Atari 8 Bit C Library Reference

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Library Version 1.21 (2023.10.06)

Reference Revision A

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Overview

The library described herein is designed for use with the C programming language, specifically the CC65 dialect with the intended target platform the Atari 8 bit home computer.

The library was initially written in Action! in 2015 and included only the base text windowing system, sort of a TUI (text user interface). Over time it was expanded to include general purpose routines, and gadgets (which are windowing system add-ons). The C version of the library is a conversion of the Action! library done in 2022. It includes all the windows and gadgets of the Action! library, and utilizes direct screen memory I/O like the Action! library. There are a few functions that are either a) not yet converted; or b) not needed due to C having a similar function already. In 2023, the APE, FujiNet, and SIO functions were added.

The major features offered by the library are:

- Window System
  - The window management system allows the programmer to open and close windows with different styles. To reduce complexity and overhead it is a LIFO (last in first out) design. It is intended for the programmer to keep track of the call stack.

- Gadgets
  - Gadgets are windowing system add-ons which are designed to provide simple things like alert boxes, progress bars, and input controls.

- Menus
  - Menus are a windowing system add-on which are designed to provide menu controls.

- Input / Output / SIO
  - The input/output routines written in Action! were not converted because C has routines to do the same thing. There is, however, an SIO function.

- String Manipulation
  - Functions to aid with string manipulation and character conversion.

- DOS Functions
  - The DOS routines written in Action! were not converted because the CC65 Atari library has routines to do the same thing.

- APE (Atari Peripheral Emulator)
  - Get time function to retrieve time from attached APE devices real time clock (RTC). Compatible with devices such as FujiNet, or other expansions or SIO2PC/USB software that provide an APE compatible clock.

- FujiNet
  - Base FujiNet functions and functions for encode and decoding text in Base64 format, as well as functions for hashing text with SHA1, SHA256, and SHA512 algorithms.

- Miscellaneous
  - Helper functions that don't fall into any particular category, including waiting with and without keystrokes. The Action! Wait() function was not converted because CC65 provides sleep() which does the same thing.

References in this documentation that refer to `void` are meant to represent the C `void` data type.
References in this documentation that refer to `byte` are meant to represent the C `unsigned char` data type.
References in this documentation that refer to `word` are meant to represent the C `unsigned int` data type.

Local Variables Warning

When programming functions with a large number of variables, or a few variables of a large size, you may run into compilation errors that state there are “Too many local variables”. This is because local variables are normally placed on the stack which has room for 256 bytes.

You can overcome this by using the compiler command line option “`-static-locals`” which will move local variables to the data segment and off the stack. However doing it via the CLI applies to all the code.

The better way to overcome this is by using compiler directive `#pragma static-locals` before and after the function in the source code. This will isolate moving the locals to the data segment to just that function.

You can see an example of the usage in the libraries example program `appdemo.c` surrounding the `FormInput()` function.

Example usage:

```
#pragma static-locals(push, on)
byte FormInput(void) {
...
}
#pragma static-locals(pop)
```

Push will change the setting and save the current setting. Pop restores the saved setting.

Code Management

Size

When using all of the components of the library, the code size of your application could start to become rather large. If you find your program no longer fits in available memory or does not have enough memory for variables after loading, you may need to optimize the compile environment.

To optimize the code size, copy all of the library files to your project directory. Subsequently modify your applications source files to include the library files from this location rather than the original library source location.

Now that your application is including the library from your application project location, you can proceed. You will want to cross reference functions defined by the library with those your application uses, including dependencies of the library functions (some library functions call others). This documentation will help identify the dependencies.

One you have identified all of the library functions (and their dependents) used by your application, you will then modify the library files (***in your project directory, NOT the original source!***). In these library files, you will remove any functions that are not needed by your application, thus reducing the overall compiled code size.

Compilation

In general when compiling a project with CC65, the easiest method is to invoke the compiler and linker together with the CL command (**C**ompile and **L**ink). This may not suit a complex project which could require the use of make.

Typically the call will be:

```
cl -v -O -t atari program.c -o program.xex
```

Parameters:
`-v` means verbose

`-O` tells CC65 to optimize. This can reduce xex file size by a few K. Every little bit, right? I recommend not using -O until the program has been fully tested and validated working.

