOTE: the value $70 is 7 times the
13 number of variables (both integers and
14 strings).
15
16
17
18
19
20
21
22
23

```

```

0 LABEL F>B ( -- )
1 PURPOSE: transfer control from Forth
2 to BASIC.
3 save X and S registers.
4 save second $50 bytes from page 0
5 at FORTH0, replacing them from BASIC0.
6 save last $40 bytes from page 1
7 at FORTH1, replacing them from BASIC1.
8 for disk based Swyft <ZPMOVE> moves
9 pages 0 and 1 from aux to main memory.
10 in ROM Swyft <ZPMOVE> is simply an RTS.
11 set return stack pointer (from BASIC0).
12 the first time through:
13 jump to D444, beginning of BASIC.
14 it will return to B>F or
15 it will emit characters through CH>F.
16 consecutive times through:
17 store -1 in RETN
18 restore registers (X, Y, P, A)
19 return to BASIC to where it emitted
20 characters.
21
22
23

```

```

0 FRAG .CH>F ( -- )
1 PURPOSE: receive characters emitted by
2 BASIC.
3
4 strip high byte and save character
5 in RETNCHR.
6 in disk version <ZPMOVE> copies
7 pages 0 and 1 from main to aux.

```

```

8 COL# STA, cr #B LDA, RETNCHR STA,
9 ELSE, CH INC, CH LDA, 57B STA,
10 COL# STA,
11 ENDIF, RETNCHR LDA,
12
13 CLC, CS IF,
14 ( skip <ZPMOVE> in B>F )
15
16
17
18
19
20
21
22
23

```

237

```

0 ( B>F ) HEX
1
2 FRAG .B>F
3 SEC, <ZPMOVE> JSR,
4 ENDIF, ( skip <ZPMOVE> from C>F )
5 CLI,
6 PHP, ASAVAL STA, PLA, PSAV STA,
7 XSAV STX, YSAV STY, TSX, SSAV STX,
8
9 4F #B LDX,
10 BEGIN,
11 50 ,X LDA, BASIC0 50 + ,X STA,
12 FORTH0 ,X LDA, 50 ,X STA,
13 DEX, MI
14 UNTIL, 3F #B LDX,
15 BEGIN,
16 1CO ,X LDA, BASIC1 ,X STA,
17 FORTH1 ,X LDA, 1CO ,X STA,
18 DEX, MI
19 UNTIL,
20
21 SSAVE LDX, TXS, XSAVE LDX, YSAVE LDY,
22 TNEXT,
23

```

```

8 in ROM version <ZPMOVE> is RTS.
9 store difference in cursor horizontal
10 position in RETN.
11 if the char is a carriage return then
12 store 0 in cursor position,
13 update 80-column enhanced ($57B),
14 convert RETNCHR to a Swyft return.
15 else increment cursor position and
16 update 80-column enhanced ($57B).
17 restore received character to A reg.
18 continue with .B>F after skipping
19 <ZPMOVE> in .B>F.....
20
21
22
23

```

scr # 238

```

0 ( erase 1st 2 tracks ) HEX
1
2 FRAG .NEWDISK. ( -- )
3 COE8 LDA, 0 #B LDA, COEF STA, COED STA,
4 ( //c IWM INITIALIZATION )
5 COEE LDA, COE9 LDA, ( turn on drive )
6 50 #B LDY, ( step 80 phases )
7 BEGIN, TYA, 3 #B AND, .A ASL,
8 TAX, COE1 ,X LDA, ( step motor )
9 56 #B LDA, FCA8 JSR, ( delay )
10 COEO ,X LDA, DEY, MI ( step motor )
11 UNTIL,
12 COEF LDA, ( Turn on write current )
13 FF #B LDA, FCA8 JSR, ( delay )
14 FF #B LDA, FCA8 JSR, ( delay )
15 COE3 LDA, 56 #B LDA, FCA8 JSR, ( step )
16 COE5 LDA, COE2 LDA, 56 #B LDA, ( to )

```

```

0 FRAG .NEWDISK ( -- )
1 PURPOSE: erase a Swyft disk when the
2 phrase "CALL 3600" is calculated.
3
4
5
6
7
8
9
10
11
12
13
14
15
16

```

```

17 FCA8 JSR, COE4 LDA,      ( next track )    17
18 FF #B LDA, FCA8 JSR,      ( delay )        18
19 FF #B LDA, FCA8 JSR,      ( delay )        19
20 COEE LDA, COE8 LDA, RTS,   ( Turn off )     20
21           ( write current and drive )  21
22                           22
23                           23
239

```

| | |
|--|---|
| 0 (soft switch words for rom card) HEX | 0 (SOFT SWITCH WORDS FOR ROM CARD) HEX |
| 1 | 1 |
| 2 FRAG .MONITOR COB1 STA, CO8A STA, | 2 FRAG .MONITOR jump to the Apple monitor |
| 3 FF69 JMP, | 3 |
| 4 FRAG .B/F COB0 STA, | 4 FRAG .B/F jump to BASIC/FORTH interface |
| 5 \.B>F JMP, | 5 |
| 6 FRAG .XNEXT COB0 STA, YSAVE LDY, TNEXT, | 6 FRAG .XNEXT return from bank 2 routine. |
| 7 FRAG .RTS COB1 STA, RTS, | 7 FRAG .RTS return from BASIC. |
| 8 FRAG .D444 COB1 STA, | 8 FRAG .D444 jump to BASIC. |
| 9 OFF #B LDX, 1 #B LDY, | 9 |
| 10 4C #B LDA, FDF0 STA, D444 JMP, | 10 |
| 11 FRAG .CH/F COB0 STA, | 11 FRAG .CH/F return character to Forth. |
| 12 7F #B AND, RETNCHR STA, | 12 |
| 13 \.CH>F JMP, | 13 |
| 14 FRAG .XFER X5 1+ STA, X5 STY, | 14 FRAG .XFER jump to bank 2 routine. |
| 15 COB2 STA, X5)JMP, | 15 |
| 16 FRAG .LEMIT2 <LEMIT> JSR, | 16 FRAG .LEMIT2 print character. |
| 17 COB2 STA, RTS, | 17 |
| 18 FRAG .BOOT | 18 FRAG .BOOT boot disk. |
| 19 CO8A STA, COB1 STA, FFFC)JMP, | 19 |
| 20 COB0 STA, D204 JMP, NOP, | 20 |
| 21 D200 , 3E9 , 3 A5 XOR C, | 21 |
| 22 FRAG .CDISK YSAVE STY, XSAVE STX, | 22 FRAG .CDISK erase Swyft disk. |
| 23 <NDISK> JSR, \ XYNEXT JMP, | 23 |

scr # 240

```

0 ( soft switch words for rom card ) HEX
1
2 FRAG .START CO8D LDA, CO8D LDA,
3 COB1 STA, D0 #B LDA, X0 1+ STA,
4 0 #B LDY, X0 STY,
5 BEGIN,
6 BEGIN, X0 )Y LDA, X0 )Y STA, INY, EQ
7 UNTIL, X0 1+ INC, EQ
8 UNTIL,
9 B0 #B LDA, E063 STA,
10 4C #B LDA, D43C STA,
11 <B/F> OFF AND #B LDA, D43D STA,
12 <B/F> SWAB OFF AND #B LDA, D43E STA,
13 <CH/F> OFF AND #B LDA, FDF1 STA,
14 <CH/F> SWAB OFF AND #B LDA, FDF2 STA,
15 CO8F LDA, CO8F LDA, <XNEXT> JMP,
16
17 FRAG .LEMIT SEI, COB1 STA,
18 0 #B LDY, 36 STY, C1 #B LDY, 37 STY,
19 60 #B LDY, FDF0 STY,
20 TXA, FDED JSR,
21 36 LDA, F75 STA,
22 FD #B LDA, 37 STA, F0 #B LDA, 36 STA,
23 COB0 STA, CLI, RTS,

```

| | |
|--|----|
| 0 FRAG .START (--) | 0 |
| 1 PURPOSE: prepare to call BASIC. | 1 |
| 2 set up for BASIC (SC08D). | 2 |
| 3 copy BASIC and monitor rom to equivalent | 3 |
| 4 space in ram and modify. | 4 |
| 5 | 5 |
| 6 NOTE: \$D43C is JMP <B/F> and | 6 |
| 7 \$FDF1 is <CH/F>. | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 FRAG .LEMIT (--) | 11 |
| 12 PURPOSE: print character from x-reg. | 12 |
| 13 | 13 |
| 14 turn romcard off. | 14 |
| 15 replace Apple output vector \$36 with | 15 |
| 16 soft hook in slot one (SC100). | 16 |
| 17 call output routine \$FDED. | 17 |
| 18 restore original output vector in' \$36 | 18 |
| 19 (\$FDF0). | 19 |
| 20 self-modify .LEMIT to store new vector | 20 |
| 21 at \$36 (SC102) next time through. | 21 |
| 22 turn romcard on. | 22 |
| 23 | 23 |

241

