

ASMEDIT X16 (v3)

REFERENCE MANUAL

GEOFFREY WAREING

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1. INTRODUCTION

1.1 DESCRIPTION

ASMEDIT X16 is a menu driven '65C02' assembler and editor for the Commander X16. Source code can be created, saved, recalled, edited and assembled with listings. It also has a file maintenance facility to organise code on disk. The software, originally developed for the Commodore CBMII Series, has been adapted and ported to the Commander X16 environment.

1.2 HARDWARE REQUIREMENTS

Commander X16 (512k)

Compatible printer (optional)

1.3 LOADING THE PROGRAM

ASMEDIT X16 can be loaded with command LOAD "ASMEDIT.PRG" (with the current directory set to ASMEDIT) followed by the 'RUN' command. ASMEDIT.PRG will load the following binaries before entering the PRIMARY COMMANDS menu and be ready for use: -

XAM.BIN	Menu Control
XAE.BIN	Menu Functions
XOF.BIN	Machine Specific Functions
XAI.BIN	Default Input Data
XHP.BIN	Help Text
XAL.BIN	Browse Listing

*** It is suggested that [HANDLING CODE](#) in the appendices is read so as to gain a quick insight into the way in which source code is held by the program and the ways in which code may be structured.

*** To gain a quick insight into ASMEDIT's manner of operation it is suggested that the example in [APPENDIX B](#) is now followed using the Commander X16.

*** See the ASMEDIT 'Quick Start' video on YouTube: <https://youtu.be/HTeLqSqDS84>

2. MENUS

2.1 DESCRIPTION

A menu is simply a screen display which either:

- a) Lists options for the User to select a function (e.g., 'LOAD CODE')
- b) Presents parameters required by a function (e.g., 'CODE NAME')

2.2 INPUT AREAS

Menus which require parameter input have what are termed 'Input Areas'. Input areas are displayed on the menu in reverse video. To the left of each area is a narrative which identifies what value the area should contain. Many input areas contain default values. Values entered in an input area are remembered between the exit and re-entry of a menu.

2.3 NAVIGATION

When a menu is first displayed a flashing cursor is placed in the leftmost position of the first input area. Movement of the cursor across input areas is achieved with the vertical cursor keys. Movement within an area is achieved with the horizontal cursor keys. Values are entered by simply pressing the appropriate keys. The function keys available are as follows: -

- [INS/DEL] to insert and delete characters respectively.
- [left arrow] to clear characters to the right of the cursor inclusive.
- [RETURN] to validate the input area values and invoke the menu function.
- [ESC] to terminate the function before or during the execution.

2.4 INPUT VALIDATION

If an invalid value is input a message INVALID INPUT will be displayed at the bottom lefthand side of the screen and the input area(s) in error high-lighted with '?'.

If an error occurs during the process an error message will be displayed at the foot of the menu screen. If a DOS error occurs the DOS message will be displayed as well. (See [MENU ERROR MESSAGES](#) for a list of messages which may occur).

2.4 FUNCTION

Once [RETURN] has been keyed, with valid values in the input areas, the menu's function will be performed.

3. PRIMARY COMMANDS

The first menu presented on entry to ASMEDIT is the PRIMARY COMMANDS menu.

```

ASMEDIT X16          PRIMARY COMMANDS
SELECT OPTION:

1. CREATE CODE
2. LOAD CODE
3. ASSEMBLE CODE
4. LIST DIRECTORY
5. FILE MAINTENANCE
6. BROWSE LISTING
7. END

DIRECTORY PATH [F2]: /
    
```

The required function is selected by keying the indicated number. e.g., Press [2] to select the LOAD CODE function.

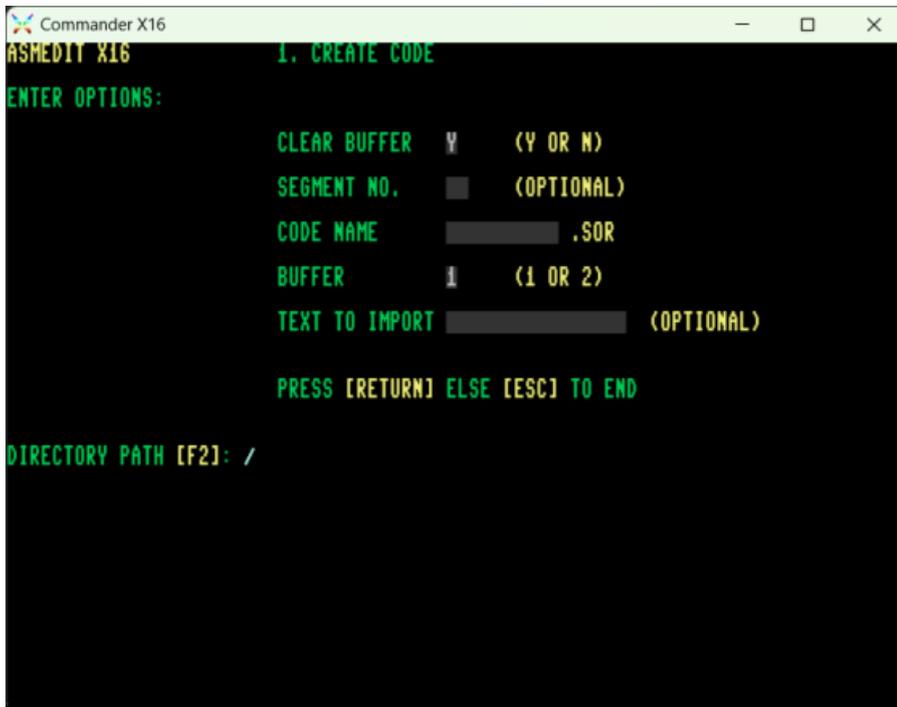
Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

A detailed description of each function follows.

3.1 CREATE CODE (MENU 1)

This function is selected when it is required to: -

- Clear the Edit buffer prior to entering new source code, which may or may not be stored on disk later.
- Create new source code to be stored on disk from new or existing code already held in the Edit BUFFER.



The EDITOR is invoked to create, browse or amend code and is described fully in [4. THE EDITOR](#) section. The menu displays the following input areas:

CLEAR BUFFER (Y OR N)

This input area is fairly self-explanatory. The term buffer simply refers to the area where code is to be held when it is being keyed in and manipulated. The EDITOR is therefore asking whether any code currently in this area is to be erased (type 'Y') or whether it is to form part of the new code (type 'N').

SEGMENT NO. & CODE NAME

SEGMENT NO. and CODE NAME are appended together to form a file name representing the segment on disk. After editing, code will be filed on disk with this file name. SEGMENT NO. is optional but if entered must be a number from 1 to 99. The first segment number of the program must always be 1 and subsequent segments incremented by 1 in sequence.

BUFFER (1 OR 2)

There are two buffers in which source code may be held. The value entered should be 1 or 2 to specify which buffer is to be used.

IMPORT TEXT FILE (OPTIONAL)

The filename of a text file to be imported into the EDITOR's buffer. This is only effective if 'CLEAR BUFFER' is set as 'Y', otherwise the filename is ignored. Please note the following:

- The text file should be in ASCII format and be held on the current directory (set by the F2 command).
- A CR char is treated as a new line.
- LF chars are ignored.
- Lines greater than 56 TEXT chars are truncated.
- A new SECTION is created every 64 LINES (leaving plenty of room for code inserts in each section), up to a maximum of 99 SECTIONS.
- No case sensitivity is observed.
- There is no verification or conversion of code.

Press [RETURN] to execute function otherwise [ESC] to return to the PRIMARY COMMANDS menu.

Note: The current DIRECTORY PATH is displayed ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.2 LOAD CODE (MENU 2)

This function is selected when required to edit existing source code held on disk. Loading from disk however, occurs only if the source code required is not contained in the Edit Buffer already.

```

ASMEDIT X16 Buffer 1 : Mode S : Section 01 of 03 : Space 0749 : Line 001
Help [F1] Code XLD : Segment : Size 0017 : - of 127
==>

*****
asmedit x16 loader (x1d)
*****
skip
symbol equates
ldfadr=$40 ;load file defn addr
filchr=$24 ;fill character
mem1=$0400 ;memory 1
msz1=$0401 ;memory size 1
asmedit=$0400 ;asmedit entry point
memfil=$fee4 ;memory fill
setmsg=$ff90 ;set/unset kernal messages
readst=$ffb7 ;read io status
setlfs=$ffba ;set logical file
setnam=$ffbd ;set file name information
load=$ffd5 ;load file
skip
zero page
-----+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----+-----

```

The EDITOR is invoked to create, browse or amend code and is described fully in [4. THE EDITOR](#) section. The menu displays the following input areas:

SECTION NO.

This input area specifies which SEGMENT No. is to be displayed on entry to the Editor. If the section specified is not numeric or greater than the number of sections in the current segment the input area will be flagged and the function will fail.

SEGMENT NO. & CODE NAME

SEGMENT NO., CODE NAME and '.SOR' are appended together to form a file name which represents a SEGMENT on disk. The current DIRECTORY will be searched for the file name constructed from the SEGMENT and CODE NAME entered. If found the code file will be loaded into the Editor's buffer. Later the amended code may be filed on disk under this file name overwriting the previous copy. SEGMENT NO. is optional but if entered must be a number from 1 to 99, beginning with 1.

'?', when specified within the SEGMENT or CODE NAME input area, has a special meaning. Instead of attempting to load code with '?' in the file name ASMEDIT searches the current disk directory and displays all files which match the characters given between the '?'s specified. The user then has the option of scrolling up or down and selecting the file required. Ref. [WILD CARD FEATURE](#) for useful examples of this feature.