`-t` tells CC65 which platform to target in regards to memory allocation, load and run locations, etc. I use "`atari`". You can also use "`atarixl`" if needed. See the CC65 website for an overview of the differences.

`program.c` is the name of the program source file.

`-o` tells CC65 the name to use for the executable.

Organization

You can pull the library components in as needed, though there is some loose required order due to the library using parts of itself.

First you will want to pull in any CC65 headers that are needed. The following are the base ones used when using all parts of the C Library:

```
#include <stdio.h>
#include <conio.h>
#include <unistd.h>
#include <string.h>
#include <atari.h>
```

“peekpoke.h” is needed as well, but is pulled in by the library sources that need it.

Then you will want to pull in the C Library headers that are needed in this order. All of the library sources require “a8defines.h”. Only “a8libwin.c” requires “a8defwin.h”. It won’t hurt in include these more than once as they establish a definition they have been loaded and only load if the definition is not present.

```
#include "a8defines.h"
#include "a8defwin.h"
```

Last you will pull in the the C Library sources that are needed in this order:

```
#include “a8defsio.h”
#include “a8defape.h”
#include "a8libmisc.c"
#include "a8libstr.c"
#include "a8libwin.c"
#include "a8libgadg.c"
#include “a8libmenu.c"
#include “a8libfuji.c”
#include “a8libfujib64.c”
#include “a8libfujihash.c”
#include “a8libape.c”
```

Requirements

C Standard Library Dependency

This library depends upon some of the C standard library functions. Library routines will list their standard function dependencies in the API reference which follows in this documentation.

Routines from the C standard library that are needed:

```
clrscr()
cputc()
gotoxy()
memcpy()
memset()
POKE()
PEEK()
PEEKW()
sprintf()
strcpy()
strncpy()
strlen()
```

Symbol Table

The symbols used by this library are as follows. Many of the names are re-used throughout the library, and are kept to a short length to converse space.

```
bC
bD
bE
bF
bH
bI
bK
bL
bM
bN
bP
bR
bS
bT
bU
bW
bZ
cB
cL
cR
cS
cT
iL
iS
iSM
iSMr
pA
pS
sC
h
w
x
xp
y
yp

baW
baWM
cpWn
vCur
```

File Reference

A8DEFINES.H

All definitions used throughout the library.

This should be included FIRST at the top of the main program file, and should be included in any program that uses the library routines.

A8DEFAPE.H

Atari Peripheral Emulator definitions used by the APE portion of the library.

A8DEFFUJI.H

FujiNet definitions used by the core FujiNet library functions.

This must be included before A8LIBFUJI.C, and before any other FujiNet related files.

A8DEFFUJIB64.H

FujiNet definitions used by the FujiNet Base64 library functions.

This must be included before A8LIBFUJIB64.C.

A8DEFFUJIHASH.H

FujiNet definitions used by the FujiNet Hash (SHA1, SHA256, and SHA512) library functions.

This must be included before A8LIBFUJIBHASH.C.

A8DEFSIO.H

Definitions used by the direct SIO function.

This should always be included BEFORE the APE include file (A8DEFAPE.H), BEFORE the FujiNet include files (A8DEFFUJI.H, A8DEFFUJIB64.H, A8DEFFUJIHASH.H), and before the FujiNet C files (A8DEFFUJI.H, A8DEFFUJIB64.H, A8DEFFUJIHASH.H).

A8DEFWIN.H

Window type definitions and variables used by the window system portion of the library.

If the windowing system is used, this file should be included immediately after A8DEFINES.H, and BEFORE A8LIBWIN.C.

A8LIBAPE.C

Function to retrieve time from the APE device real time clock (RTC).

A8LIBFUJI.C

Collection of functions to communicate with the FujiNet. This is the core function set. The FujiNet unit number is assumed to be 1.

A8LIBFUJIB64.C

Collection of functions to utilize the FujiNet's Base64 encoding and decoding functions.

A8LIBFUJIHASH.C

Collection of functions to utilize the FujiNet's Hashing functions. These include SHA1, SHA256, and SHA512 algorithms. FujiNet has a provision for MD5, but it was not implemented at the time of this release.

A8LIBGADG.C

Collection of gadgets (add-ons) for the window system.