```

0 ( .FRAGMENTS FOR ROM CARD ) HEX
1
2 LABEL ROM-FRAGMENTS
3 YSAVE STY, OF #B LDY, BEGIN,
4 \ .LEMIT2 ,Y LDA, <LEMIT2> ,Y STA,
5 \ .CDISK ,Y LDA, <CDISK> ,Y STA,
6 \ .XNEXT ,Y LDA, <XNEXT> ,Y STA,
7 \ .MONITOR ,Y LDA, <MON> ,Y STA,
8 \ .B/F ,Y LDA, <B/F> ,Y STA,
9 \ .D444 ,Y LDA, <D444> ,Y STA,
10 \ .CH/F ,Y LDA, <CH/F> ,Y STA,
11 \ .XFER ,Y LDA, <XFER> ,Y STA,
12 \ .RTS ,Y LDA, <RTS> ,Y STA,
13 DEY, MI UNTIL, 2F #B LDY, BEGIN,
14 \ .LEMIT ,Y LDA, <LEMIT> ,Y STA,
15 \ .BOOT 10 - ,Y LDA, 3D0 ,Y STA,
16 DEY, MI UNTIL, 5F #B LDY, BEGIN,
17 \ .NEWDISK ,Y LDA, <NDISK> ,Y STA,
18 \ .START ,Y LDA, <START> ,Y STA,
19 DEY, MI UNTIL,
20 60 #B LDA, <ZPMOVE> STA,
21 YSAVE LDY, TNEXT,
22
23

```

```

0 LABEL ROM-FRAGMENTS ( -- )
1 PURPOSE: copy routines that can't
2 operate in romcard to an area in ram.
3
4 .START to <START>
5 .RTS to <RTS>
6 .CH/F to <CH/F>
7 .D444 to <D444>
8 .B/F to <B/F>
9 .LEMIT to <LEMIT>
10 .XNEXT to <XNEXT>
11 .XFER to <XFER>
12 .MONITOR to <MON>
13 .BANK1 to <BANK1>
14 .BOOT 10 - to 3D0
15 RTS, to <ZPMOVE>
16
17 NOTE: the same space can be loaded with
18 fragments used by the disk version
19 which manage bank switching differently
20
21
22
23

```

scr # 242

```

0 ( soft switch words for disk ram ) HEX
1
2 FRAG D.MONITOR <MAIN> JSR, C08A LDA,
3 FF69 JMP,
4 FRAG D.B/F C009 STA, C003 STA,
5 C005 STA, \ .B>F JMP,
6 FRAG D.XNEXT C08F LDA, C08F LDA,
7 YSAVE LDY, TNEXT,
8 FRAG D.RTS C008 STA, C002 STA,
9 C004 STA, RTS,
10 FRAG D.AUX PLA, TAY, PLA, C009 STA,
11 C003 STA, C005 STA, PHA, TYA, PHA, RTS,
12 FRAG D.MAIN PLA, TAY, PLA, C008 STA,
13 C002 STA, C004 STA, PHA, TYA, PHA, RTS,
14 FRAG D.D444 <MAIN> JSR,
15 OFF #B LDX, 1 #B LDY,
16 4C #B LDA, FDF0 STA, D444 JMP,
17 FRAG D.CH/F C009 STA, C003 STA,
18 C005 STA, \ .CH>F JMP,
19 FRAG D.XFER X5 1+ STA, X5 STY,
20 C083 LDA, C083 LDA, X5 )JMP,
21 FRAG D.CDISK YSAVE STY, XSAVE STX,
22 <MAIN> JSR, <NDISK> JSR, <AUX> JSR,
23 \ XYNEXT JMP,

```

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```

0 ( soft switch words for disk ram ) HEX
1
2 FRAG D.ZPMOVE 300 STA, 301 STX,
3 302 STY, PLA, 303 STA, PLA, 304 STA,
4 O #B LDY,
5 BEGIN, NC
6 IF, O ,Y LDA, TAX, 100 ,Y LDA,
7 C008 STA, 100 ,Y STA, TXA,

```

```

0 ( SOFT SWITCH WORDS FOR DISK RAM ) HEX
1
2 FRAG D.MONITOR set up main memory then
3 call the Apple monitor.
4 FRAG D.B/F BASIC/Forth interface.
5
6 FRAG D.XNEXT return from bank 2 routine.
7
8 FRAG D.RTS reset banks.
9
10 FRAG D.AUX set up auxilliary ram.
11
12 FRAG D.MAIN set up main ram.
13
14 FRAG D.D444 set up main ram and then
15 jump to BASIC.
16
17 FRAG D.CH/F return character from BASIC.
18
19 FRAG D.XFER jump to bank 2 routine.
20
21 FRAG D.CDISK set up main memory, erase
22 Swyft disk, return to auxilliary memory
23

```

```

0 ( SOFT SWITCH WORDS FOR DISK RAM ) HEX
1
2 FRAG D.ZPMOVE
3 PURPOSE: move page 0 from auxilliary
4 memory to main, or vice versa; carry
5 flag determines direction in the disk
6 version only.
7 save registers beginning at $300.

```

```

8      0 ,Y STA, C009 STA,
9      ELSE, C008 STA, 0 ,Y LDA, TAX,
10     100 ,Y LDA, C009 STA,
11     100 ,Y STA, TXA, 0 ,Y STA,
12 ENDIF, INY, EQ
13 UNTIL, 304 LDA, PHA, 303 LDA, PHA,
14 302 LDY, 301 LDX, 300 LDA, RTS,
15
16 FRAG D.LEMIT SEI, <MAIN> JSR,
17 C1 #B LDY, 37 STY, 0 #B LDY, 36 STY,
18 60 #B LDY, FDFO STY, TXA,
19 FDED JSR, 36 LDA, F79 STA,
20 FD #B LDA, 37 STA, F0 #B LDA, 36 STA,
21 <AUX> JSR, CLI, RTS,
22
23 FRAG D.LEMIT2 <LEMIT> JMP,

```

```

8 if carry clear then move from auxilliary
9 to main.
10 else carry set so
11 move from main memory to auxilliary.
12 restore registers.
13
14 FRAG D.LEMIT
15 PURPOSE: print character. x-reg has the
16 character.
17 set up main memory.
18 modify Apple vectors.
19 output character.
20 restore auxilliary memory.
21
22 FRAG D.LEMIT2
23 PURPOSE: jump to printer routine.

```

scr # 244

```

0 ( soft switch words for disk ram ) HEX
1
2 FRAG D.START -
3 <MAIN> JSR, C08D LDA, C08D LDA,
4 DO #B LDA, X0 1+ STA, 0 #B LDY, X0 STY,
5 BEGIN,
6 BEGIN, X0 )Y LDA, X0 )Y STA, INY, EQ
7 UNTIL, X0 1+ INC, EQ
8 UNTIL,
9 B0 #B LDA, E063 STA,
10 4C #B LDA, D43C STA,
11 <B/F> DUP OFF AND #B LDA, D43D STA,
12 SWAB OFF AND #B LDA, D43E STA,
13 <CH/F> DUP OFF AND #B LDA, FDF1 STA,
14 SWAB OFF AND #B LDA, FDF2 STA,
15 <AUX> JSR, <XNEXT> JMP,
16
17 FRAG D.BOOT
18 <AUX> JSR, C08F LDA, C08F LDA,
19 FFF6 LDA, FFFE STA, FFF7 LDA, FFFF STA,
20 D204 JMP,
21 C08A LDA, <MAIN> JSR,
22 0 #B LDA, 3F4 STA, FFFC )JMP, NOP, NOP,
23 D200 , 3C8 , 3 A5 XOR C,

```

```

0 ( SOFT SWITCH WORDS FOR DISK RAM ) HEX
1
2 FRAG D.START
3 PURPOSE: prepare for BASIC.
4 set up main memory.
5 set up for BASIC ($C08D).
6 move and modify (see .START).
7 restore auxilliary memory.
8
9
10
11
12 FRAG D.BOOT
13 PURPOSE: boot disk.
14
15
16
17
18
19
20
21
22
23

```

245

```

0 ( D:FRAGMENTS FOR DISK RAM ) HEX
1
2 LABEL DISK-FRAGMENTS
3 YSAVE STY, 5F #B LDY, BEGIN,
4 \ D.BOOT 28 - ,Y LDA, 3A0 ,Y STA,
5 \ D.ZPMOVE ,Y LDA, <ZPMOVE> ,Y STA,
6 \ D.LEMIT ,Y LDA, <LEMIT> ,Y STA,
7 \ D.START ,Y LDA, <START> ,Y STA,
8 \ .NEWDISK ,Y LDA, <NDISK> ,Y STA,
9 DEY, MI UNTIL, F #B LDY, BEGIN,
10 \ D.LEMIT2 ,Y LDA, <LEMIT2> ,Y STA,
11 \ D.CDISK ,Y LDA, <CDISK> ,Y STA,
12 \ D.AUX ,Y LDA, <AUX> ,Y STA,
13 \ D.MAIN ,Y LDA, <MAIN> ,Y STA,
14 \ D.XNEXT ,Y LDA, <XNEXT> ,Y STA,
15 \ D.MONITOR ,Y LDA, <MON> ,Y STA,
16 \ D.B/F ,Y LDA, <B/F> ,Y STA,