BUFFER (1 OR 2)

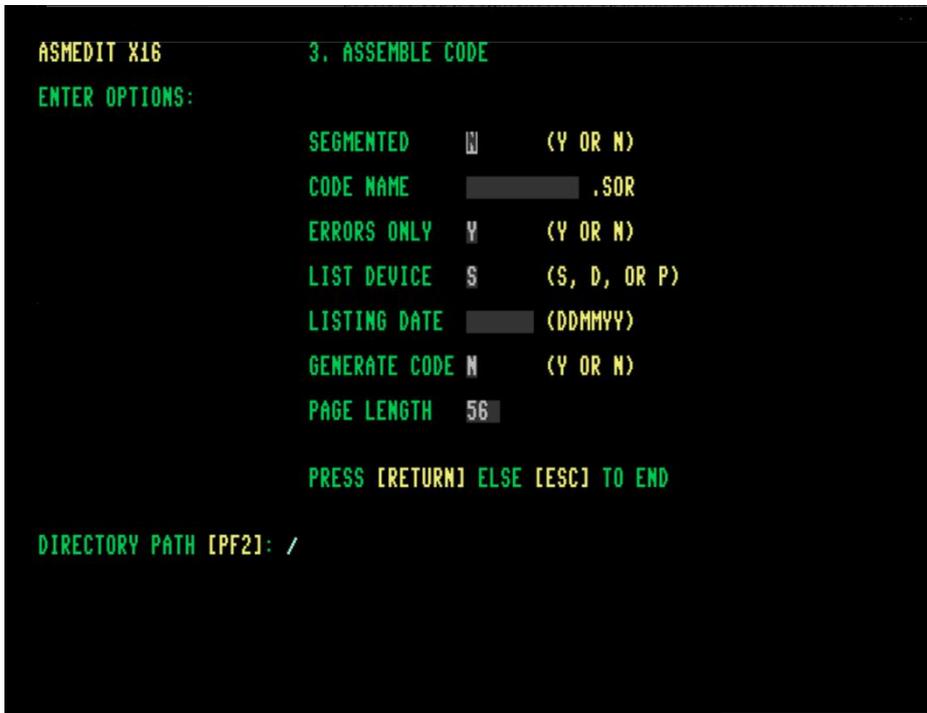
There are two buffers in which source code may be held. The value entered should be 1 or 2 to specify which buffer is to be used.

Press [RETURN] to execute function otherwise [ESC] to return to the PRIMARY COMMANDS menu.

Note: The current DIRECTORY PATH is displayed ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.3 ASSEMBLE CODE (MENU 3)

This menu receives the assembly options and performs the code assembly.



The menu displays the following input areas:

SEGMENTED (Y or N)

Type 'Y' to indicate the source code is held in multiple files prefixed with a segment number, the first file having a SEGMENT NO. of '1'; or 'N' if held on a single file. If an incorrect value for a program is entered then a FILE NOT FOUND message will likely result.

CODE NAME

The CODE NAME is used to identify the program files on disk.

Source code file names will be formatted as

[SEGMENT NO.][CODE NAME].SOR	(segmented)
[CODE NAME].SOR	(non-segmented).

Executable Code file names will be formatted

[CODE NAME].PRG

Listing files names (when LIST DEVICE is 'D', for disk) will be formatted

[CODE NAME].LST

ERRORS ONLY (Y or N)

'Y' will list errors only. 'N' will give a full listing. Ref. [SAMPLE LISTING](#) for an example of a program listing.

LIST DEVICE (S, D OR P)

'S' (Screen) will display the listing on the screen as it is produced. This is a straight listing with assembly print commands (i.e., skip, eject) suppressed. Use [CTRL] key to slow the screen scrolling.

'D' (Disk) will save the listing to disk as a text file. honouring the print commands specified in the source code.

'P' (Print) will print the listing with page headings, honouring the print commands specified in the source code.

LISTING DATE (DDMMYY)

A date to be placed in the listing page headers.

GENERATE CODE (Y or N)

'Y' instructs the assembler to write executable code to the current directory. This code can be loaded later with the BASIC command LOAD "code-name.PRG".

'N' specifies that no code is to be generated, only a listing (full or errors only) is required.

Press [RETURN] to execute function otherwise [ESC] to return to the PRIMARY COMMANDS menu.

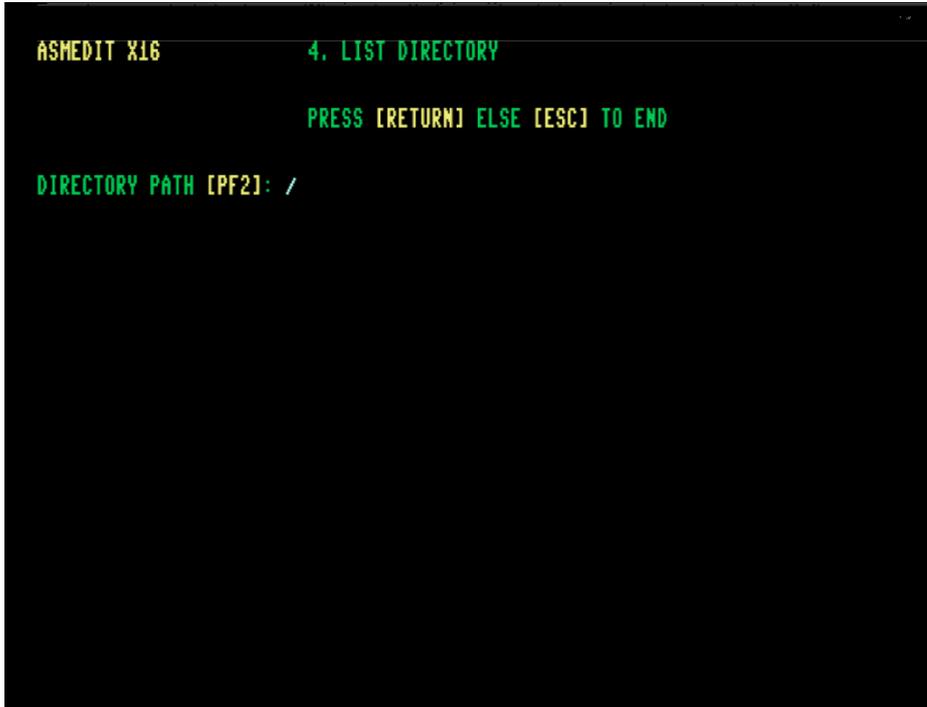
Note: The assembly may be temporarily suspended with [STOP] after which it may be restarted with [RETURN] or cancelled with [ESC]. Pausing the assembly is useful when the list is displayed on the screen rather than being printed.

Note: Refer to [5. THE ASSEMBLER](#) for an overview of this process.

Note: The current DIRECTORY PATH is displayed ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.4 LIST DISK DIRECTORY (MENU 4)

This function simply lists the files held in the current directory as indicated by DIRECTORY PATH.



Press [RETURN] to list the current DIRECTORY otherwise [ESC] to return to the PRIMARY COMMANDS menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.5 FILE MAINTENANCE (MENU 5)

This function displays a list of file maintenance functions which are supported by CMDR-DOS.

```

ASMEDIT X16          5. FILE MAINTENANCE
SELECT OPTION: █
                    1. COPY CODE
                    2. DELETE CODE
                    3. RENAME CODE
                    4. MAKE DIRECTORY
                    5. REMOVE DIRECTORY
                    6. CMDR-DOS COMMAND

DIRECTORY PATH [PF2]: /
    
```

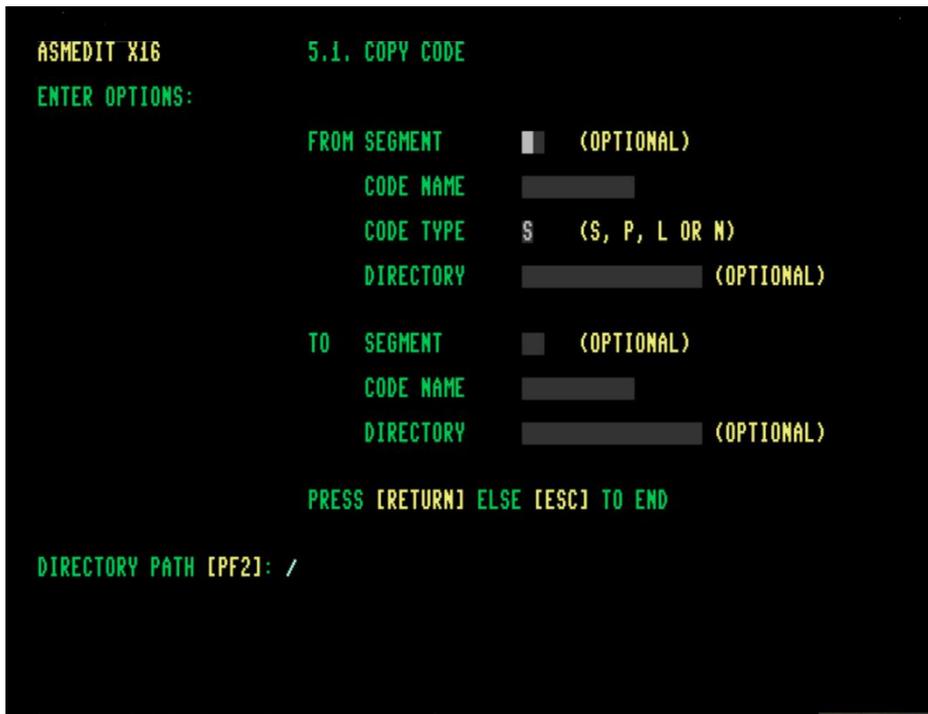
A maintenance function is selected by keying the adjacent number. i.e., Press [2] to a delete code file.

The CODE NAME is used to identify the listing fon disk.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

A detailed description of each function now follows from the next page.

3.6 COPY CODE (MENU 5.1)



This function will copy of an ASMEDIT file, or other file if CODE TYPE 'N' is selected. See below.

SEGMENT & CODE NAME (FROM & TO)

These fields are appended together to form a filename prefix, however SEGMENT is optional. If SEGMENT is entered it must be a number from 1 to 99.