When using these routines, A8LIBWIN.C MUST be included before.

A8LIBMENU.C

Collection of menu routines which simplifies program navigation.

When using these routines, A8LIBWIN.C MUST be included before.

A8LIBMISC.C

Collection of routines that don't fall into the other categories, such as waiting for key.

A8LIBSTR.C

Collection of string manipulation routines that augment the C standard library routines which are specific to the Atari platform.

A8LIBWIN.C

Collection of window routines that make up the text window system.

When using these routines, A8DEFINES.H, A8DEFWIN.H, and A8LIBSTR.C MUST be included before.

API Reference

Window System (A8LIBWIN.C)

---

void WBack(byte bN)

Parameters: bN = Internal code of character
Returns: void
Requires: A8DEFWIN.H
Standard - memset()

Description
Sets the background “image” that covers the entire screen. This is a single character to repeat in every cell.

Using large footprint characters (a lot of pixels) can make the program elements like windows and menus harder to see. It is best used with small footprint characters like the ‘.’. With a custom character set, this function could be advantageously used.

---

byte WClose(byte bN)

Parameters: bN = Window handle number
Returns: byte = Success status
0 = Successful
WENOPN = Window not open (default)
Requires: A8DEFINES.H
A8DEFWIN.H
Standard - PEEKW(), memcpy(), memset()

Description
Closes an open window specified by the handle bN.

If window is not open, no action is taken.

It is up to the programmer to close windows in the proper order - the last one opened should be the first one closed. If an earlier window is closed before a more recent overlapping window, the screen contents will not be reflected accurately when the latter is closed (it will show remnants of the earlier window).

byte WClr(byte bN)

Parameters: bN = Window handle number
Returns: byte = Success status
0 = Succesful
WENOPN = Window not open (default)
Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBSTR.C - StrInv()
Runtime - PEEKW(), memset(), memcpy()

Description
Clears the contents of the window referenced by window handle bN. Effectively clearing the screen of the windows interior dimensions (excluding frame).

byte WDiv(byte bN, byte y, byte bD)

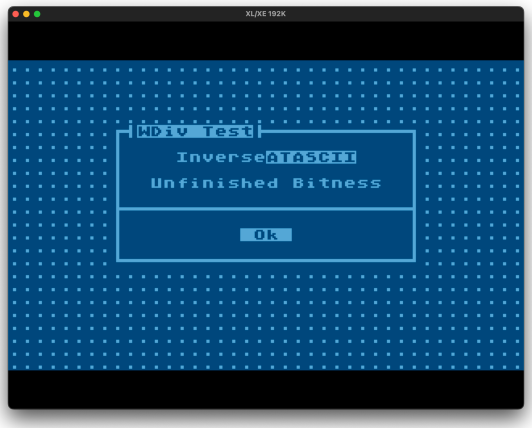
Parameters: bN = Window handle number
y = Window row to display divider
bD = On/Off flag
WON = On (show divider)
WOFF = Off (remove divider)
Returns: byte = Success status
0 = Succesful
WENOPN = Window not open (default)
Requires: A8DEFINES.H
A8DEFWIN.H
Standard - PEEKW(), memset(), memcpy()

Description
Draws a divider line in the window referenced by handle bN.

The divider is drawn on row y of the window.

The bD (display on/off) parameter is passed as WON, the bar will be displayed. With WOFF, the bar will be removed which will blank the contents on the window row and restore the window frame.

Calling WDiv() with WOFF is also a quick way to clear one line of a window.



void WInit(void)

Parameters: void
Returns: void
Requires: A8DEFINES.H
A8DEFWIN.H
Standard - POKE(), clrscr(), gotoxy(), memset()

Description
Used to initialize the window management system. It should be called before any other windowing system call.