```

```

0 LABEL DISK-FRAGMENTS ( -- )
1 PURPOSE: copy routines that can't
2 operate in ramcard to an area in ram.
3
4 D.BOOT 28 - to 3A0
5 D.ZPMOVE to <ZPMOVE>
6 D.LEMIT to <LEMIT>
7 D.START to <START>
8 .NEWDISK to <NDISK>
9 D.LEMIT2 to <LEMIT2>
10 D.XNEXT to <XNEXT>
11 D.MONITOR to <MON>
12 D.B/F to <B/F>
13 D.D444 to <D444>
14 D.CH/F to <CH/F>
15 D.XFER to <XFER>
16 D.MAIN to <MAIN>

```

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```

17 \ D.D444      ,Y LDA, <D444>   ,Y STA,      17 D.AUX       to <AUX>
18 \ D.CH/F      ,Y LDA, <CH/F>    ,Y STA,      18 D.RTS       to <RTS>
19 \ D.XFER      ,Y LDA, <XFER>    ,Y STA,      19
20 \ D.RTS      ,Y LDA, <RTS>     ,Y STA,      20 NOTE: the same space can be loaded with
21 DEY, MI UNTIL,          ,Y STA,      21 fragments used by the rom version
22 YSAVE LDY, TNEXT,          ,Y STA,      22 which manage bank switching differently
23

```

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SCR # 246

```

0 ( START ) HEX
1
2 ( BELONGS IN WARM START )
3 LABEL START YSAVE STY, ROM? LDA, EQ
4 IF, 00 #B LDA, 3C STA, 42 STA,
5 03 #B LDA, 3D STA, 43 STA,
6 11 #B LDA, 3F STA, FF #B LDA, 3E STA,
7 CLC, C311 JSR,
8 ENDIF, <START> JMP,
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

0 LABEL START (--)
 1 PURPOSE: set up for BASIC.
 2 if using the disk version of Swyft
 3 (i.e., ROM? is equal to zero) then
 4 move from auxilliary to main from
 5 \$300 through \$11FF to \$300.
 6
 7 NOTE: called by WARM.
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23

247

```

0 ( FRAGMENTS MOVE-VARS ) HEX
1
2 T: FRAGMENTS ROM? IF ROM-FRAGMENTS
3 ELSE DISK-FRAGMENTS ENDIF ;
4
5 FRAG .MOVE-VARS ROM? LDA, EQ
6 IF, LOMEM
7 DUP SWAB OFF AND #B LDA,
8 3D STA, 43 STA,
9 OFF AND #B LDA, 3C STA, 42 STA,
10 BOV 1-
11 DUP SWAB OFF AND #B LDA, 3F STA,
12 OFF AND #B LDA, 3E STA,
13 C311 JSR,
14 ENDIF, RTS,
15
16
17
18
19
20
21
22
23

```

0 T: FRAGMENTS (--)
 1 PURPOSE: decide which set of machine
 2 code routines (disk versus rom) to
 3 copy from rom space to their own ram
 4 space.
 5 input: ROM? is zero if using the disk
 6 based version of Swyft.
 7
 8 FRAG .MOVE-VARS (--)
 9 PURPOSE: move BASIC variables in disk
 10 version of Swyft.
 11 in the disk version only:
 12 move, between aux to main memory.
 13 BASIC variables (1200-15FF)
 14 and input buffer (200-2FF)
 15
 16
 17
 18
 19
 20
 21
 22
 23

scr # 248

```

0 ( BEFORE AFTER ) HEX
1
2 LABEL BEFORE -YSAVE STY,
3 \ .MOVE-VARS JSR, 0 #B LDY,
4 BEGIN, BASICO ,Y LDA, 0 ,Y STA, INY,
5 50 #B CPY, EQ
6 UNTIL, A0 #B LDY,
7 BEGIN, BASICO ,Y LDA, 0 ,Y STA, INY, EQ
8 UNTIL,
9 ROM? LDA, EQ
10 IF, 02 #B LDA, 3D STA, 43 STA, 3F STA,
11 00 #B LDA, 3C STA, 42 STA,
12 FF #B LDA, 3E STA,
13 CLC, C311 JSR,
14 ENDIF, YSAVE LDY, TNEXT,
15
16 LABEL AFTER YSAVE STY, 0 #B LDY,
17 BEGIN, 0 ,Y LDA, BASICO ,Y STA, INY,
18 50 #B CPY, EQ
19 UNTIL, A0 #B LDY,
20 BEGIN, 0 ,Y LDA, BASICO ,Y STA, INY, EQ
21 UNTIL, SEC, \ .MOVE-VARS JSR,
22 YSAVE LDY, TNEXT,
23

```

249

```

0 ( ?MOVETEXT ) HEX
1
2 ( shiftamount -- )
3 T: MOVETEXT DUP >R
4 BOC 2DUP + EOS BOC - R> 0<
5 IF CMOVE ELSE CMOVE> ENDIF
6 BOT >R EBOT >R
7 DUP BOC +TO DUP BOT +TO
8 DUP BOS +TO DUP EOS +TO
9 DUP EBOT +TO OEOS +TO
10 FIXEND R> R> +ALIGN
11 TOP LOCLIN LINADR REWINDOW TOPLINE
12 OFF FRESH RENCUR OFF
13 0 NEWBOTTOM TO ;
14
15 T: ?MOVETEXT C2D4 V@ >R
16 R@ BOC - DUP NEWBOTTOM TO
17 IF BEOT EOS 100 + - BOC + R@ U<
18 R@ BOTTOM U< OR
19 IF BOC C2D4 V! 0 NEWBOTTOM TO
20 ENDIF ENDIF R> DROP ;
21
22
23

```

scr # 250

```

0 ( MARGIN-CHANGES ) HEX
1 T: MARGIN-CHANGES CDC1 V@ MARGIN% -
2 IF CDC1 V@ QMAX 30 UMIN
3 DUP MARGIN% TO CDC1 V! ENDIF
4
5 DOCC V@ PLEN% -
6 IF LINES PAGES - 0 DOCC V@
7 ABOVE% BELOW% + 1+ UMAX OFF UMIN

```

0 T: MARGIN-CHANGES

```

1 PURPOSE: after a BASIC command update
2 margins (ie, left margin, page length,
3 header, footer). Note that there is an
4 interaction of these variables (ie,
5 they affect each other). in particular,
6 PLEN% (page length) is not set below
7 values of ABOVE% plus BELOW%; also

```

203

```

8 ABOVE% - BELOW% -
9 UM/MOD SWAP 0= 0= - CA U<
10 IF DOCC V@ OMAX
11 ABOVE% BELOW% + 1+ UMAX OFF UMIN
12 DUP PLEN% TO DOCC V!
13 ELSE PLEN% DOCC V! ENDIF ENDIF
14
15 C1C2 V@ ABOVE% -
16 IF C1C2 V@ OMAX
17 PLEN% !- BELOW% - UMIN HEAD% OMAX
18 UMAX DUP ABOVE% TO C1C2 V! ENDIF
19
20 C2C5 V@ BELOW% -
21 IF C2C5 V@ OMAX PLEN% 1-
22 ABOVE% - UMIN LPAGE% 2 + OMAX
23 UMAX DUP BELOW% TO C2C5 V! ENDIF ;

```

251

```

0 ( WIDTHCHANGE SPACINGCHANGE ) HEX
1
2 T: WIDTHCHANGE
3 D7C9 V@ WIDE -
4 IF D7C9 V@ WIDE U< DUP
5 IF DROP OCA 0
6 WIDE 0 D7C9 V@
7 UM/MOD SWAP 0= 0= -
8 UM/MOD SWAP 0= 0= - PAGES U<
9 ENDIF 0=
10 IF D7C9 V@ 50 UMIN 10 UMAX
11 DUP D7C9 V! WIDE TO
12 7000 TOP TO BOT BOT NEWPAGES
13 ELSE WIDE D7C9 V!
14 ENDIF ENDIF ;
15 ;S
16 T: SPACINGCHANGE
17 SPACING D3D0 V@ OMAX 2 UMIN U<
18 IF LINES PAGES - 0 PLEN% ABOVE% -
19 BELOW% - U2/ UM/MOD SWAP 0= 0= - CA U<
20 IF 2 SPACING TO 2 ELSE 1 ENDIF D3D0 V!
21 ELSE D3D0 V@ OMAX 2 UMIN DUP
22 SPACING TO D3D0 V! ENDIF ;

```

204

```

8 PLEN% cannot be set so that page table
9 overflows.
10
11 left margin can range from 0 to $30.
12
13 page length ranges from ab%+be%+1 to SFF
14 if the change in page length will not
15 overflow the page table then make the
16 change; otherwise reset BASIC value,
17 set error# to 19
18
19 top margin ranges from pl%+be%-1 to he%.
20
21 bottom margin ranges from pl%+tab%-1 to
22 lp%+2.
23