CODE TYPE

The type of file to be copied. A File type is appended to the filename prefix as indicated:

'S'	SOURCE type	e.g., 'SOR'
'P'	PROGRAM type	e.g., 'PRG'
'L'	LIST type	e.g., 'LST'
'N'	No file type to be appended	

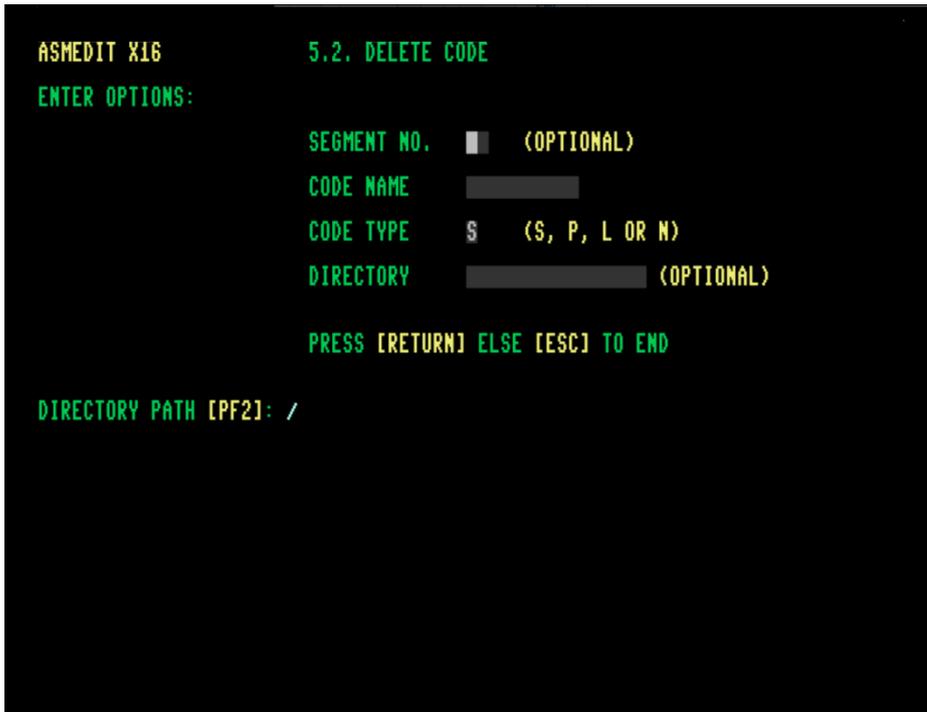
DIRECTORY (FROM & TO)

This field is optional and refers to a child directory below the current DIRECTORY. However double dots '..' can be specified to refer to the parent directory. Leaving this field blank means the file is for the current DIRECTORY PATH only.

Press [RETURN] or [ESC] to return to the 5. DISK MAINTENANCE menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.7 DELETE CODE (MENU 5.2)



This function will delete an ASMEDIT file, or other file if CODE TYPE 'N' is selected. See below

SEGMENT NO. & CODE NAME

These fields are appended together to form a filename prefix, however SEGMENT is optional. If SEGMENT is entered it must be a number from 1 to 99.

CODE TYPE

The type of file to be copied. A File type is appended to the filename prefix as indicated:

'S'	SOURCE type	e.g., 'SOR'
'P'	PROGRAM type	e.g., 'PRG'
'L'	LIST type	e.g., 'LST'
'N'	No file type to be appended	

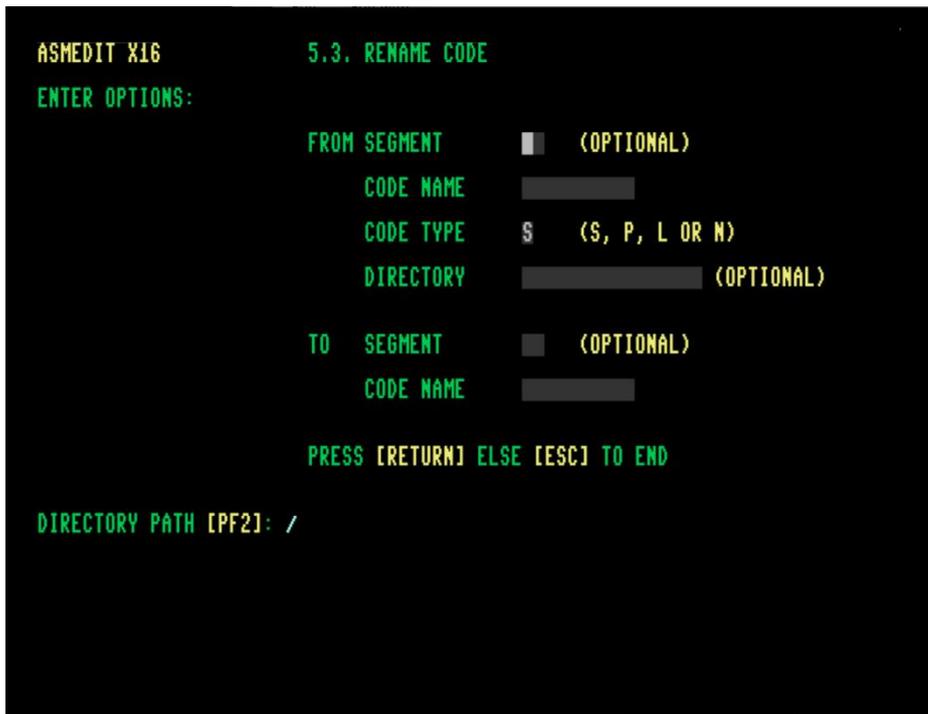
DIRECTORY

This field is optional and refers to a child directory below the current DIRECTORY. However double dots '..' can be specified to refer to the parent directory. Leaving this field blank means the file is for the current DIRECTORY PATH only.

Press [RETURN] or [ESC] to return to the 5. DISK MAINTENANCE menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.8 RENAME CODE (MENU 5.3)



This function renames an ASMEDIT file, or other file if CODE TYPE 'N' is selected. See below

SEGMENT NO. & CODE NAME

These fields are appended together to form a filename prefix, however SEGMENT is optional. If SEGMENT is entered it must be a number from 1 to 99.

CODE TYPE

The type of file to be copied. A File type is appended to the filename prefix as indicated:

'S'	SOURCE type	e.g., '.SOR'
'P'	PROGRAM type	e.g., '.PRG'
'L'	LIST type	e.g., '.LST'
'N'	No file type to be appended	

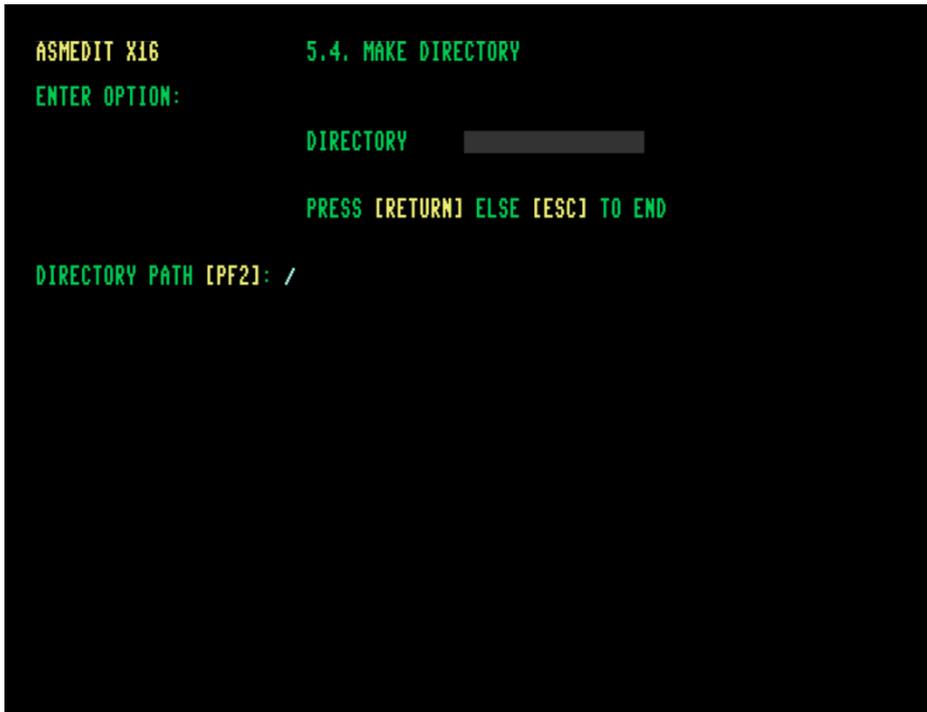
DIRECTORY

This field is optional and refers to a child directory below the current DIRECTORY. However double dots '..' can be specified to refer to the parent directory. Leaving this field blank means the file is for the current DIRECTORY PATH only.

Press [RETURN] or [ESC] to return to the 5. DISK MAINTENANCE menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.9 MAKE DIRECTORY (MENU 5.4)



This will create a child DIRECTORY below the current DIRECTORY PATH.

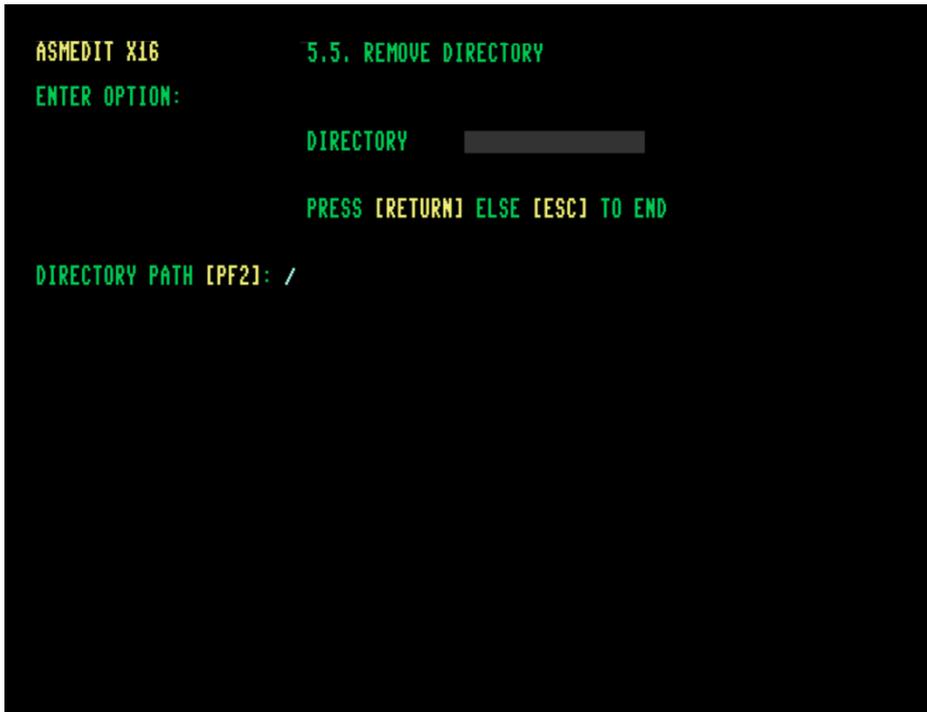
DIRECTORY

This refers to a child directory to be created below the current DIRECTORY.

Press [RETURN] or [ESC] to return to the 5. DISK MAINTENANCE menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.10 REMOVE DIRECTORY (MENU 5.5)



This will remove a child DIRECTORY below the current DIRECTORY PATH.