In addition to defaulting all the windowing system variables, it will perform the following:
- Turn the cursor off (poke 752, 1)
- Set the left screen margin to 0 (poke 82, 0)
- Set the cursor position to the top left corner (0,0)
- Clear the screen

The library is built to handle 10 windows. You can alter this routine for more or less as your program requires. Memory requirements will increase or decrease as the number is changed. Increasing the number may also necessitate increasing the window system storage space by increasing the value of WBUFSZ in file A8DEFWIN.H.

byte WOpen(byte x, byte y, byte w, byte h, byte bT)

Parameters: x = Column of screen for left edge of window
y = Row of screen for top edge of window
w = Width of window in columns
h = Height of window in rows
bT = Inverse video flag (optional)
WON = Inverse video
WOFF = Normal video (default)

Returns: byte = Window handle number
-or-
WENONE = No window handles available

Requires: A8DEFINES.H
A8DEFWIN.H
Standard - PEEKW(), memset(), memcpy()

Description
Opens a window on the screen with a single line border. The screen contents under the window are saved, then restored when the window is closed.

Top left coordinate is specified by x and y. The width and height are specified with w and h. If the inverse flag, bT, is set, the window is drawn and filled in inverse video.

byte WOrn(byte bN, byte bT, byte bL, unsigned char *pS)

Parameters: bN = Window handle number
bT = Top or bottom of window designation
WPTOP = Top border
WPBOT = Bottom border
bL = Left, right, or center of window designation
WPCNT = Center
WPLFT = Left side
WPRGT = Right side
pS = Pointer to character string of title text
Maximum size is 36 characters!

Returns: byte = Success status
0 = Succesful
WENOPN = Window not open (default)

Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBSTR.C - StrAI(), StrInv()
Standard - PEEKW(), memcpy(), sprintf(), strlen()

Description

Sets a window ornament to text string s with decorations on the window referenced by bN, on either the top or bottom border as given by bT, and left or right side as given by bL.

If an ornament is to be set, the window itself must be large enough to accommodate it, along with any other assigned ornaments. For a single ornament, a minimum window width should be the title length plus four characters (two characters for the ornaments on either side of the tile, and two characters for the window frame where the ornaments can't be drawn). Because of this, the maximum length of a title is 36 characters.

If multiple ornaments are used on top or bottom at the same time, care must be taken to ensure the window size is large enough, or the ornament size is small enough, to accommodate both ornaments.

byte WPos(byte bN, byte x, byte y)

Parameters: bN = Window handle number
-or-
WPABS = Absolute screen position
x = Window column to move cursor to
y = Window row to move cursor to
Returns: byte = Success status
0 = Succesful
WENOPN = Window not open
Requires: A8DEFINES.H
A8DEFWIN.H
Standard - gotoxy()

Description
Moves the window systems virtual cursor to the screen position of the specified x and y coordinates within the window referenced by window handle bN.

byte WPrint(byte bN, byte x, byte y, byte bI, unsigned char *pS)

Parameters: bN = Window handle number
x = Window column to print text
y = Window row to print text
bI = Inverse flag
WON for inverse
WOFF for normal
pS = Pointer to character string of text to print
Maximum size is 38 characters!
Returns: byte = Success status
0 = Succesful
WENOPN = Window not open (default)
Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBSTR.C - StrAI(), StrInv()
Standard - PEEKW(), memcpy(), strcpy(), strlen()

Description
Prints text string pointed to by pS at the virtual cursor position of x and y within the window referenced by window handle bN. You can force inverse video text by specifying WON in the bI parameter, otherwise use WOFF.

A minimum window width should be the text length plus two characters (for the window frame). Because of this, the maximum length of a text is 38 characters.

byte WPut(byte bN, byte x)

Parameters: bN = Window handle number
x = Character to put
Returns: byte = Success status
0 = Succesful
WENOPN = Window not open
Requires: A8DEFINES.H
A8DEFWIN.H
Standard - cputc()

Description
Outputs the character specified by x at the window systems virtual cursor within the window referenced by window handle bN.

Increments the window systems virtual cursor by one column.

If the window was created with the inverse flag set, the character will be inversed to match.

byte WStat(byte bN)

Parameters: bN = Window handle number
Returns: byte = Window status
WON = In use (window ON)
WOFF = Not in use (window OFF)
Requires: A8DEFWIN.H

Description
Returns the status of the window specified by the handle bN.

Gadgets (A8LIBGADG.C)

---

void GAlert(unsigned char *pS)

Parameters: pS = Pointer to character string to display
Maximum size is 38 characters!
Returns: void
Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C - WOpen(), WOrn(), WPrint(), WClose()
A8LIBMISC.C - WaitKCX()

Description

Displays a screen centered modal window with the title "Alert" and the message text of the string pointed to by char pointer pS. It will display an OK "button" beneath the text and wait for keystroke, which will be consumed.