```

0 T: WIDTHCHANGE (--)
 1 PURPOSE: change the horizontal width of
 2 the text. width will not be changed if
 3 it would cause too many pages for the
 4 page table.
 5
 6 if the BASIC variable WI% and WIDE are
 7 not the same then
 8 if the new width is less than the
 9 current width then
 10 figure out if the new width would
 11 overflow the page table.
 12 if there would be no overflow then make
 13 the change.
 14 else keep the same width with no
 15 change, set error# to 19
 16
 17 NOTE: the width can range from \$10 to
 18 \$50.
 19
 20
 21
 22
 23

scr # 252

```

0 ( CHECKCHANGES ) HEX
1 T: CHECKCHANGES WIDTHCHANGE
2 MARGIN-CHANGES DOC1 V@ PAGE% -
3 IF DOC1 V@ PAGE% TO
4 7000 TOP TO EBOT BOT NEWPAGES ENDIF
5 SPACING D3D0 V@ OMAX 2 UMIN U<
6 IF LINES PAGES - 0 PLEN% ABOVE% -
7 BELOW% - U2/ UM/MOD SWAP 0= 0= - CA U<
8 IF 2 SPACING TO 2 ELSE 1 ENDIF D3D0 V!
9 ELSE D3D0 V@ OMAX 2 UMIN DUP
10 SPACING TO D3D0 V! ENDIF
11 PLEN% BELOW% - ABOVE% - SPACING 2 =
12 IF 0 2 UM/MOD + ENDIF
13 DUP LONG -
14 IF DUP LONG TO 7000 TOP TO
15 BOT BOT NEWPAGES
16 ENDIF DROP
17 CCDO V@ LPAGE% -
18 IF CCDO V@ OMAX 1 UMAX BELOW% 2 - UMIN
19 DUP LPAGE% TO CCDO V! ENDIF
20 CCDS 1/2 PFLAG% TO CCDS V@ ! TNEND% TO

```

0 T: CHECKCHANGES (--)
 1 PURPOSE: adjust Swyft for changes in
 2 BASIC variables.
 3
 4 after BASIC returns to Forth then make
 5 changes in the following if needed:
 6 width (WIDTHCHANGE)
 7 margin (MARGIN-CHANGES)
 8 pagination (PAGE%)
 9 page length (PLEN%)
 10 spacing (SPACING)
 11 (else set error# to 19)
 12 margin above (ABOVE%)
 13 margin below (BELOW%)
 14 page flag (PFLAG%)
 15 modem initialization (SEND% and
 16 SETMODEM)
 17 printer strings (SAVESTRINGS)
 18 ram key translation and command tables
 19 (?RAMKEYS)
 20 bottom of text (?MOVETEXT)

```

253
 0 ( TOINPUT APPEND ) HEX
 1
 2 ( address count -- )
 3 T: TOINPUT
 4 0 OVER 200 + !
 5 200 SWAP CMOVE
 6 300 200
 7 DO I C@ ?DUP
 8 IF 20 U<
 9 IF 20 I C!
10 ENDIF ENDIF
11 LOOP ;
12
13 ( char -- | insert char at OEOS )
14 T: APPEND EBOT C!
15 1 EBOT +TO 1 EOS +TO
16 -1 DIRTY TO FIXEND ;
17
18
19
20
21
22
23

```

```

0 T: TOINPUT ( address count -- )
1 PURPOSE: pass characters to BASIC.
2
3 move from text address to BASIC input
4 area by the count of bytes.
5 insure that no character is less than
6 $20.
7
8
9 T: APPEND ( char -- )
10 PURPOSE: insert character from BASIC at
11 OEOS.
12
13 if text is full, discard and beep.
14 enter a character arriving from BASIC
15 at the end of selection,
16 updating pointers, and setting DIRTY.
17
18
19
20
21
22
23

```

```

scr # 254
 0 ( TOBASIC ) HEX
 1
 2 ( address count -- )
 3
 4 T: TOBASIC TOINPUT VALIDATE DROP
 5 OFF RETN TO 0 COL# TO
 6 0 BASICO 24 + C!
 7 RESETVARS LOADSTRINGS BEFORE
 8 BEGIN F>B
 9 PAGES OCA U<
10 EBOT 100 + BEOT U< AND DUP 0=
11 IF BEEP OFF OFF C! ENDIF
12 RETN 7F U< AND
13 WHILE RETN ?DUP
14 IF 0 DO 20 APPEND LOOP
15 ENDIF RETNCHR 7 =
16 IF BEEP
17 ELSE RETNCHR 1D UMAX DUP APPEND
18 21 U< IF FRESH ENDIF
19 ENDIF
20 REPEAT AFTER FRESH VALIDATE
21 IF CHECKCHANGES ENDIF ;
22
23

```

```

255
 0 ( BASIC ) HEX
 1
 2 T: BASIC .
 3 AUTOEXTEND OFF
 4 BOS EOS OVER WR!
 5 BEGIN WRAP WR@ WC@
 6 ENDWRAP DROP WR@ >R
 7 >R 2DUP - R> UMIN

```

```

0 T: TOBASIC ( address count -- )
1 PURPOSE: call BASIC to interpret one
2 line and place its output into text.
3 only display text after a space or
4 carriage return, and when done
5 respond to changes to control variables.
6
7 move text to BASIC area, validate
8 variables, set RETN and COL# to zero,
9 set BASICO ADDR 24 + to zero.
10 reset BASIC variables.
11 BEFORE sets up BASIC for disk version.
12 begin call BASIC interface
13 while RETN and enough pages and room
14 insert spaces in text (RETN gives
15 the horizontal position).
16 if a BASIC error
17 then beep, set error# to 15
18 else insert character in text
19 (BASIC character returned in RETNCHR).
20 fresh screen
21 repeat AFTER resets disk vers from BASIC
22 if any BASIC variables have changed
23 then recalculate text format

```

```

0 T: BASIC ( -- )
1 PURPOSE: interpret multiple lines of
2 BASIC and insert response in text.
3
4 autoextend selection.
5 turn off cursor.
6 interpret selected lines and place their
7 output into text (TOBASIC).

```

```

8 TOBASIC
9 DUP 1- R> DUP WR! U<
10 UNTIL EBOT OVER - >R
11 DUP BEOT R@ - R@ CMOVE
12 R> NEGATE BEOT +TO DUP EBOT TO
13 BOS OEOS TO
14 NEWMARK NEWND SHOW
15 BEOT EOT =
16 IF LEXCUR ELSE RENCUR ENDIF
17 O OLIN TO ENDFORM
18 NEWBOTTOM IF NEWBOTTOM MOVETEXT ENDIF
19 -1 EXTENDED TO :
20
21
22
23

```

```

8 leave the selection selected.
9 show fat cursor
10 unless at the end of the text.
11 wrap text (ENDFORM).
12 if the bottom of text has been changed
13 then movetext.
14
15
16
17
18
19
20
21
22
23

```

```

scr # 256
0 ( FIND-PREV ) HEX ;S
1
2 ( addr -- addr )
3 LABEL FIND-PREV YSAVE STY,
4 0 SP) LDA, TAY, 0 #B LDA, X0 STA,
5 1 SP) LDA, X0 1+ STA,
6 BEGIN, DEY, OFF #B CPY, EQ
7 IF, X0 1+ DEC, ENDIF,
8 X0 )Y LDA, 0D #B CMP, NE
9 IF, 01C #B CMP, ENDIF, EQ
10 UNTIL,
11 TYA, 0 SP) STA, X0 1+ LDA, 1 SP) STA,
12 YSAVE LDY, TNEXT,
13
14 ( addr -- addr )
15 LABEL FIND-NEXT YSAVE STY,
16 0 SP) LDA, TAY, 0 #B LDA, X0 STA,
17 1 SP) LDA, X0 1+ STA,
18 BEGIN, INY, EQ IF, X0 1+ INC, ENDIF,
19 X0 )Y LDA, 0D #B CMP, NE
20 IF, 01C #B CMP, ENDIF, EQ
21 UNTIL,
22 TYA, 0 SP) STA, X0 1+ LDA, 1 SP) STA,
23 YSAVE LDY, TNEXT,

```

```

0 ( COMPARE ) HEX ;S
1 ( addr1 len1 addr2 len2 -- flag )
2 LABEL COMPARE 1 SP) LDA, 5 SP) CMP, EQ
3 IF, 0 SP) LDA, 4 SP) CMP, ENDIF, CS
4 IF, 4 SP) LDA, X0 STA,
5 5 SP) LDA, X0 1+ STA,
6 ELSE, 0 SP) LDA, X0 STA,
7 1 SP) LDA, X0 1+ STA, ENDIF,
8 BEGIN, X0 LDA, X0 1+ ORA, X1 STA, SEC.
9 2 X) LDA, 6 X) SBC, EQ
10 IF, OFF #B LDA, ELSE, 0 #B LDA, ENDIF,
11 X1 ORA, NE
12 WHILE, X0 DEC, X0 LDA, OFF #B CMP, EQ
13 IF, X0 1+ DEC, ENDIF,
14 CLC, 6 SP) LDA, 01 #B ADC, 6 SP) STA,
15 7 SP) LDA, 00 #B ADC, 7 SP) STA,
16 CLC, 2 SP) LDA, 01 #B ADC, 2 SP) STA,

```

```

0 ( sort words ) ;S
1
2 this is Mino's sort routine that was not
3 implemented.
4
5 LABEL FIND-PREV
6
7
8 LABEL FIND-NEXT
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 ( sort words ) ;S
1
2 this is Mino's sort routine that was not
3 implemented.
4
5
6 LABEL COMPARE
7
8
9
10
11
12
13
14
15
16