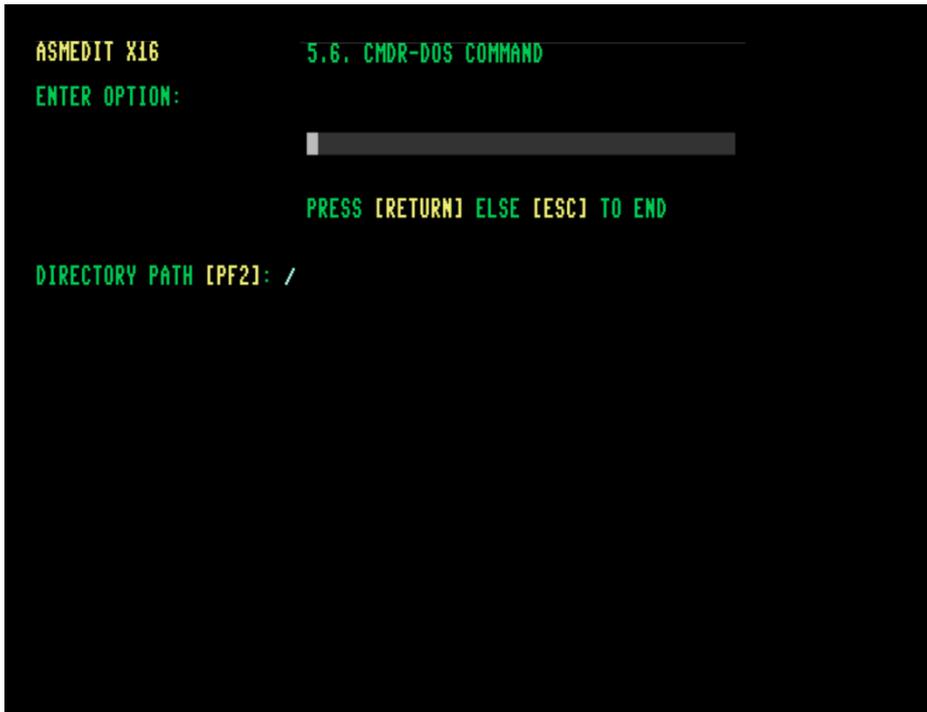
DIRECTORY

This refers to a child directory to be removed below the current DIRECTORY.

Press [RETURN] or [ESC] to return to the 5. DISK MAINTENANCE menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.11 CMDR-DOS COMMAND (MENU 5.6)



The input to this function is the same as the DOS command content, which might be coded between double quotes, (with the exception of list directory commands e.g., "\$").

Press [RETURN] or [ESC] to return to the 5. DISK MAINTENANCE menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.12 BROWSE LISTING (MENU 6)

```

ASMEDIT X16          6. BROWSE LISTING
ENTER OPTION:
                     CODE NAME  █
                     PRESS [RETURN] ELSE [ESC] TO END
DIRECTORY PATH [F2]: /
    
```

This function enables the user to browse a listing held on disk previously created by the Assembler.

Enter the CODE NAME to identify the listing on disk which will have a file name of 'code-name.LST'.

Press [RETURN] or [ESC] to return to the PRIMARY COMMANDS menu.

Note: The current DIRECTORY PATH is displayed on each menu ('/' means the root). Pressing [F2] allows the user to change the current directory at any point.

3.13 END (MENU 7)

This function terminates the program with any code held in the buffers lost.



On selecting '6. END' the option to return to the PRIMARY COMMANDS menu is given (pressing [ESC]); or [RETURN] ends the program ultimately. The program must be reloaded before it can be used again.

Note: Care should be taken before finalising this command to file any code in the buffers that may be required again. To do this return to the LOAD CODE menu, press [RETURN] then exit with [SHIFT]+[X]. If a CODE NAME has not been specified, navigate to the CREATE CODE menu, enter a CODE NAME, ensure that CLEAR BUFFER specifies 'N', press [RETURN] then exit with [SHIFT]+[X]. The code will be secured on disk.

4. THE EDITOR

The EDITOR is entered from the CREATE CODE or LOAD CODE menu. This function allows the user to enter, display and manipulate source code (ref. [5.2 SOURCE CODE FORMAT](#)). During this function source code is held in memory otherwise known as a 'buffer'. Two buffers are used (Ref. [BUFFER](#) in the appendices).

```

ASMEEDIT X16 Buffer 1 : Mode S : Section 01 of 03 : Space 0749 : Line 001
Help [F1] Code XLD : Segment : Size 0017 : - of 127
==>

*****
asmedit x16 loader (xld)
*****
skip
;
symbol equates
ldfadr=$40 ;load file defn addr
filchr=$24 ;fill character
mem1=$0400 ;memory 1
mszl=$0401 ;memory size 1
asmedit=$0400 ;asmedit entry point
memfil=$fee4 ;memory fill
setmsg=$ff90 ;set/unset kernal messages
readst=$ffb7 ;read io status
setlfs=$ffb8 ;set logical file
setnam=$ffbd ;set file name information
load=$ffd5 ;load file
skip
;
zero page
;
-----+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----+-----+

```

Usually, a program is defined with one SEGMENT having up to 99 SECTIONS, each SECTION having a maximum of 127 lines. However, large programs may be defined as linked segments held on separate disk files. The EDITOR can handle only one SEGMENT (per BUFFER) at a time however all linked segments will be assembled into one execution file.

Note: Pressing [F1] at any point in the EDITOR gives a QUICK REFERENCE to the commands. Press [ESC] to return to the EDITOR

The following values are displayed in the header lines:

- BUFFER** 1 or 2, depending on the current buffer selection
- CODE** The name of the program to be coded.
- SEGMENT** Either blank (single segment) or nn (01-99) representing the segment identifier.
- MODE** Displays which mode is in operation. i.e., S: SCAN EDIT, O: OVERWRITE or I: INSERT. Scan mode allows for commands to be entered, whereas the two input modes can be to OVERWRITE or INSERT.
- SPACE and SIZE** Displayed in Blocks (256 bytes). The two buffers combined have a maximum of 192K (768 blocks) available.
- ==>** The Command Prompt.

*** NOTE: A QUICK REFERENCE GUIDE to commands is given in [EDITOR COMMANDS QUICK REFERENCE](#) in the Appendices.

4.1 COMMAND SYNTAX SYMBOLS

[]	Keystroke
[] + []	2 keys at once
' '	Enter character string
{ }	Repeatable action(s)
/	OR
()	Group of actions

4.2 KEYSTROKE COMMANDS

The Editor has the following single stroke commands:

Command Quick Reference	[F1]	
Step forward one section	[PGDN]	mode S only
Step backward one section	[PGUP]	mode S only
Cursor left	[CURSOR LEFT]	
Cursor left (rapid)	[CURSOR LEFT] + [SHIFT]	
Cursor right	[CURSOR RIGHT]	
Cursor right (rapid)	[CURSOR RIGHT] + [SHIFT]	
Cursor up	[CURSOR UP]	
Cursor up (rapid)	[CURSOR UP] + [SHIFT]	
Cursor down	[CURSOR DOWN]	
Cursor down (rapid)	[CURSOR DOWN] + [SHIFT]	
Set Tab or Delete Tab	[TAB] + [CTRL]	
Skip to next tab position	[TAB]	
Skip to previous tab position	[TAB] + [SHIFT]	
Select Text Display Option	[F12]	

Note: Some of these commands repeat if the key is held down.

4.3 FIND

[F] { 'String' [RETURN] { [RETURN] } } [ESC]

This command searches for a given string of characters. The search is carried out left to right and downward from the current input cursor position. On reaching the end of code the search begins again from the first line. If a matching string is not found, a Condition Code of 2 is returned otherwise the key input is positioned at the start of the matching code. Pressing [RETURN] again will locate the next occurrence. The function is ended with [ESC]. The maximum length that can be entered is 30 characters.

*Example, to find the occurrence of 'bananas', Press [F], enter **bananas** then [RETURN] (Use [BACKSPACE] to correct errors). The input cursor will point to the first character of the string entered - the 'b' in bananas. Pressing [RETURN] again will point to the next occurrence, if found.*

Note: Press [STOP] to terminate the command when in operation

4.4 ALTER

[A] 'old string' [RETURN] 'new string' [RETURN] ([A] [RETURN]) / ([F] { [RETURN] }) [ESC]

This enables a selected string of characters to be replaced with another. The replacement can either be selective or can automatically replace all occurrences. After pressing [A] and entering the 'old-string' then [RETURN], the 'new-string' and [RETURN] again, there are two alternatives. First, by pressing [A] all occurrences of the string will be altered. Or by pressing [F] each occurrence is found and may be changed by pressing [RETURN], or 'F' again to move to the next occurrence. The function is cleared with the [ESC] key.

*Example, throughout the code held in the Edit buffer, we wish to change all occurrences of the word 'program' to 'programme': Press [A] enter **program** [RETURN] screen shows **A program**. Enter **programme** [RETURN] (Use [BACKSPACE] to correct errors) screen shows **A program;programme**. Now pressing [A] will change all occurrences of 'program'. Or, alternatively, pressing 'F' will locate an occurrence, which can be either be altered by pressing [RETURN] or can be skipped by pressing [F] again. It will be found that all occurrences of any 'string' can quickly be skipped through by pressing [F]. NOTE: A problem can occur when altering, in that changing a word such as 'the' will also change part of 'then'. The 'fix' is to space where necessary. For example, if one altered 'the ' (space following e) then words containing 'the' such as 'then' will not be affected.*

Note: Press [STOP] to terminate the command when in operation

4.5 DELETE LINES

[D] start [RETURN] end [RETURN]

This command deletes consecutive lines between two cursor positions. Cursor position is achieved using the cursor control keys. To delete lines press [D] then position the cursor onto the top line of the code to be deleted and press [RETURN]. Then, again using the cursor control keys, position the cursor so that it is on the bottom line to be deleted, and press [RETURN]. *Note: A single line may be deleted by positioning the cursor on the same line and pressing [RETURN] twice.* The whole block is deleted. An error Condition Code of 3 is returned if the end line is before the start line, in which case press [ESC] and try again.

***** NOTE:** *You do not enter the line numbers manually - positioning the cursor and pressing [RETURN] automatically selects the line.*

4.6 COPY LINES

[C] start [RETURN] end [RETURN] { insert-after [RETURN] } [ESC]

This command copies consecutive lines between two cursor positions to another location or locations. Cursor position is achieved using the cursor control keys. To copy lines press [C] then position the cursor onto the top line of the code to be copied and press [RETURN]. Then, again using the cursor control keys, position the cursor so that it is on the bottom line to be copied, and press [RETURN]. *Note: A single line may be copied by positioning cursor on the same line and pressing [RETURN] twice.* Using the cursor and page control keys, select the line after which the 'copied' lines are to be inserted and press [RETURN] to perform the copy. This last action may be repeated to copy lines to different locations in potentially different sections. An error Condition Code of 3 is returned if the end line is before the start line, in which case press [ESC] and try again. The [ESC] terminates the function.