Calling GAlert will consume one window handle while it is open.

Because the window will have a frame, the maximum message length is 38 characters.

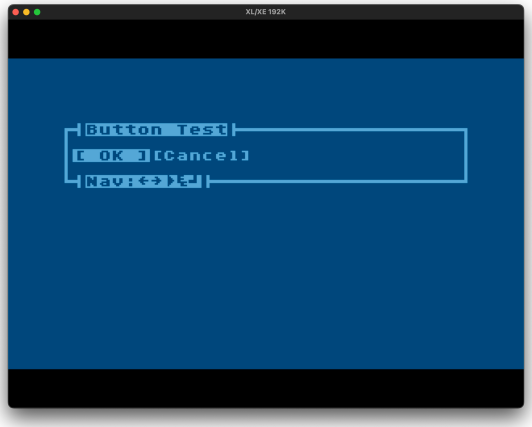
byte GButton(byte bN, byte x, byte y, byte bD, byte bS unsigned char **pA)

Parameters: bN = Window handle number
x = Window column to start get
y = Window row
bD = Initial selected button
GDISP = Display only and exit
bS = Number of buttons in array pA
pA = Pointer to ragged array of button name strings

Returns: byte = Button number selected or exit status
XESC = Exited with ESCape (no button chosen)
XTAB = Exited with TAB (no button chosen)

Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C - WPrint()
A8LIBMISC.C - WaitKCX()
Standard - strlen()

Description
Displays a row of buttons and gets selection from user.



If the initial selection indicator (bD) is passed as GDISP, then the buttons will be displayed and the function will exit (none will be highlighted).

It is up to the programmer to define the button ornaments, if any. For example: **[OK]**. In this example the [and] are the ornaments enclosing the 4 character string space OK space. The entire string will be inversed when selected, including the ornaments.

Care must be taken on the total length of the button strings contained in ragged array pointer pA. The total should be no more than 38 for a window that is 40 wide.

Keys accepted are:

LEFT\+	= Move button selector left
RIGHT*	= Move button selector right
UP\-	= Move button selector left
DOWN\=	= Move button selector right
ESCAPE	= Exits without selection (returns XESC)
TAB	= Exits without selection (returns XTAB)
ENTER	= Accepts current selected button and exits (returns selected button #)

byte GCheck(byte bN, byte x, byte y, byte bI, byte bD)

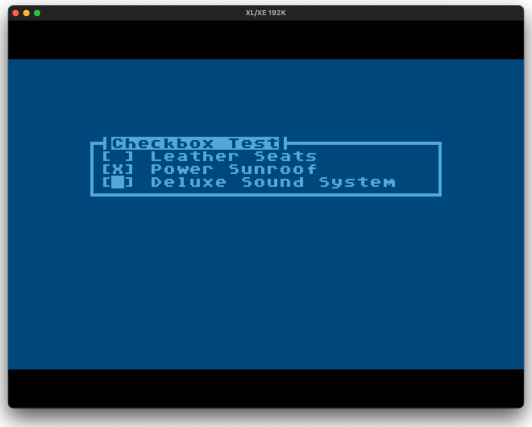
Parameters: bN = Window handle number
x = Window column to start get
y = Window row
bI = Display Only indicator
GDISP = Display only and exit
GEDIT = Edit checkbox
bD = Default initial value
GCON = Checked
GCOFF = Unchecked

Returns: byte = Checked status or exit status
GCON = Checked
GCOFF = Not Checked
XESC = Exited with ESCape (no value chosen)
XTAB = Exited with TAB (no value chosen)

Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C - WPrint()
A8LIBMISC.C - WaitKCX()

Description

Displays a checkbox ([ ]) and gets selection from user.



Unlike many other input gadgets, the text for the option is not included and should be displayed separately in the window using WPrint() prior to calling GCheck().

When the checkbox is marked, an inverse video X will be displayed, otherwise it will be an inverse space. When the function exits, the set value will be displayed in normal video. ENTER must be used to set (lock) the value to be returned, otherwise the default value passed in is re-displayed.