```

```

17      3 SP) LDA, 00 #B ADC, 3 SP) STA,    17
18 AGAIN, X1 LDA, EQ           18
19 IF, SEC, 0 SP) LDA, 4 SP) SBC,    19
20 1 SP) LDA, 5 SP) SBC, ENDIF, NC   20
21 IF, OFF #B LDA, ELSE, 00 #B LDA, ENDIF, 21
22 INX, INX, INX, INX, INX, INX,    22
23 0 SP) STA, 1 SP) STA, TNEXT,    23

```

```

scr # 258
0 ( SWAP-NEXT ) HEX ;S
1
2 T: SWAP-NEXT -
3 CURPOS DUP 1- FIND-NEXT
4 DUP 1+ OVER FIND-NEXT
5 OVER - FILLED-LEN MIN >R >R OVER -
6 FIELD-LEN MIN R> R> COMPARE
7 IF CURPOS 1- DUP FIND-NEXT
8 DUP FIND-NEXT DUP >R OVER - >R DUP 1+
9 R> REVERSE OVER - >R DUP 1+ R>
10 R> REVERSE R> OVER - SWAP 1+ SWAP
11 REVERSE -1 SWAPPED TO
12 ENDIF, ;
13
14
15
16 NOTE: this word has been embedded into
17 the next word, SORT.
18
19
20
21
22
23

259
0 ( SORT ) HEX ;S
1
2 T: SORT EOS OEOS TO BEOT EOS EOT BEOT -
3 DUP EOS + TOT TO CMOVE BOS DUP
4 FIND-PREV DUP 1+ BOS TO - DUP OFFSET TO
5 EOS DUP FIND-PREV
6 - SWAP - OMAX FIELD-LEN TO
7 BEGIN 0 SWAPPED TO START-ADDR CURPOS TO
8 BEGIN CURPOS DUP 1- FIND-NEXT DUP 1+
9 OVER FIND-NEXT OVER - FILLED-LEN UMIN
10 >R >R OVER - FIELD-LEN UMIN R> R>
11 COMPARE
12 IF CURPOS 1- DUP FIND-NEXT
13 DUP FIND-NEXT DUP >R OVER - >R DUP
14 1+ R> REVERSE OVER - >R DUP 1+ R>
15 R> REVERSE R> OVER - SWAP 1+ SWAP
16 REVERSE -1 SWAPPED TO
17 ENDIF
18 CURPOS FIND-NEXT 1+ DUP CURPOS TO
19 EOS 1- FIND-PREV 1+ DUP LASTREC TO =
20 UNTIL LASTREC EOS TO SWAPPED 0=
21 UNTIL EOS TOT OVER - EOT OVER - SWAP
22 CMOVE EOT TOT - BEOT TO EOS EBOT TO
23 7000 TOP TO BOT BOT NEWPAGES ;

```

0 (sort words) ;S
1
2 this is Mino's sort routine that was not
3 implemented.
4
5 T: SWAP-NEXT
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

scr # 260

```

0          0 LABEL ACT ( -- )
1          1 PURPOSE: turn disk on.
2          2
3          3 LABEL DEACT ( -- )
4          4 PURPOSE: turn disk off.
5          5
6          6 T: PROT? ( -- flag )
7          7 RESULT: true if disk is write protected.
8          8
9          9 T: SEEK ( # -- )
10         10 PURPOSE: seek to track #
11
12         12 T: RECAL ( -- )
13         13 PURPOSE: bang up against seek stop and
14         14 call that track 0.
15
16         16 T: DISKON ( -- )
17         17 PURPOSE: set up disk for test of EDDE or
18         18 Apple header.
19         19 go to 1st text track:
20         20 turn disk on, wait 224 milliseconds,
21         21 recalibrate, and seek to track 1
22
23         23

```

261

```

0 ( ACT DEACT PROT? DON SEEK HOME ) HEX      0 T: READ ( t -- )
1                                         1 PURPOSE: read track t.
2 LABEL ACT COEA LDA, COE9 LDA, TNEXT,        2
3                                         3 seek to track t.
4 LABEL DEACT COE8 LDA, TNEXT,                4 read track.
5                                         5 if track # does not match then
6 T: PROT? COED C@ DROP 7F COEE C@ U< ;      6 recalibrate, seek, read.
7                                         7 if still no match
8 ( track# -- )                                8 then beep, set error# to 31
9 T: SEEK 2* <SEEK> 0A MS ;                  9 if the checksum does not match then
10
11 T: RECAL 50 TRACK TO 0 SEEK ;              10 reread.
12
13 T: DISKON ACT E0 MS RECAL 1 SEEK ;        11 if still no match
14
15
16
17
18
19
20
21
22
23

```

scr # 262

```

0 ( READ ) HEX
1
2 ( track# -- )-
3 T: READ >R R@ SEEK <READ>
4 B3FF C@ R@ -
5 IF RECAL R@ SEEK <READ>
6 B3FF C@ R@ -
7 IF BEEP

```

0 T: GET (--)
1 PURPOSE: copy an extended selection from
2 disk to ram.
3
4 turn disk on, seek to track 0.
5 not an edde disk:
6 turn disk off, set error# to 7, stop
7 else read track 0.

4,806,916

213

```
8 ENDIF ENDIF CHECKSUM
9 IF <READ> CHECKSUM
10 IF BEEP
11 ENDIF ENDIF R> DROP ;
12
13 ;S During a read, a valid checksum is 0
14
15 LABEL TLEN
16 DEX, DEX, 0C #B LDA, 1 SP) STA,
17 0 #B LDA, 0 SP) STA, TNEXT,
18
19
20
21
22
23
```

263

```
0 ( GET ) HEX
1 T: GET ACT EO MS ?EDDE
2 IF 1 READ B400 ORIGIN ADDR - DUP >R
3 EOS ADDR + @ BOS ADDR R> + @
4 DUP ORIGIN ADDR - FIRST TO - SIZE TO
5 BEOT U2/ EBOT U2/ SIZE U2/ + 80 + U<
6 IF DEACT BEEP EXIT ENDIF SIZE CT TO
7 EOS BOS TO EOS OEOS TO EOS PTR TO
8 FIRST 0 COO UM/MOD 1+ READ
9 >R B400 R@ + PTR SIZE
10 COO R@ - UMIN CMOVE
11 R> COO - SIZE + F400 OVER U<
12 IF DROP 0 ENDIF SIZE TO
13 CT SIZE - DUP FIRST +TO PTR +TO
14 BEGIN SIZE
15 WHILE FIRST 0 COO UM/MOD
16 1+ READ DROP
17 B400 PTR SIZE COO UMIN DUP >R CMOVE
18 R@ PTR +TO R@ FIRST +TO
19 R> NEGATE SIZE +TO
20 REPEAT CT EBOT +TO CT EOS +TO
21 EBOT CT - BOT NEWPAGES FLUSH
22 -1 EXTENDED TO -1 DIRTY TO
23 ENDIF DEACT ;
```

214

```
8 get disk's selection parameters.
9 first=bos-origin size=ct=eo=bos.
10 check: selection won't fit: beep stop.
11 otherwise, move selection from disk to
12 current text, update page table,
13 clear queues, set dirty bit.
14 turn disk off.
15
16
17
18
19
20
21
22
23
```

```
0 T: <LOAD> ( #tracks -- )
1 PURPOSE: load #tracks from disk.
2 copy code fragments to $0800.
3 show sign on message.
4 set disk# and olldisk# from disk.
5 read all tracks and clear dirty bit.
6
7 T: LOAD ( -- )
8 PURPOSE: load only the number of tracks
9 necessary (SAVED) and reinsert gap.
10 read and load parameters.
11 load compressed text.
12 restore gap to text.
13 warmstart.
14
15
16
17
18
19
20
21
22
23
```

scr # 264

```
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
```

```
0 T: DRAG ( -- )
1 PURPOSE: drag text from the current
2 universe to the text on another disk.
3
4 calculate # of tracks needed for saving.
5 read track 1.
6 find out # of tracks used on disk.
7 if there are enough tracks left on disk
8 move selected text to top of text area.
9 <load> text from disk.
10 turn off drive.
11 set dirty bit.
12 move selected text to EBOT (3 reverses)
13 and restore gap.
14 make sure last character is form feed.
15 add selection to EBOT.
16 align page table.
```

```

17
18
19
20
21
22
23

```

```

17 delete selection if too many pages.
18 show display.
19 warmstart.
20 else drop return stack and turn drive
21 off.
22 error# is 5 means no more room
23 error# is 6 means too many pages

```

265

```

0 ( .LTABLE ) HEX
1
2 FRAG .LTABLE
3 \ NOOP , ( 0 )
4 \ DELETE , ( 1 )
5 \ PRINT , ( 2 )
6 \ NOOP , ( 3 was SORT )
7 \ NOOP , ( 4 DISK - was SAVE )
8 \ SEND , ( 5 )
9 \ GET , ( 6 )
10 \ PASTE , ( 7 )
11 \ BASIC , ( 8 )
12 \ .MON , ( 9 was MON )
13 \ NOOP , ( 0A was BOOT7.5 )
14 \ NOOP , ( 0B was BOOTABLE )
15 \ CONTROL , ( 0C was STOPSEND )
16 \ NOOP , ( 0D was STARTSEND )
17 \ NOOP , ( 0E )
18 \ NOOP , ( 0F )
19 \ NOOP , ( 10 )
20 \ NOOP , ( 11 )
21 \ NOOP , ( 12 )
22 \ NOOP , ( 13 )
23 \ NOOP , ( 14 )