**** NOTE: You do not enter the line numbers manually - positioning the cursor and pressing [RETURN] automatically selects the line.*

4.7 MOVE LINES

[M] start [RETURN] end [RETURN] insert-after [RETURN]

This command moves consecutive lines between two cursor positions to another location. Cursor position is achieved using the cursor control keys. To copy a block of code press [M] then position the cursor onto the top line of the code to be moved and press [RETURN]. Then, again using the cursor control keys, position the cursor so that it is on the bottom line to be moved, and press [RETURN]. *Note: A single line may be moved by positioning the cursor on the same line and pressing [RETURN] twice.* Using the cursor and page control keys, select the line after which the 'moved' lines are to be inserted and press [RETURN] to perform the move. An error Condition Code of 3 is returned if the end line is before the start line, in which case press [ESC] and try again.

**** NOTE: You do not enter the line numbers manually - positioning the cursor and pressing [RETURN] automatically selects the line.*

4.8 TRANSCRIBE LINES

[T] start [RETURN] end [RETURN] AUTOSWAP { insert-after [RETURN] } [ESC]

This command is initiated with [T]. The operation of the command is identical to the COPY command, except that it 'transcribes' lines from the EDIT buffer to a location or locations in the STORAGE buffer. The 'start' and 'end' lines are entered as with the copy, then on pressing [RETURN] the buffers automatically 'SWAP' over so that the selected lines may be inserted in one or more segments in the other buffer. The [ESC] terminates the function.

**** NOTE: You do not enter the line numbers manually - positioning the cursor and pressing [RETURN] automatically selects the line.*

4.9 SWAP BUFFERS

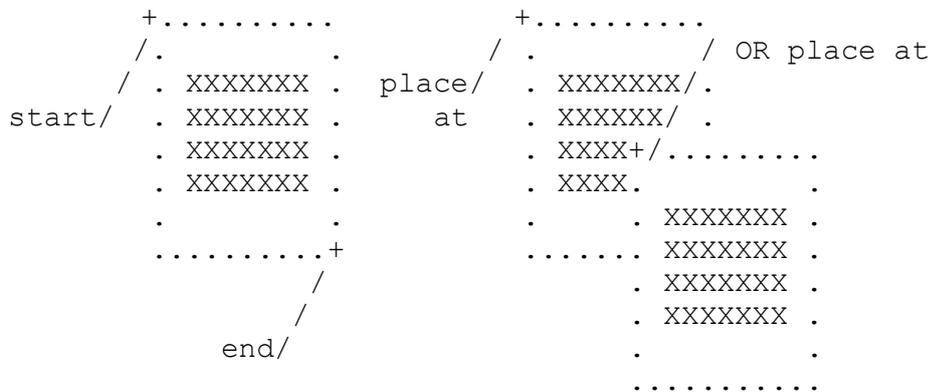
[S]

This simply exchanges the total contents of the EDIT buffer with the contents of the STORAGE buffer. The only way to put code into the STORAGE buffer is by 'SWAPPING' the EDIT buffer contents.

4.10 COPY- A COLUMN

[SHIFT]+[C] start [RETURN] end [RETURN] { place-at [RETURN] } [ESC]

This command copies a column of code/text between two cursor positions, as illustrated below, to another location overwriting the existing content. Cursor position is achieved using the cursor and page control keys. To copy a column press [SHIFT]+[C] then move the cursor to the top left corner representing the 'start' position and press [RETURN]. Similarly move the cursor to the bottom right corner which is the 'end' position. The 'place at' is the new start for the whole column specified using the page and control keys as required. Columns are repeatable by just moving the cursor to another start position and pressing [RETURN] again. There is no limitation on the new starting position for the column and so code/text can be overlaid as desired. The [ESC] terminates the function.



4.11 MOVE- A COLUMN

[SHIFT]+[M] start [RETURN] end [RETURN] place-at [RETURN]

This command moves a column of code/text between two cursor positions to another location overwriting the existing content. Cursor position is achieved using the cursor and page control keys. To move a column press [SHIFT]+[M] then move the cursor to the top left corner representing the 'start' position and press [RETURN]. Similarly move the cursor to the bottom right corner which is the 'end' position. The 'place at' is the new start for the whole column specified using the page and control keys as required. The original location of the column is replaced by blanks.

4.12 TRANSCRIBE- A COLUMN

[SHIFT]+[T] start [RETURN] end [RETURN] AUTOSWAP { place-at [RETURN] } [ESC]

This command is initiated with [SHIFT]+[T]. The operation of the command is identical to the COPY COLUMN command, except that it 'transcribes' a column from the EDIT buffer to a specified location or locations in the STORAGE buffer. The 'start' and 'end' positions are entered as with the copy, then on pressing [RETURN] the buffers automatically 'SWAP' over so that the column may be placed in the other buffer as with the copy command. The [ESC] terminates the function.

4.13 COPY- A SECTION

[ALT]+[C] from [RETURN] { insert-after [RETURN] } [ESC]

The page control keys, [PGUP] and [PGDN], which enable movement between sections, or the GO command may be used to select the section to be copied. The position of the Input Cursor is not significant. The current section number is always displayed at the top of the screen. When the required section is on view [RETURN] should be pressed. Similarly, the section AFTER which the copy is to be inserted may be selected in the same way. On pressing [RETURN] the 'copied' section will be inserted. Subsequent [RETURN]s will produce further copies always after the current section on display. The [ESC] terminates the function.

4.14 MOVE- A SECTION

[ALT]+[M] from [RETURN] insert-after [RETURN]

The page control keys, [PGUP] and [PGDN], which enable movement between sections, or the GO command may be used to select the section to be moved. The position of the Input Cursor is not significant. The current section number is always displayed at the top of the screen. When the required section is on view [RETURN] should be pressed. Similarly, the section AFTER which the 'moved' section is to be inserted may be selected in the same way. On pressing [RETURN] the 'moved' section will be inserted

4.15 TRANSCRIBE- A SECTION

[ALT]+[T] from [RETURN] AUTOSWAP { insert-after [RETURN] } [ESC]

The operation is the same as for the copy except that an automatic 'SWAPPING' of buffers occurs after registering the source section. This then gives the facility to transcribe a section of code from one program or segment, say in *BUFFER 1*, into another program or segment in *BUFFER 2*. The [ESC] terminates the function.

4.16 INSERT- A SECTION

[ALT]+[I] [RETURN]

Inserts section AFTER current section on view.

4.17 DELETE- A SECTION

[ALT]+[D] [RETURN]

Deletes current section on view unless there is only one section. ASMEDIT does not allow a buffer to contain zero sections but the remaining section content may be cleared with the ERASE command.

4.18 ERASE- A SECTION

[SHIFT]+[E] [RETURN]

Clears current section on view.

4.19 GO TO A SECTION

[G] section number [RETURN]

Section specified becomes current section displayed.

4.20 UNDO- CURRENT SECTION

[U] [RETURN]

The current section on view is held in the Edit buffer. If a significant formatting error occurs on this page, this command may be used to refresh the section from the Main buffer pool to effectively undo all changes made since the section was first displayed. It can also be used to reverse the ERASE command.

4.21 VERIFY CODE

[V] 0 / 1 [RETURN]

The command performs an assembly of the source code in the current *BUFFER* for verification purposes. [ESC] to cancel command before [RETURN]. The options are: -

- | | |
|-------------------------|---------------------------------------|
| Option 0 (or no option) | - display errors only |
| Option 1 | - displays the full listing on screen |

NOTE: This command does not allow for segmented code to be verified. Segmented code is held across multiple files and therefore is incomplete within the BUFFER area. Primary Command Menu 3 should be used instead.

4.22 EXIT & OPTIONALLY SAVE CODE TO DISK

[X] or [SHIFT]+[X]

Pressing [X] returns control to Primary Commands. If [SHIFT]+[X] is pressed (and the CODE NAME is defined) the code will also be written to disk as a '.SOR' file.

4.23 EXPORT TO TEXT FILE

[O] filename [RETURN] [ESC]

This command will export the complete contents of the BUFFER area (all segments) to an ASCII text file using the filename given. The [ESC] Key terminates the function. Please note the following:

- Text is written in ASCII format (in lowercase).
- Sections are output sequentially to one file using the given filename.
- The file is written to the current directory.
- An existing file will be overwritten.
- CR/LF chars are written as line breaks.

4.24 PASS CONTROL TO INPUT COMMANDS

[F3]

Pressing [F3] passes control to the input mode so that code can be typed into the buffer from the keyboard.

4.25 INPUT COMMANDS

OVERVIEW

Apart from typing into the Edit buffer, a number of 'key stroke' commands are available. These include setting of tabs, skipping between tabs, character deletion, inserting blank lines and toggling the input mode between 'Insert' and 'Overwrite'. Four-way scanning is available using the cursor control keys. For rapid action press shift key as well.

SELECT SUB-MODE

[INST]

On entry, the editor will be in the 'O' input mode, which is OVERWRITE. Typing over code/text in this mode will replace the characters with whatever is entered from the keyboard. Pressing [INST] will change the input mode to 'I', for INSERT. In this mode space will be made for characters being typed, and all code/text to the right of the cursor will be moved along. Pressing [INST] again will change the mode back to OVERWRITE. *Note: In INSERT mode, If the last non-blank character on the current line is at the last column position, indicating that the line is full, then input is suppressed for this line.*

SETTING TABS

[CTRL]+[TAB]

Tab positions are pre-selected for formatting code. These positions may be changed, removed or added to by this command. Moving the cursor and pressing [CTRL]+[TAB] sets a tab, except where a tab position is already set, in which case it is removed.

When editing: -

[RETURN] moves the cursor to the FIRST tab position on the next line.

[SHIFT]+[RETURN] moves the cursor to column 1 of the next line.

[TAB] advances the cursor to the next tab position. If the cursor is positioned at the last tab the cursor is advanced to the first tab position of the next line.

[SHIFT]+[TAB] will move the cursor to the previous tab. If the cursor is positioned at the first tab the cursor is moved up a line to the last tab position.