If the display only indicator (bI) is passed as GDISP, then the checkbox will be displayed and the function will exit. Display Only will respect default values and represent them accordingly. This is useful for drawing the checkbox on a form before selection is to occur.

Keys accepted are:

ESCAPE	= Exits without selection (returns XESC)
TAB	= Exits without selection (returns XTAB)
SPACE	= Toggle value of checkbox (display only)
X/x	= Acts just like SPACE
ENTER	= Accepts (sets and locks to displayed current value) and exits

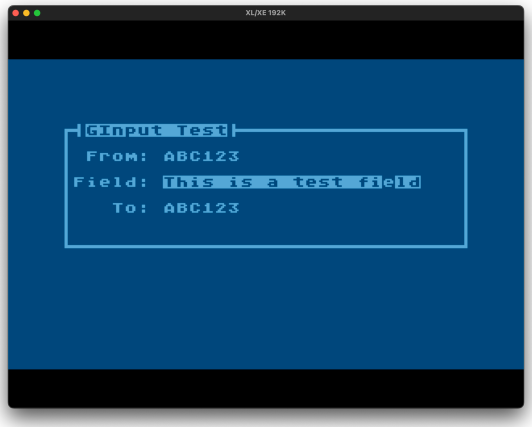
byte GInput(byte bN, byte x, byte y, byte bT, byte bS, unsigned char *pS)

Parameters: bN = Window handle number
x = Window column to start get
y = Window row
bT = Allowed character type
GANY = Any non-cursor control character
GALNUM = Any Alpha-Numeric character (0-9, a-z, A-Z, <space>)
GALPHA = Alphabetic characters only (a-z, A-Z, <space>)
GNUMER = Numeric characters only (0-9, ., -)
bS = Display size for string (max 38)
pS = Pointer to text string to input/edit (max 128)

Returns: byte = Success indicator
TRUE = String was modified
FALSE = String was not modified

Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBMISC.C - WaitKCX(), IKC2ATA()
A8LIBWIN.C - WPrint()
Standard - memset(), strlen(), strcpy(), strncpy()

Description
Edits a large string in a smaller display window by scrolling through the string and displaying only a portion at a time, much like modern operating system input fields.



The edit area is opened in the window handle referenced by bN. The edit area is placed at the x and y position in the window. The maximum size of the edit area is specified by bS, and the maximum should be considered to be 38 (given a window that is 40 characters wide).

The initial edit area contents will be a copy of the string passed as pS.

If the input is exited using ESC, the string passed will be left in tact. If the input is exited using the ENTER key, any edits made will be copied to the string passed via pointer pS. This means you can not pass a static text string such as "Hello World", it MUST be unsigned char pointer.

Keys accepted are:

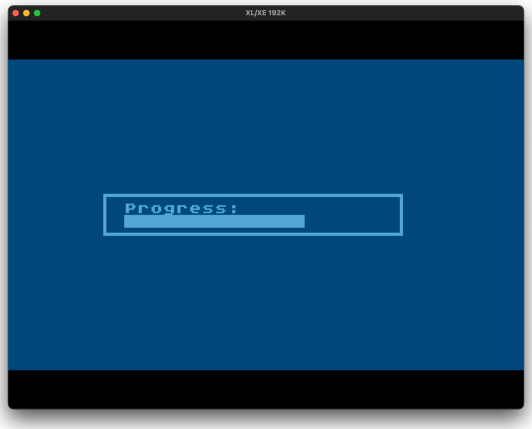
`LEFT\+`	= Move cursor left
`RIGHT\*`	= Move cursor right
`DEL`	= Delete character left of cursor (or 1st char if cursor is at position 1)
`Control-DEL`	= Delete character at cursor (move remainder left 1 position, add space at end)
`Shift-DEL`	= Delete entire string contents (moves cursor to position 1 of text string)
`INSERT`	= Insert space at cursor (character at end of text string will be lost)
`Control-Shift-S`	= Move cursor to beginning of string
`Control-Shift-E`	= Move cursor to end of string
`ESCAPE`	= Cancel edits and exit
`ENTER`	= Accept edits and exit

void GProg(byte bN, byte x, byte y, byte bS)

Parameters: bN = Window handle number
x = Window column to display bar at
y = Window row to display bar at
bS = Bar size (Percent complete), Range 0 to 100.
Returns: void
Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C - WPrint()
Standard - memset(), strcpy()

Description

Displays a progress bar at the x and y position within the window referenced by window handle bN. The percentage complete is referenced by bS, and has a range of 0 to 100. The bar will always be displayed with 20 characters of length, so the window it is placed in should be a minimum of 22 wide to account for the frames.