```

```

0 T: WRITE ( t -- flag )
1 PURPOSE: write to disk track t.
2 seek to track t
3 store serial # at B3FC
4 and checksum at B3FE
5 store track # at B3FF
6 write the track (see <WRITE>)
7 check for "ED DE DA" header
8 not there: recalibrate, seek, write
9 still not there:
10 beep, return zero, set error# to 30
11 return 1 for success
12
13 T: APPLEDISK ( -- )
14 PURPOSE: boot Apple disk.
15 if text is dirty and
16 if text is empty then boot Apple disk.
17 else beep, set error# to 4
18 else boot Apple disk.
19
20
21
22
23

```

scr # 266

```

0 ( LOOKUP LTABLE ) HEX
1
2 \ NOOP ,-( 15 )
3 \ NOOP , ( 16 )
4 \ NOOP , ( 17 )
5 \ NOOP , ( 18 )
6 \ NOOP , ( 19 )
7 \ NOOP , ( 1A )
8 \ TAB , ( 1B )
9 \ ENTER , ( 1C::ASCII CHARS )
10 EDDE , ( magic number )
11
12 LABEL LOOKUP 0 SP) LDA, ff #B CMP, CS
13 IF, \ ENTER JMP,
14 ENDIF, INX, INX, .A ASL,
15 YSAVE STY, TAY,
16 RTABLE ,Y LDA, X5 STA,
17 RTABLE 1+ ,Y LDA, X5 1+ STA,
18 YSAVE LDY, X5 )JMP,
19
20
21
22
23

```

```

0 T: WRITES ( address hi+1 lo -- flag )
1 PURPOSE: write a range of tracks to the
2 disk.
3 write tracks lo through hi, inclusive
4 in 3K hunks, beginning at address
5 true = success
6
7 WARNING: the flag is FALSE after
8 successfully writing the last C00 bytes
9 in memory (from F400 to FFFF) so do not
10 use the flag if you are writing the
11 last C00 bytes.
12
13
14
15
16
17
18
19
20
21
22
23

```

267

```

0 ( BUG RP! MAIN ) HEX
1
2 LABEL BUG ( -- flag )
3 YSAVE STY, 0 #B LDY, SPO #B CPX, NE
4 IF, SPO #B LDX, DEY, ENDIF,
5 DEX, DEX, 0 SP) STY, 1 SP) STY,
6 YSAVE LDY, TNEXT,
7
8 LABEL RP! ( -- ) TXA, 04F #B LDX,
9 TXS, TAX, TNEXT,
10
11 T: MAIN RP!
12 BEGIN ?X
13 IF LEXREX
14 ELSE
15 ?K IF @K DUP >R LOOKUP R> LASTC TO
16 ENDIF
17 ?M IF MAPPEND ENDIF
18 BELL? IF BEEP O BELL? TO ENDIF
19 ENDIF
20 QUE ?BLINK
21 BUG IF BEEP BEEP BEEP BEEP ENDIF
22 AGAIN ;
23

```

scr # 268

```

0 ( WARM ) HEX
1
2 T: WARM DEACT FRAGMENTS START
3 O LEXXING TO O BELL? TO
4 FLUSH
5 SETDISP
6 36A5 39E !
7 SETMODEM
8 O LINESCOUNT TO
9 O PRINT? TO
10 ?RAMKEYS
11 -1 TEOS TO
12 PREALIGN <ENDFORM>
13 TOP LOCLIN LINADR REWINDOW
14 FRESH
15 NARROW EOT BEOT = OR
16 IF LEXCUR ELSE RENCUR ENDIF
17 MAIN ;
18
19
20
21
22
23

```

269

```

0 ( ?RAMKEYS ) HEX
1
2 LABEL ?RAMKEYS ( -- )
3 \ .MSG0 OB + RTABLE 3A +
4 2DUP LDA, CMP, EQ
5 IF, >R 2DUP 1+ LDA, 1+ CMP, EQ
6 IF, >R 2DUP 2+ LDA, 2+ CMP, EQ
7 IF, >R 3+ LDA, 3+ CMP, EQ

```

```

0 T: SAVE ( -- )
1 PURPOSE: save the text to disk.
2 assumes EDDE disk turning at track 1
3 with matching old disk #
4
5 if write protected then beep
6 else collapse the gap, get new disk#
7 calculate the number of tracks needed
8 to save the text and store in SAVED
9 write text to disk
10 if successful then old disk number
11 equals the newly disk number
12 calculated disk number, clear the
13 dirty bit, write boot 0 and
14 if that is successful,
15 write the rest of the program image
16 else restore original disk number
17 move text back into its original
18 position.
19
20 T: IMAGE ( flag -- )
21 PURPOSE: Write edde image if TRUE
22 in blocks $13 thru $16
23

```

```

0 T: DISK ( -- )
1 PURPOSE: smart disk command.
2 turn disk on.
3 check up to two times for EDDE header.
4 if a Swyft disk and
5 if text is empty then load.
6 else (not empty) <read> the disk and
7 if disk# matches then save.
8 else (not the same disk) and
9 if dirty and
10 if the whole text has been selected
11 then drag the text else beep.
12 else (not dirty) and
13 if the bootup# = olddisk# and
14 if the last command was Disk
15 then save.
16 else beep and set error# to 2
17 else (no match) and
18 if there is a selection then drag.
19 else load.
20 else seek to track 0 and
21 if Apple disk then load
22 else save text, write edde image (disk)
23 turn disk off.

```

```

0
1
2
3
4
5
6
7

```

```

8     IF, TNEXT,
9 R> R> R> ENDIF, ENDIF, ENDIF, ENDIF,
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

8
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20
21
22
23

```

scr # 270

```

0 ( RAMKEYS ) HEX
1
2 LABEL RAMKEYS. ( -- )
3 \ .XLAT DUP OFF AND #B LDA, X0 STA,
4     SWAB OFF AND #B LDA, X0 1+ STA,
5 HIMEM DUP OFF AND #B LDA, X1 STA,
6     SWAB OFF AND #B LDA, X1 1+ STA,
7 \ .LTABLE DUP OFF AND #B LDA, X2 STA,
8     SWAB OFF AND #B LDA, X2 1+ STA,
9 RTABLE DUP OFF AND #B LDA, X3 STA,
10    SWAB OFF AND #B LDA, X3 1+ STA,
11 YSAVE STY, 1F #B LDY,
12 BEGIN, X0 )Y LDA, X1 )Y STA, DEY, MI
13 UNTIL, 3F #B LDY,
14 BEGIN, X2 )Y LDA, X3 )Y STA, DEY, MI
15 UNTIL, RTABLE 3A + \ .MSG0 OB +
16 2DUP LDA, STA,
17 2DUP 1+ LDA, 1+ STA,
18 2DUP 2 + LDA, 2 + STA,
19 3 + LDA, 3 + STA,
20 YSAVE LDY, TNEXT,
21
22
23

```

271

```

0 ( INIT <INIT> ) HEX
1
2 LABEL INIT 0 #B LDA, BOTTOM STA,
3 BOV SWAB OFF AND #B LDA, BOTTOM 1+ STA,
4 EOV 1- OFF AND #B LDA, EOT STA,
5 EOV 1- SWAB OFF AND #B LDA, EOT 1+ STA,
6 30 #B LDA, YWRAP STA,
7
8 T: <INIT> 0 QOUT TO 0 QIN TO 0 CHAR TO
9 0 MQIN TO 0 MQOUT TO 0 TOP TO
10 50 WIDE TO 36 LONG TO BOTTOM BOT TO
11 BOT BOC TO BOT 1+ EBOT TO BOT BOS TO
12 EOT 1- BEOT TO 1D1C BEOT ! EBOT EOS TO
13 BOS OEOS TO BEOT EBOT - GAP TO
14 0 LCT TO 0 PCT TO SERIAL# OLDDISK# TO
15 1C BOT C! BOT REWINDOW
16 -1 EXTENDED TO 0 NARROW TO 0 DIRTY TO

```

```

0 FRAG .LTABLE ( -- )
1 PURPOSE: main control character
2 execution vector table.
3
4 control keys are translated by using the
5 .XLAT table into an index which is used
6 to access the command table, .LTABLE.
7 control keys that are not used can have
8 a NOOP in the command table, .LTABLE,
9 and/or a zero for that key in the
10 .XLAT table (or both).
11 both .XLAT and .LTABLE are downloaded
12 into ram so that they may be modified
13 by the user with a BASIC program.
14 the magic number is used to reinitialize
15 the ram tables. this number is the
16 version number in .MSG0.
17
18
19
20
21
22
23

```

```

0 LABEL LOOKUP ( index -- )
1 PURPOSE: execute element of LTABLE.
2
3 if the index is greater than a form
4 feed (1C) then process it as a
5 character.
6 remove character from stack, multiply by
7 2 (ie, ASL), store value from RTABLE +
8 2*index in X5 and jump to the address
9 at X5.
10
11 NOTE: RTABLE is ram equiv to LTABLE.
12
13
14
15
16