DELETE CHARACTER

[BACKSPACE] / [DELETE]

[BACKSPACE] will delete characters to the left of the current cursor.

[DELETE] key will perform a 'forward' delete, deleting characters to the right of the cursor.

INSERT A NEW LINE (^)

[SHIFT] + [6] will insert a blank line after the current line. The key repeats if held down.

5. THE ASSEMBLER

5.1 DESCRIPTION

The function of the Assembler is to generate executable code from source code specifically to run on the commander X16. It can also produce a program listing (complete or errors only). Refer to [SAMPLE LISTING](#) for an example of a program listing. The Assembler will read through the source code TWICE. The first pass identifies SYMBOLs and builds a SYMBOL table. At this point some SYMBOL values will be unresolved. The second pass resolves these values, creates the listing, identifies and reports code errors and generates the required machine code. Finally, the SYMBOLs are reported in tabular form, in alphabetic order at the end of the program listing. The progress of the assembly is displayed on the screen.

Note: The Assembly can be suspended at any time with the [STOP] key and either terminated with the [ESC] key or resumed with the [RETURN] key.

5.2 SOURCE CODE FORMAT

The ASSEMBLER is NOT case sensitive and scans each line of code expecting the following format.

((SYMBOL/LABEL) MNEMONIC/COMMAND (OPERAND)) (COMMENTS)

A SYMBOL or LABEL is optional. If entered it must begin in column 1.

All characters on a line following a semicolon (;) are treated as COMMENTS

An assembly COMMAND or MNEMONIC code must be preceded by at least one blank.

Depending on the MNEMONIC or COMMAND, an OPERAND preceded by a blank is further required.

For examples of source code lines refer to the program code in *APPENDIX B*.

5.3 SYMBOL & LABEL

A SYMBOL is used to assign a value to a name/identifier. A SYMBOL is recognised by a character string beginning in column 1 which is no more than 8 characters in length and begins with an alphabetic character. Symbols are defined in the format 'symbol=value' however a SYMBOL with no operand in column 1 is known as a LABEL and takes the current program address as its value. Some examples of a SYMBOL definition are ('PRINT=\$FFD2', 'EOF=\$80', 'START', 'DATA=*'). Once defined a SYMBOL can be used to substitute a particular value in an '65C02 assembler instruction operand', e.g. ('JMP START', 'CMP #EOF', 'JSR PRINT').

5.4 SYMBOL OPERANDS

In addition to a straight numeric value, a SYMBOL value may be derived from one or more of the following:

symbol	Uses the value represented by the SYMBOL.
*	Current program address.
>	Prefixed to a SYMBOL to signify that the high order byte value should be used. (e.g. '>PRINT')
<	Prefixed to a SYMBOL to signify that to the low byte order byte should be used. (e.g., '<START')
\$	Prefixed to indicate the subsequent value is in hexadecimal format (e.g., '\$d', '\$FFE4').
'	Prefix to indicate the value is a character or character string (e.g., #'x').
+value	Extend an operand by adding a further 'value' e.g. ('START+2').
-value	Extend an operand by subtracting a further 'value' e.g. ('*-2').

5.5 GENERAL ASSEMBLY COMMANDS

Must be coded AFTER column 1 with only one command on a line.

SKIP n	Applies to listing only. Skip n lines where n=1 to 3 or blank, defaulting to 1
EJECT	Applies to listing only. Skip to start of next page
END	Signifies the end of the source code to be assembled.
*=value	This command sets the program counter (address). The command is required first to signify the start of ZERO PAGE. ZERO PAGE may then be changed or incremented with a subsequent command, for example: -
	*=0
	DBANK *=*+1
	EBANK *=*+1
	*= \$22
	SCRADD *=*+2

A further asterisk command is required to signify the start of code. This must be a value **above** the ZERO PAGE (>\$FF) and be specified **once only**.

*=\$800

5.6 SPECIAL ASSEMBLY COMMAND

+	A blank line with only a single '+' IN column 1 instructs the assembler to load the next SEGMENT from disk (e.g., '2 SORT.SOR' is loaded if the current SEGMENT is '1 SORT').
----------	---

6. THE BROWSER

6.1 DESCRIPTION

```

ASMEDIT X16                               6. BROWSE LISTING
Help [F1]
==>
page 0013                                xal.sor                                date 21/09/23
line loc  code                               source
0490 5250 :
0491 5250 : open listing file
0492 5250 :
0493 5250 ad 9d 54 d00 lda flnlen
0494 5250 ae 9b 54 ldx flnadr
0495 5250 9c 54 ldy flnadr+1
0496 5250 00 ff jsr setnam ;set filename
0497 5250 01 ff lda #1 ;logical file
0498 5250 02 ff ldx #8 ;device
0499 5250 03 ff ldy #1tsca ;listing file secondary address
0500 5250 ba ff jsr setlfs ;set logical file ($ffba)
0501 5250 c0 ff clc
0502 5250 c0 ff jsr open ;open file
0503 5250 c0 ff rts

0505 526a :
0506 526a : open command file
0507 526a :
0508 526a a 06 d10 lda #cmdlen
0509 526a 9e 54 ldx #<cmname
0510 526a 00 ff ldy #>cmname
0511 526a 00 ff jsr setnam ;set filename
0512 526a 00 ff lda #15 ;logical file
0513 526a 00 ff ldx #8 ;device
0514 526a 00 ff ldy #15 ;secondary address
0515 526a ba ff jsr setlfs ;set logical file ($ffba)
0516 526a c0 ff clc
0517 526a c0 ff jsr open ;open file
0518 526a c0 ff rts

0520 5281 :
0521 5281 : next page
0522 5281 :
0523 5281 e6 43 d20 inc pageno ;page no (low)
0524 5283 d0 02 bne d21

0526 5285 e6 44 d21 inc pageno+1;page no (high)
0527 5287 60 rts

0529 5288 :
0530 5288 : previous page
0531 5288 :
0532 5288 c6 43 d30 dec pageno ;page no (low)
0533 5288 00 ff cmp #5ff
0534 5288 d0 02 bne d31

0536 528e c6 44 d31 dec pageno+1;page no (high)
0537 5290 60 rts

0539 5291 :
0540 5291 : increment file postion
0541 5291 :

```

The BROWSER is entered from Menu 6. BROWSE LISTING and has the following commands:

6.2 GO TO A PAGE

This command moves position directly to the given page number.

[G] page number [RETURN]

6.3 KEYSTROKE COMMANDS

The Browser has the following single stroke commands:

- Command Quick Reference [F1]
- Step forward one section [PGDN]
- Step backward one section [PGUP]
- Cursor up [CURSOR UP]
- Cursor down [CURSOR DOWN]

Note: Some of these commands repeat if the key is held down.

HANDLING CODE

BUFFER

The EDITOR holds source code in so-called BUFFERS. Two buffers are used, buffer 1 and buffer 2. The buffer in which source code is currently in view is referred to in this manual as the EDIT buffer. This may be either buffer 1 or 2. Code entered from the keyboard is always entered into the EDIT buffer, similarly all filing is performed from the EDIT buffer. The code not in the EDIT buffer, held temporarily to one side as it were, is kept in the STORAGE buffer. When in the STORAGE buffer it cannot be saved or 'handled' without first passing it back to the EDIT buffer. However, its whole contents can be swapped with the EDIT buffer at the touch of a key (ref. [4.9 SWAP BUFFERS](#)).

It may be useful to think of buffers 1 and 2 as being a turn table divided into two. The half nearest and currently in use is then the EDIT buffer. The part furthest away is the STORAGE buffer. Swapping the buffers is then equated with turning the table so that the other half is then nearer and so becomes the EDIT buffer.

CODE NAME

The EDITOR uses a file naming convention to aid the saving and loading of source code on disk. Programs are assigned a CODE NAME by the user (this may be done before or after creating the source code but before it's saved). For single SEGMENT programs the CODE NAME is combined with the character suffix 'SOR' to create a filename: CODE NAME+.SOR. e.g., 'SORT.SOR'

SEGMENT

Large programs may be broken down into SEGMENTS. Each SEGMENT is then stored as a single file prefixed by a 2-character assigned SEGMENT No. and suffixed by the CODE NAME + 'SOR'. The first segment must be 1 and each subsequent SEGMENT must be the previous SEGMENT + 1.

For example, a '3 SEGMENT' program, with an assigned CODE NAME of 'SORT' would have the following files: '1 SORT.SOR', '2 SORT.SOR' & '3 SORT.SOR'

SECTION

A SEGMENT is divided into SECTIONS. A section having a maximum of 127 Lines. A SEGMENT has a maximum of 99 SECTIONS. All programs must have at least one SECTION.

Note: Source code may be transferred freely between SECTIONS within a SEGMENT. Code may be copied (using one of the TRANSCRIBE commands e.g., [4.8 TRANSCRIBE LINES](#) from one SEGMENT to another. To do this requires both SEGMENTS be loaded. This is achieved by loading one SEGMENT into the Edit buffer, swapping it into the Storage buffer (ref. [4.9 SWAP BUFFERS](#)) and then loading the second SEGMENT into the Edit buffer.

QUICK START INTRODUCTION SCRIPT

This is a simple example of ENTERING, EDITING and ASSEMBLING code

ACTION	COMMENT
DOS"CD:ASMEDIT"	Makes ASMEDIT the current directory
LOAD "ASMEDIT.PRG" then RUN	ASMEDIT loads and runs entering the PRIMARY COMMANDS menu.
Press '1'	ASMEDIT enters menu 1. CREATE CODE

The cursor is first positioned on the CLEAR BUFFER parameter which can be left as 'Y'. Use the down cursor key to position on the CODE NAME input area, ignoring SEGMENT NO. for this exercise.

Enter CODE NAME 'HELLOWORLD'	This Identifies the code to be input.
Press [RETURN]	ASMEDIT enters the EDITOR in mode S, 'Scan/Edit'
Press [F3]	ASMEDIT enters into mode O 'Overwrite' to enable input from the keyboard.

Type in perhaps HELLOWORLD as per the SAMPLE CODE below. Ref.to [4.2 KEYSTROKE COMMANDS](#) & 4.25 INPUT COMMANDS to aid with the input and ref. [5. THE ASSEMBLER](#) for an understanding of the syntax. Toggle [INST] to switch between OVERWRITE and INSERT modes as required.

Note the current MODE is displayed in the screen header.