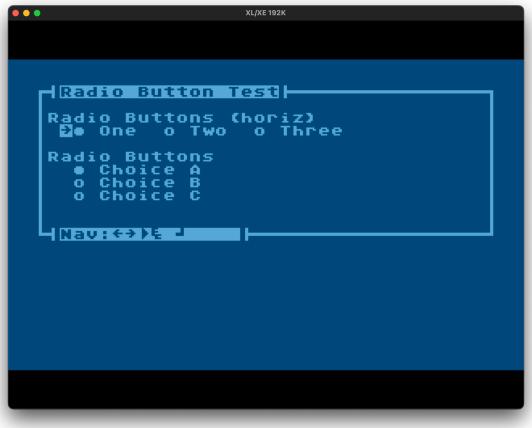
byte GRadio(byte bN, byte x, byte y, byte bD, byte bE, byte bI, byte bS, unsigned char **pS)

Parameters: bN = Window handle number
x = Window column to start get
y = Window row
bD = Direction of button placement
GHORZ = Horizontal (side by side)
GVERT = Vertical (stacked)
bE = Display Only indicator
GDISP = Display only and exit
GEDIT = Edit
bI = Initial selected button
bS = Number of buttons in array pS
pS = Pointer to ragged array of button name strings

Returns: byte = Button number selected or exit status
XESC = Exited with ESCape (no button chosen)
XTAB = Exited with TAB (no button chosen)

Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C - WPrint(), WPos(), WPut()
A8LIBMISC.C - WaitKCX()
Standard - strlen()

Description
Displays a selection of radio buttons and gets a selection of one from user.



Only one button from the defined group can be selected. When there is a need for multiple option selection GCheck() should be used instead.

The buttons will be arranged in the direction specified by bD. Valid directions are GHORZ or horizontal (side by side), or GVERT for vertical (stacked) alignment. Care should be taken to ensure the window boundaries are large enough to accommodate the buttons, especially when aligning horizontally. For horizontal buttons, it is only reasonably to expect 3 or 4 buttons to fit in the 38 columns available inside a window frame. Each horizontal button is separated by 2 spaces. For this reason, it is recommended to use vertical alignment (GVERT) to stack the buttons for more than 3 buttons.

If the initial selection indicator (bI) is passed as GDISP, then the buttons will be displayed and the function will exit (none will be highlighted). This is useful for drawing the buttons on a form before selection is to occur.

Keys accepted are:

LEFT\+	= Move button selector left
RIGHT*	= Move button selector right
UP\-	= Move button selector left
DOWN\=	= Move button selector right
ESCAPE	= Exits without selection (returns XESC)
TAB	= Exits without selection (returns XTAB)
SPACE	= Set currently selected button as choice
ENTER	= Accepts current selected button and exits (returns selected button #)

byte GSpin(byte bN, byte x, byte y, byte bL, byte bM, byte bI, byte bE)

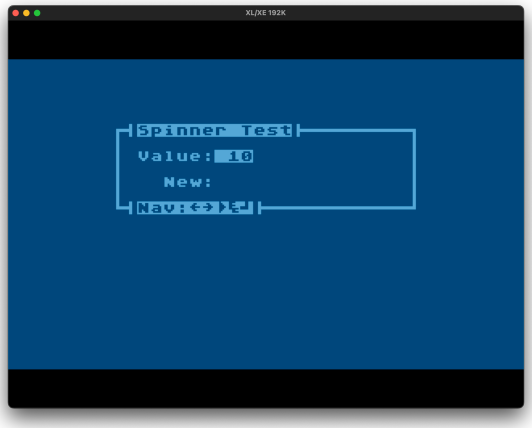
Parameters: bN = Window handle number
x = Window column to display value at
y = Window row to display value at
bL = Lowest allowed value
bM = Maximum allowed value
bI = Initial value
bE = Display only indicator
GDISP = Display only and exit
GEDIT = Edit

Returns: byte = Value selected or exit status
XESC = Exited with ESCape (no value chosen)
XTAB = Exited with TAB (no value chosen)

Requires: A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C - WPrint()
A8LIBMISC.C - WaitKCX()
Standard - sprintf()

Description

Displays value bP, considered the starting/default value, and allows value change via spinner controls. The lowest value is limited to bL. The maximum value is limited to bM.