```

| | | |
|----|-------------------------------------|----|
| 17 | 100 BL1 TO 200 BLO TO | 17 |
| 18 | INITBASIC SAVESTRINGS | 18 |
| 19 | -1 LINEND% TO 1609 SEND% TO | 19 |
| 20 | 2 PFLAG% TO 0 PAGE% TO 1 SPACING TO | 20 |
| 21 | 0 .LF TO 0 .BL TO 0 MARGIN% TO | 21 |
| 22 | 6 ABOVE% TO 6 BELOW% TO 3 LPAGE% TO | 22 |
| 23 | 42 PLEN% TO RAMKEYS ; | 23 |

| | |
|--|--|
| scr # 272 | |
| 0 (<LOAD> OLDLOAD LOAD) HEX | 0 LABEL TIMEOUT? (-- flag) |
| 1 | 1 PURPOSE: count down the timer, returning |
| 2 T: <LOAD> >R B400 800 COO CMOVE | 2 TRUE when it gets to 0. If the value |
| 3 FRAGMENTS SIGNON | 3 of TIMER is between 128 and 256, |
| 4 B3FC @ DUP DISK# TO OLDDISK# TO | 4 prepare the system so that DISK is |
| 5 1400 R> 1+ 2 | 5 fooled into loading the disk in the |
| 6 DO I READ B400 OVER COO CMOVE COO + | 6 drive. |
| 7 LOOP DROP 0 DIRTY TO ; | 7 |
| 8 | 8 |
| 9 T: OLDLOAD ACT E0 MS 1 SEEK ?EDDE | 9 |
| 10 IF 1 READ OF <LOAD> WARM ENDIF ; | 10 |
| 11 | 11 |
| 12 T: LOAD 1 READ B400 ORIGIN ADDR - | 12 |
| 13 SAVED ADDR + @ <LOAD> | 13 |
| 14 EBOT BEOT EOT 1+ OVER - CMOVE> | 14 |
| 15 WARM ; | 15 |
| 16 | 16 |
| 17 | 17 |
| 18 | 18 |
| 19 | 19 |
| 20 ;S | 20 |
| 21 \ OLDLOAD \ .LTABLE ROM - AIM + 6 + ! | 21 |
| 22 | 22 |
| 23 | 23 |
| 273 | |
| 0 (DRAG) HEX | 0 LABEL STACK? (-- flag) |
| 1 | 1 |
| 2 T: DRAG SEL 0 COO UM/MOD SWAP 0= 0= - | 2 LABEL RP! (--) |
| 3 1 READ | 3 |
| 4 B400 SAVED ADDR 800 - + @ >R | 4 T: MAIN RP! |
| 5 OF R@ - U< | 5 |
| 6 IF R> | 6 |
| 7 BOS EOT 1+ SEL - SEL DUP >R CMOVE> | 7 |
| 8 <LOAD> DEACT -1 DIRTY TO | 8 |
| 9 EBOT EOT 1+ OVER - REVERSE | 9 |
| 10 BEOT EOT 1+ OVER - REVERSE | 10 |
| 11 EBOT R@ REVERSE | 11 |
| 12 FIXEND | 12 |
| 13 R> EBOT DUP >R +TO | 13 |
| 14 R@ BOT +ALIGN | 14 |
| 15 - PAGES 07F U< | 15 |
| 16 IF R> EBOT SHOWMARK WARM ENDIF | 16 |
| 17 DELETE BEEP | 17 |
| 18 ELSE BEEP DEACT | 18 |
| 19 ENDIF R> DROP ; | 19 |
| 20 | 20 |
| 21 | 21 |
| 22 | 22 |
| 23 | 23 |

```

scr # 274
0 ( WRITE APPLEDISK ) HEX
1
2 ( disk# track# -- flag )
3
4 T: WRITE >R R@ SEEK
5 B3FO 10 0 FILL
6 DISK# B3FC !
7 0 B3FE C!
8 R@ B3FF C!
9 CHECKSUM B3FE C!
10 <WRITE> ?EDDE 0=
11 IF RECAL R@ SEEK
12 <WRITE> ?EDDE 0=
13 IF BEEP DEACT R> DROP 0 EXIT
14 ENDIF ENDIF R> DROP 1 ;
15
16 T: APPLEDISK DIRTY
17 IF EBOT BOT - EOT BEOT - + 2 =
18 IF ABOOT ELSE BEEP ENDIF
19 ELSE ABOOT ENDIF ;
20
21
22
23

```

275

```

0 ( WRITES ) HEX
1
2 ( address hi-track+1 lo-track -- flag )
3 ( true = success )
4
5 T: WRITES
6 DO DUP B400 COO CMOVE
7 I WRITE 0=
8 IF DROP 0 LEAVE
9 ENDIF COO + 10 MS
10 LOOP ;
11
12 ;S WARNING, the flag is FALSE after
13 successfully writing the last COO
14 bytes in memory ( from F400 - FFFF )
15 so don't use the flag if you are
16 writing the last COO bytes.
17
18
19
20
21
22
23

```

scr # 276

```

0 ( SAVE ) HEX
1
2 ( -- | assumes EDDE disk turning at
3 track 0 with matching old disk #)
4
5 T: SAVE PROT?
6 IF BEEP

```

```

0 T: WARM
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

0 FRAG .VECS
1 PURPOSE: this is a copy of the vectors
2 needed for the custom modem support:
3 \ .MQUE JMP, ( .IVEC )
4 \ .MEMIT JMP, ( .OVEC )
5 RTS, NOP, NOP, ( .SVEC )
6 RTS, ( .QVEC )
7 they are moved to $1594 by RAMKEYS
8
9 LABEL ?RAMKEYS ( -- )
10 PURPOSE: reload ramtable if RTABLE+3A
11 does not equal the version number.
12
13 if the value at RTABLE+3A is equal to
14 the version number then exit.
15 otherwise execute the next definition,
16 RAMKEYS....
17
18
19
20
21
22
23

```

```

0 LABEL RAMKEYS ( -- )
1 PURPOSE: copy key and command
2 translation tables into ram.
3
4 prepare to copy:
5 store the address of .XLAT in X0.
6 store the address of HIMEM in X1.

```

```

7 ELSE 4 LASTC TO
8 BEOT EBOT EOT 1+ BEOT - CMOVE
9 DISK# SERIAL# DISK# TO
10 EBOT EOT BEOT - +
11 800 - 1+ 0 COO UM/MOD SWAP
12 0= 0= - SAVED TO
13 800 SAVED 1+ 1 WRITES
14 IF DROP DISK# OLDDISK# TO 0 DIRTY TO
15 0 SEEK WRITE0
16 ELSE DISK# TO
17 ENDIF EBOT BEOT EOT 1+ OVER - CMOVE>
18 ENDIF ;
19
20 ;S ROM? 0= D000 13 11
21 DO DUP CMOVE2 COO + I WRITE 0=
22 IF DROP 0 LEAVE ENDIF 30 MS LOOP
23 IF D000 17 13 WRITES DROP

```

277

```

0 ( DISK ) HEX
1 T: DISK DISKON ?EDDE DUP 0=
2 IF DROP RECAL 1 SEEK ?EDDE ENDIF
3 IF <READ> B3FA @ EDDE =
4 IF GET EXIT ENDIF
5 EBOT BOT - EOT BEOT - + 2 =
6 IF LOAD
7 ELSE <READ> B3FC @ DISK# =
8 IF OLDDISK# SAVE OLDDISK# TO
9 ELSE DIRTY
10 IF BOS BOT 2 + U<
11 EOT 2 - BEOT U< AND
12 IF DRAG ELSE BEEP ENDIF
13 ELSE B3FC @ OLDDISK# =
14 IF LASTC 4 = SERIAL# DISK# = AND
15 IF SAVE ELSE BEEP ENDIF
16 ELSE 1 SEL U<
17 IF DRAG ELSE LOAD ENDIF
18 ENDIF ENDIF ENDIF ENDIF
19 ELSE 0 SEEK ?APPLE
20 IF APPLEDISK ELSE SAVE ENDIF
21 ENDIF DEACT ;
22
23 \ DISK \ .LTABLE ROM - AIM + 8 + !

```

```

7 store the address of .LTABLE in X2.
8 store the address of RTABLE in X3.
9 copy $20 bytes from .XLAT to HIMEM.
10 copy $40 bytes from .LTABLE to RTABLE.
11 store the version number (at .MSG0+SOC)
12 to RTABLE+3A.
13
14 NOTE: this is why the position of the
15 version number in .MSG0, on screen 111,
16 should not be changed unless a similar
17 change is made elsewhere.
18
19
20
21
22
23

0 LABEL INIT ( -- ) Initialize for no disk
1 BOTTOM from BOV. EOT from EOF.
2 YWRAP is $30, as it counts from $30
3 to $7F for a total of dec 80 (columns)
4 before it turns negative. Calls <INIT>.
5 T: <INIT> ( -- )
6 clear the key and modem queue.
7 set page format to hex 50 wide (80)
8 by hex 36 long (54)
9 CHAR holds a "null" (0) = empty
10 start display at top
11 nothing in the cut buffer.
12 beginning of text is a formfeed (1C)
13 select the formfeed
14 ect is a CR (1D) and formfeed (1C).
15 total line and page count is zero.
16 REWINDOW from beginning of text.
17 LEXXED state=false EXTENDED true.
18 calc GAP (- $100 = room%).
19 INITBASIC. save printer string in PBUF.
20 initialize for FX80 printer.
21 set page length to $42.
22 save printer string in PBUF.
23 load tables into ram.