Note: Pressing [F1] at any point in the EDITOR gives a QUICK REFERENCE to the commands. Press [ESC] to return to the EDITOR

When typing is complete then:

Press [ESC]	Exit from Keyboard Input mode back to Scan/Edit mode [S].
Press 'V' followed by [RETURN]	This will perform a VERIFY operation in the form of an assembly to show any errors found.
Press [ESC]	This ends the VERIFY and returns to the EDITOR

Go back to input mode with [F3] to correct any errors. Then from within Scan/Edit mode [S]: -

Press Shifted 'X'	This saves file 'HELLOWORLD.SOR' to disk and exits the EDITOR. If the save is successful ASMEDIT passes control to the LOAD CODE menu otherwise it returns to the CREATE CODE menu.
-------------------	---

Press [ESC] ASMEDIT returns to the PRIMARY COMMANDS menu

Press '3' ASMEDIT enters menu 3. ASSEMBLE CODE.

You do not need to change the default values unless you want to generate code and/or the listing. For an understanding of the input parameters ref. to [3.3 ASSEMBLE CODE \(MENU 3\)](#)

ACTION

COMMENT

Press [RETURN] The assembly will begin

If the listing is directed to the screen, then at the end of the assembly The ASSEMBLER gives the option to list the SYMBOLS with [RETURN] or to end with [ESC]

Press [RETURN] the SYMBOLS are listed in tabular form.

Press [ESC] ASMEDIT returns to 3. ASSEMBLE CODE menu

Press [ESC] ASMEDIT return to the PRIMARY COMMANDS menu.

Press '6' ASMEDIT enters the 6. END menu.

Press [RETURN] ASMEDIT returns control to BASIC.

SAMPLE SOURCE CODE

The sample code is in to parts.

The first sample code is a simple program to reside at address \$0400. It can be invoked with LOAD"HELLOWORLD.PRG",8,1 then SYS \$0400.

The second part is a 'loader' program which will load and invoke the 'hello world' program.

Sample Part 1 – Hello World (HELLOWORLD.SOR)

```

;
;      hello world sub-routine
;
print=$ffd2
      *=$0400
      ldx #0
loop   lda hello,x
      beq exit
      skip
      jsr print
      inx
      bne loop
      skip
exit   rts
      skip
hello  byt '!!! HELLO WORLD !!!'
      byt 0
      skip
      end

```

Sample Part 2 – The program loader (LOADER.SOR)

```

;*****;
;
;      program loader
;
;*****;
      skip
;
;      symbol equates
;
sys=$9e          ;basic token for 'sys'
basic=$ff47      ;enter basic
readst=$ffb7    ;read io status
setlfs=$ffb8    ;set logical file
setnam=$ffbd    ;set file name information
load=$ffd5      ;load file
hello=$0400     ;hello world location
      skip
;
;      zero page
;
      *=1
ebank  *=*+1
      *=$40
ldfadr *=*+1     ;load file defn addr
      skip

```

Sample Part 2 – The program loader (LOADER.SOR) continued

```

;
;   basic header (10 sys2061)
;
      *=$0801
bas0  byt <bas1,>bas1  ;next line address
      byt 10,0        ;line number
      byt sys,'2061'  ;basic code
      byt 0           ;end of line marker
bas1  byt 0,0         ;end of program
      skip
;
;   main line (location 2061)
;
main01 lda #0         ;bank
      sta ebank      ;exec bank
      jsr load01     ;load program files
      bne main02     ;load failed

      skip

      jsr hello      ;invoke 'hello world'

      skip
main02 jmp basic     ;return to basic
      skip
;
;   load program files
;
load01 lda #<ldftab;load file table addr (low)
      sta ldfadr     ;load file defn addr (low)
      lda #>ldftab;load file table addr (high)
      sta ldfadr+1;load file defn addr (high)

      skip
load02 lda #1        ;logical file
      ldx #8         ;device
      tay           ;secondary address
      jsr setlfs     ;set logical file ($ffb)
      ldy #0
      lda (ldfadr),y ;file defn length
      beq load04     ;no more load files

      skip
;
;           ;parm idx = defn length - 2
      sec
      sbc #2
      pha           ;save parm idx on stack
;
;           ;fnlen = parm idx - 1
      sbc #1       ;file name length in (a)
;
;           ;set filename address
      ldx ldfadr   ;load file defn addr (low)
      ldy ldfadr+1;load file defn addr (high)
      inx         ;filename addr (low)
      bne load03

      skip

      iny         ;filename addr (high)

```

Sample Part 2 – The program loader (LOADER.SOR) continued

```

load03  jsr setnam  ;set file name information ($ffbd)
        pla        ;restore parm idx from stack
        tay
;
        ;get the start address for load
        lda (ldfadr),y ;<start
        pha
        iny
        lda (ldfadr),y ;>start
        tax        ;<start
        pla
        tay        ;>start
        lda #0     ;load flag
        jsr load   ;load the file
        jsr readst ;read io status
        and #$bf   ;ignore eof status
        bne load04 ;load failed, terminate
;
        ;advance to next load file
        clc
        ldy #0
        lda (ldfadr),y ;file defn length
skip
        adc ldfadr ;load file defn addr (low)
        sta ldfadr ;load file defn addr (low)
        bcc load02
skip
        inc ldfadr+1;load file defn addr (high)
        bcs load02
skip
load04  rts        ;return
skip 3
;
;      load file table
;
;      ;hello world
ldftab  byt z0fln  ;filename length
        byt 'helloworld.prg' ;filename
        byt <hello,>hello ;start address
z0fln=*-ldftab
skip
ldftaben byt 0     ;end of table marker
skip
        end

```

SAMPLE LISTINGS

HELLO WORLD (HELLOWORLD.LST)

```

PAGE 0001                HELLOWORLD.SOR        DATE 09/08/23

LINE  LOC  CODE          SOURCE
0001  0000                ;
0002  0000                ;          HELLO WORLD SUB-ROUTINE
0003  0000                ;
0004  0000                PRINT=$FFD2
0005  0000                *= $0400
0006  0400  A2 00          LDX #0
0007  0402  BD 0E 04      LOOP   LDA HELLO,X
0008  0405  F0 06          BEQ  EXIT
0010  0407  20 D2 FF          JSR  PRINT
0011  040A  E8            INX
0012  040B  D0 F5          BNE  LOOP
0014  040D  60            EXIT   RTS
0016  040E  21 21 21 20  HELLO  BYT  '!!! HELLO WORLD !!!'
0017  0421  00            BYT  0
0018  0422                END

```

ERRORS = 0000

SYMBOL TABLE

SYMBOL	VALUE
EXIT	040D
HELLO	040E
LOOP	0402
PRINT	FFD2

END OF ASSEMBLY

ASMEDIT X16 Reference Manual

LOADER (LOADER.LST)

```

PAGE 0001          LOADER.SOR          DATE 09/08/23

LINE  LOC  CODE    SOURCE

0001  0000          ;*****;
0002  0000          ;          ;
0003  0000          ;          PROGRAM LOADER          ;
0004  0000          ;          ;
0005  0000          ;*****;
0007  0000          ;
0008  0000          ;          SYMBOL EQUATES
0009  0000          ;
0010  0000          SYS=$9E          ;BASIC TOKEN FOR 'SYS'
0011  0000          BASIC=$FF47        ;ENTER BASIC
0012  0000          READST=$FFB7       ;READ IO STATUS
0013  0000          SETLFS=$FFBA       ;SET LOGICAL FILE
0014  0000          SETNAM=$FFBD       ;SET FILE NAME INFORMATION
0015  0000          LOAD=$FFD5         ;LOAD FILE
0016  0000          HELLO=$0400        ;HELLO WORLD LOCATION
0018  0000          ;
0019  0000          ;          ZERO PAGE
0020  0000          ;
0021  0000          ;          *=1
0022  0001          EBANK          *=*+1
0023  0002          ;          *=$40
0024  0040          LDFADR          *=*+1          ;LOAD FILE DEFN ADDR
0026  0041          ;
0027  0041          ;          BASIC HEADER (10 SYS2061)
0028  0041          ;
0029  0041          ;          *=$0801
0030  0801  0B 08          BAS0          BYT <BAS1,>BAS1 ;NEXT LINE ADDRESS
0031  0803  0A 00          ;          BYT 10,0 ;LINE NUMBER
0032  0805  9E 32 30 36          BYT SYS,'2061' ;BASIC CODE
0033  080A  00          ;          BYT 0 ;END OF LINE MARKER
0034  080B  00 00          BAS1          BYT 0,0 ;END OF PROGRAM
0036  080D          ;
0037  080D          ;          MAIN LINE (LOCATION 2061)
0038  080D          ;
0039  080D  A9 00          MAIN01          LDA #0 ;BANK
0040  080F  85 01          ;          STA EBANK ;EXEC BANK
0041  0811  20 1C 08          ;          JSR LOAD01 ;LOAD PROGRAM FILES
0042  0814  D0 03          ;          BNE MAIN02 ;LOAD FAILED
0044  0816  20 00 04          ;          JSR HELLO ;INVOKE 'HELLO WORLD'
0046  0819  4C 47 FF          MAIN02          JMP BASIC ;RETURN TO BASIC
0048  081C          ;
0049  081C          ;          LOAD PROGRAM FILES
0050  081C          ;
0051  081C  A9 6A          LOAD01          LDA #<LDFTAB;LOAD FILE TABLE ADDR (LOW)
0052  081E  85 40          ;          STA LDFADR ;LOAD FILE DEFN ADDR (LOW)
0053  0820  A9 08          ;          LDA #>LDFTAB;LOAD FILE TABLE ADDR (HIGH)
0054  0822  85 41          ;          STA LDFADR+1;LOAD FILE DEFN ADDR (HIGH)
0056  0824  A9 01          LOAD02          LDA #1 ;LOGICAL FILE
0057  0826  A2 08          ;          LDX #8 ;DEVICE
0058  0828  A8          ;          TAY ;SECONDARY ADDRESS
0059  0829  20 BA FF          ;          JSR SETLFS ;SET LOGICAL FILE ($FFBA)
0060  082C  A0 00          ;          LDY #0