```

scr # 278

```

0 ( COLD BOOT ) HEX
1
2 T: COLD DEACT
3 ORIGIN ADDR 1000 0 FILL FRAGMENTS
4 400 MS INIT WARM ;
5
6 T: BOOT CO10 C8 86 =
7 IF 0 CHAR C! COLD
8 ENDIF DISKON 0 80 0
9 DO 7F COEC C8 U< + LOOP
10 NEGATE 8 U< IF COLD ENDIF
11 ?EDDE IF <READ> B3FA @ EDDE =
12 IF COLD ELSE LOAD ENDIF ENDIF
13 0 SEEK ?APPLE IF ABOOT ENDIF
14 COLD ;
15

```

```

0 T: COLD
1 PURPOSE: initialize for no disk.
2 turn disk off.
3 clear all variables to zero.
4 load in code fragments.
5 wait 400 milliseconds
6 INITialize text variables and BASIC.
7 WARM start.
8
9 T: BOOT ( -- )
10 PURPOSE: boot Swyft system and copy text
11 from an Edde disk.
12 turn disk on.
13 if holding ^F then do a coldstart.
14 if disk is unformatted (cannot find
15 a header) then do a COLD start.

```

```

16
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23

279
0 ( .RESET RESET ) HEX
1
2 FRAG .RESET ( -- ) ROM? LDA, NE
3 IF, COBO LDA,
4 ELSE, <AUX> JSR, C08F LDA, C08F LDA,
5 \ .INTERRUPT DUP FF AND #B LDA,
6 FFFE STA,
7 SWAB FF AND #B LDA, FFFF STA,
8 ENDIF, D200 JMP,
9
10 T: RESET
11 FRAGMENTS SETDISP SIGNON
12 7F C061 C@ U< IF ABOOT ENDIF
13 7F C062 C@ U< IF COLD ENDIF
14 39E @ 36A5 = IF WARM ENDIF
15 BOOT ;
16
17 ;S Upon reset, the //c stores its mouse
18 interrupt vector at the RECEIVE
19 interrupt (FFFE). ~RESET fixes it.
20
21 Ctrl-open apple-reset does a mem test
22 in the disk version, instead of COLD
23

```

```

scr # 280
0 ( last pointers ) HEX
1
2 ( hard reset vectors for Eddo card )
3 \ .INTERRUPT AIM 2FFE + ! ( irq )
4 \ .RESET AIM 2FFC + ! ( reset )
5 \ .RESET AIM 2FFA + ! ( nmi )
6 EDDE AIM 2FF8 + ! ( romcard id )
7 \ .INTERRUPT AIM 2FF6 + ! ( copy of irq)
8
9 ( emplace track 0 boot image )
10 HEX 12 BLOCK 200 + AIM 200 - 200 CMOVE
11
12
13
14
15
16
17
18
19
20
21
22
23

```

```

16 if an Eddo disk then load it.
17 if an apple disk then boot it.
18 if disk is none of the above then do a
19 COLD start.
20
21
22
23

0 FRAG .RESET ( -- )
1 PURPOSE: handle 6502 RESET or NMI.
2 if this is the romcard version then
3 turn on romcard (LDA$COBO).
4 else turn on the bank 1 (JSR<AUX>)
5 and store the receive interrupt vector
6 at $FFFE (6502 IRQ)--this is needed
7 since the //c stores an interrupt for
8 the mouse there.
9 jump to D200 and start Swyft.

10
11 T: RESET ( -- )
12 PURPOSE: respond to control-reset and to
13 control-apple-reset.
14 load rom or disk code fragments.
15 set up 80 column display.
16 SIGNON here prevents garbage on screen.
17 if open apple reset, boot the disk.
18 if closed apple reset, do a COLD start.
19 if a warm start has been done
20 do it again.
21 if none of the above then do a BOOT.
22
23 NOTE: stored at D00A for reset.

```

```

0 ( last pointers ) HEX
1
2 set up reset, nonmaskable interrupt and
3 interrupt request vectors
4 vectors for reset and entry points
5
6 move $200 bytes to the end of bank 2
7 for the boot track 0 image
8 there are $200 less bytes in bank 2
9 available than seen on the printout
10 for compilation
11
12
13
14
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```

We claim:

1. In a computer system having a display device, a memory device, an entry device and processing means for displaying symbols and a cursor on the display device in response to signals from the entry device, a method for creating and modifying a string of symbols, in response to signals from the entry device, the method comprising the steps of:
 - displaying on the display device a string of symbols;
 - displaying on the display device a cursor, said cursor occupying a display region and having a first cursor part occupying a first part of the display region and a second cursor part occupying a second part of the display region adjacent the first part of the display region, the first part of the display region including a symbol in the string of symbols;
 - in response to signals of a first type from the entry device, said first type of signals including signals representing an entered symbol, inserting the entered symbol into the string of symbols at the second part of the display region; and
 - in response to signals of a second type from the entry device, said second type of signals designating a deletion operation, performing the designated deletion operation by deleting the symbol included in the first part of the display region.
2. The method of claim 1, further comprising the steps of:
 - in response to signals of a third type from the entry device, moving said cursor to a desired location on the display device indicated by said third type of signals, and coalescing the cursor by positioning the first part of the cursor and the second part of the cursor at a single symbol occupying the desired location.
3. The method of claim 1 wherein the display region is a first display region and said inserting step further comprises moving the cursor to a second display region having a first part including the inserted symbol.
4. The method of claim 2 further comprising the step of: in response to signals of a fourth type from said entry device, extending the first part of the display region to include a plurality of symbols.
5. An apparatus for creating and modifying a string of symbols, the apparatus comprising:
 - a processing unit;
 - entry means, coupled to said processing unit, for transmitting signals to said processing unit;
 - display means coupled to said processing unit for displaying symbols and a cursor at specified locations in response to signals from said processing unit;
 - said processing unit comprising means for generating signals for:
 - displaying, on said display means, a string of symbols;
 - displaying, on said display means, a cursor, said cursor occupying a display region and having a first cursor part occupying a first part of the display region and a second cursor part occupying a second part of the display region adjacent the first part of the display region, the first part of the display region including a symbol in the string of symbols;
 - in response to signals of a first type from the entry device, inserting the entered symbol into the string of symbols at the second part of the display region;
 - in response to signals of a second type from the entry device, moving the cursor to a desired location on the display device indicated by said second type of signals, and coalescing the cursor by positioning the first part of the cursor and the second part of the cursor at a single symbol occupying the desired location;
 - in response to signals of a third type from the entry device, moving the cursor to a desired location on the display device indicated by said third type of signals, and coalescing the cursor by positioning the first part of the cursor and the second part of the cursor at a single symbol occupying the desired location;
 - in response to signals of a fourth type from the entry device, extending the first part of the display region to include a plurality of symbols.

- region including a symbol in the string of symbols, and
- in response to a first type of signals from said entry means inserting an entered symbol into the string of symbols at the second part of the display region, said first type of signals including signals representing the entered symbol; and
- in response to a second type of signals from said entry means, performing a deletion operation by deleting the symbol included in the first part of the display region;
- in response to a third type of signals from said entry means, moving the cursor to a desired location on the display means indicated by said third type of signals and coalescing the cursor by positioning the first part of the cursor and the second part of the cursor on a single symbol occupying the desired location; and
- in response to signals of a fourth type from the entry device, extending the first part of the display region to include a plurality of symbols.
6. In a computer system having an entry device, a display device and processing means for displaying symbols and a cursor on the display device in response to signals from the entry device, a method for indicating loci of operations, the method comprising the steps of:
 - displaying a string of symbols on the display device;
 - displaying a cursor on the display device, said cursor having a first part and a second part;
 - positioning the first part of the cursor at a first region on the display, the first region including a symbol in the string of symbols;
 - positioning the second part of the cursor at a second region on the display adjacent to the first region;
 - in response to signals of a first type from the entry device, said first type of signals including signals representing an entered symbol, inserting the entered symbol into the string of symbols by displaying the entered symbol at the second region, moving the first part of the cursor to the second region and moving the second part of the cursor to a third region on the display adjacent the second region;
 - in response to externally-supplied signals of a second type, deleting the symbol included in the first region.
7. The method of claim 6 further comprising the step of:
 - in response to signals of a third type from the entry device, said third type of signals specifying a target location, moving the cursor to the target location and coalescing the cursor by positioning both parts of the cursor on a single symbol occupying the target location.
8. The method of claim 6 wherein the first part of the cursor is displayed in reverse video and the second part of the cursor is displayed as a blinker.
9. The method of claim 8 further comprising the step of: in response to signals of a fourth type from said entry device, extending the first display region to include a plurality of symbols.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 4,806,916

DATED : February 21, 1989

INVENTOR(S) : Jef Raskin, James Winter, Renwick Curry

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

IN THE APPENDIX: Please insert the following copyright notice at the first page of the Source Code Appendix:

--Copyright 1988 Information Appliance, Inc.--

Signed and Sealed this
Twenty-first Day of November, 1989

Attest:

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Attesting Officer

Acting Commissioner of Patents and Trademarks