```

ASMEDIT X16 Reference Manual

LOADER (LOADER.LST) continued

```

PAGE 0002          LOADER.SOR          DATE 09/08/23

LINE  LOC  CODE    SOURCE

0061  082E  B1 40          LDA (LDFADR),Y ;FILE DEFN LENGTH
0062  0830  F0 37          BEQ LOAD04      ;NO MORE LOAD FILES
0064  0832          ;                      ;PARAM IDX = DEFN LENGTH - 2
0065  0832  38          SEC
0066  0833  E9 02          SBC #2
0067  0835  48          PHA            ;SAVE PARM IDX ON STACK
0068  0836          ;                      ;FNLEN = PARM IDX - 1
0069  0836  E9 01          SBC #1        ;FILE NAME LENGTH IN (A)
0070  0838          ;                      ;SET FILENAME ADDRESS
0071  0838  A6 40          LDX LDFADR    ;LOAD FILE DEFN ADDR (LOW)
0072  083A  A4 41          LDY LDFADR+1;LOAD FILE DEFN ADDR (HIGH)
0073  083C  E8          INX            ;FILENAME ADDR (LOW)
0074  083D  D0 01          BNE LOAD03
0076  083F  C8          INY            ;FILENAME ADDR (HIGH)
0077  0840  20 BD FF      LOAD03  JSR SETNAM    ;SET FILE NAME INFORMATION ($FFBD)
0078  0843  68          PLA            ;RESTORE PARM IDX FROM STACK
0079  0844  A8          TAY
0080  0845          ;                      ;GET THE START ADDRESS FOR LOAD
0081  0845  B1 40          LDA (LDFADR),Y ;<START
0082  0847  48          PHA
0083  0848  C8          INY
0084  0849  B1 40          LDA (LDFADR),Y ;>START
0085  084B  AA          TAX            ;<START
0086  084C  68          PLA
0087  084D  A8          TAY            ;>START
0088  084E  A9 00          LDA #0        ;LOAD FLAG
0089  0850  20 D5 FF      JSR LOAD      ;LOAD THE FILE
0090  0853  20 B7 FF      JSR READST   ;READ IO STATUS
0091  0856  29 BF          AND #$BF     ;IGNORE EOF STATUS
0092  0858  D0 0F          BNE LOAD04   ;LOAD FAILED, TERMINATE
0093  085A          ;                      ;ADVANCE TO NEXT LOAD FILE
0094  085A  18          CLC
0095  085B  A0 00          LDY #0
0096  085D  B1 40          LDA (LDFADR),Y ;FILE DEFN LENGTH
0098  085F  65 40          ADC LDFADR   ;LOAD FILE DEFN ADDR (LOW)
0099  0861  85 40          STA LDFADR   ;LOAD FILE DEFN ADDR (LOW)
0100  0863  90 BF          BCC LOAD02
0102  0865  E6 41          INC LDFADR+1;LOAD FILE DEFN ADDR (HIGH)
0103  0867  B0 BB          BCS LOAD02
0105  0869  60          LOAD04  RTS      ;RETURN
0107  086A          ;
0108  086A          ;          LOAD FILE TABLE
0109  086A          ;
0110  086A          ;                      ;HELLO WORLD
0111  086A  11          LDFTAB  BYT ZOFLN ;FILENAME LENGTH
0112  086B  48 45 4C 4C      BYT 'HELLOWORLD.PRG' ;FILENAME
0113  0879  00 04          BYT <HELLO,>HELLO ;START ADDRESS
0114  087B          ZOFLN=*-LDFTAB
0116  087B  00          LDFTABEN BYT 0      ;END OF TABLE MARKER
0118  087C          END

```

ASMEDIT X16 Reference Manual

LOADER (LOADER.LST) continued

PAGE 0003 LOADER.SOR DATE 09/08/23

LINE LOC CODE SOURCE

ERRORS = 0000

SYMBOL TABLE

SYMBOL VALUE

BAS0	0801	BAS1	080B	BASIC	FF47	EBANK	0001
HELLO	0400	LDFA DR	0040	LDFTAB	086A	LDFTABEN	087B
LOAD	FFD5	LOAD01	081C	LOAD02	0824	LOAD03	0840
LOAD04	0869	MAIN01	080D	MAIN02	0819	READST	FFB7
SETLFS	FFBA	SETNAM	FFBD	SYS	009E	Z0FLN	0011

END OF ASSEMBLY

APPENDIX C

WILD CARD FEATURE

ASMEDIT has the capability to display a list of source files, selected from the current directory, from which a program or program segment may be selected and loaded into the Edit buffer. This is achieved using the 'wild card' character '?'.

The number and positions of the '?', interspersed within the code name and segment input areas, specifies the criteria to dictate whether the file is to be displayed in the resulting list.

Here is an example to illustrate this capability and how it can be used.

Suppose a number of code files exist as follows:-

```
'1 APPLE.SOR'
'2 APPLE.SOR'
'1 PINEAPPLE.SOR'
'2 PINEAPPLE.SOR'
'1 APPLE PIE.SOR'
```

Let us now suppose that we wish to display, in our subsequent list, all files ENDING in the letters APPLE then segment and program name should be specified as follows:-

```
SEGMENT      ?
CODE NAME    ?APPLE
```

The resulting display would list:

```
'1 APPLE.SOR'
'2 APPLE.SOR'
'1 PINEAPPLE.SOR'
'2 PINEAPPLE.SOR'
```

Note that '1 APPLE PIE.SOR' is not selected because although the file name contains the letters APPLE the file name does not actually end in APPLE.

EDITOR CONDITION CODES

Code	Explanation	Action
1	The space allocated to the Edit Buffer has been exceeded.	Reset with ESC Key. Deleted last line or lines processed. To continue save code so far and clear the buffer.
	If this occurs with the Verify command then the space allocated to the Symbol buffer has been exceeded.	Reset with ESC Key. Reduce the number of symbols and/or symbol name lengths.
	If this occurs with a text movement command then the maximum lines in a segment (127) may have been Exceeded.	Reset with ESC Key. Look to reduce the segment lines by moving text to a new segment Instead.
2	The character string searched for does not exist in the Edit buffer.	Reset with ESC Key.
3	The last parameter entered has illegal content.	Reset with ESC Key. Check the permissible parameter contents under the appropriate command description.
4	This isn't an error situation. The last command invoked has ended successfully.	Reset with ESC Key.

APPENDIX D continued

MENU ERROR MESSAGES

Error Message	Action
MEMORY EXCEEDED	If occurs during editing then attempt to re-enter the Editor and delete text as necessary. If re-entry is not allowed there is no alternative but to re-load from disk or clear the buffer through MENU 1. If occurs during Assembly then the area allocated to symbols has been exceeded in which case look to reduce the number of symbols or the symbol name lengths.
INVALID INPUT	One or more Input Areas in the menu have incorrect values. The inputs in error are highlighted with an adjacent '?' in reverse field. Correct and press RETURN again.
O.K.	NOT an error. Successful end.
LOAD ERROR	Try again. This message is often supplemented with an explanatory DOS message - i.e. (FILE NOT FOUND).
INVALID FILE	You are attempting to load a file which is not ASMEDIT source code or is corrupt.
SAVE ERROR	Try again. This message is often supplemented with an explanatory DOS message - i.e. (FILE EXISTS).
OPEN FILE ERROR	The editor cannot open a source code file. A supplementary DOS error message should be provided giving reason for failure.
SOURCE FILE ERROR	The assembler cannot open a source code file during assembly. A supplementary DOS message should be provided giving reason for failure.
CODE FILE ERROR	The assembler cannot open a file to receive the code generated during assembly. A supplementary DOS error message should be provided giving reason for failure.
LIST FILE ERROR	The assembler cannot open the disk output file or printer during assembly. For a disk file a supplementary DOS error message should be provided giving reason for failure. If attempting to print the listing then no printer has been detected.
DOS ERROR	A DOS command has failed. A supplementary DOS error message should be provided giving reason for failure.

EDITOR COMMANDS QUICK REFERENCE

Commands in Scan/Edit (Mode S)

Commands are entered starting at the command prompt '==>' at the top of the display. The first character entered is always the command. Some commands are terminated with [ESC].

Find String	[F] { <i>string</i> { [RETURN] } } [ESC]
Alter String	[A] <i>old-str</i> [RETURN] <i>new-str</i> [RETURN] ([A] [RETURN]) / ([F] { [RETURN] }) [ESC]
Delete Lines	[D] <i>start</i> [RETURN] <i>end</i> [RETURN]
Copy Lines	[C] <i>start</i> [RETURN] <i>end</i> [RETURN] { <i>insert-after</i> [RETURN] } [ESC]
Move Lines	[M] <i>start</i> [RETURN] <i>end</i> [RETURN] <i>insert-after</i> [RETURN]
Transcribe Lines	[T] <i>start</i> [RETURN] <i>end</i> [RETURN] { <i>insert-after</i> [RETURN] } [ESC]
Copy Column	[SHIFT]+[C] <i>top-left</i> [RETURN] <i>bottom-right</i> [RETURN] { <i>to</i> [RETURN] } [ESC]
Move Column	[SHIFT]+[M] <i>top-left</i> [RETURN] <i>bottom-right</i> [RETURN] <i>to</i> [RETURN]
Transcribe Column	[SHIFT]+[T] <i>top-left</i> [RETURN] <i>bottom-right</i> [RETURN] { <i>to</i> [RETURN] } [ESC]
Copy Section	[ALT]+[C] <i>section</i> [RETURN] { { [PGUP] or [PGDN] } [RETURN] } [ESC]
Move Section	[ALT]+[M] <i>section</i> [RETURN] { [PGUP] or [PGDN] } [RETURN]
Transcribe Section	[ALT]+[T] <i>section</i> [RETURN] { { [PGUP] or [PGDN] } [RETURN] } [ESC]
Insert Section	[I] <i>insert-after</i> [RETURN]
Delete Section	[ALT]+[D] <i>section</i> [RETURN]
Erase Section	[SHIFT]+[E] <i>section</i> [RETURN]
Goto Section	[G] <i>section</i> [RETURN]
Undo Section	[U] [RETURN]
Previous Section	{ [PGUP] }
Next Section	{ [PGDN] }
Key Mode	[F3] <i>input</i> [ESC]
Exit Scan Edit	[X]
Save and Exit Scan Edit	[SHIFT]+[X]
Swap Buffers	[S]
Quick Reference	[F1]

Commands in Input Mode (Overwrite - 'O' or insert 'I')

Insert/overwrite	[INST]	
Insert new line	[^]	(Repeats)
Delete character (BWD)	[Backspace]	(Repeats)
Delete character (FWD)	[DEL]	(Repeats)
Set/Unset Tab	[CTRL]+[TAB]	
Display option	[F12]	
'S' Mode	[ESC]	
Next tab position	[TAB]	(Repeats)
Previous tab position	[SHIFT]+[TAB]	(Repeats)