Any byte value is allowed for the limits and default value. The upper limit can be up to 250, and is limited by the function at this value. This is because the input gadgets use the the 253, 254, and 255 as specific return values that indicate how the gadget was exited. The spinner gadget is an exception in that it is a hybrid. It will return those values, and it returns the selected value. Realistically, the foreseen use case is from 0 to 100.

Keys accepted are:

LEFT\+	= Decrease value
RIGHT*	= Increase value
UP\-	= Increase value
DOWN\=	= Decrease value
ESCAPE	= Exits without setting value (returns XESC)
TAB	= Exits without setting value (returns XTAB)
ENTER	= Accepts current value and exits (returns value)

Menus (A8LIBMENU.C)

---

byte MenuV(byte bN, byte x, byte y, byte bI, byte bS, byte bC, unsigned char **pS)

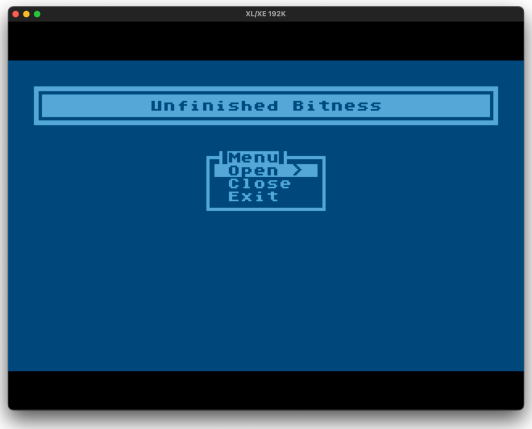
Parameters: bN = Window handle number
x = Window column to display menu at
y = Window row to display menu at
bI = Inverse selection on exit flag
WON = Leave menu selection in inverse video
WOFF = Return menu selection to normal video
bS = Start item selection number
bC = Number of menu items in array pS
pS = Pointer to array of strings containing menu items

Returns: byte = Number of item chosen or exit value
XESC = Exited with ESCape (no item chosen)
XTAB = Exited with TAB (no item chosen)

Requires:
```
A8DEFINES.H
A8DEFWIN.H
A8LIBWIN.C    - WPrint()
A8LIBMISC.C   - WaitKCX()
Standard      - strcpy()
```

Description

Displays a list of menu items at the x and y coordinates within the window referenced by window handle bN.



The currently selected menu item will be highlighted (displayed in inverse video), while the remaining items will be in normal video.

The menu will have the following navigation key controls:

UP/-	= Move cursor (selection) up
DOWN/=	= Move cursor (selection) down
LEFT/+	= Move cursor (selection) up
RIGHT/*	= Move cursor (selection) down
ENTER	= Accept selected item
ESCAPE	= Abandon selection and return
TAB	= Abandon selection and return

The initially selected item will be the one referenced by bD.

If the selector scrolls past the bottom it will be returned to the top. Likewise if the selector scrolls past the top it will set to the bottom.

If the inverse on exit parameter (bI) is set to WON, the currently highlighted (selected) menu item will remain in inverse video at exit. This is useful if you have sub-menus and want to see the “breadcrumbs” of previous selections.

If the inverse on exit parameter (bI) is set to WOFF, the currently highlighted (selected) menu item will be re-displayed in normal video at exit. This is useful for generating input forms and using MenuV() as a field selector.

The number of the item selected will be returned once a selection is accepted.
If ESCAPE is used to exit the menu, it will return 0 (XESC).
If TAB is used to exit the menu, it will return 99 (XTAB).

String Manipulation (A8LIBSTR.C)

---

void StrAI(unsigned char *pS, byte bS)

Parameters: pS = Pointer to text string
bS = Size (number) of chars in string to convert
Returns: void
Requires: n/a

Description
Converts elements (characters) of the string referenced by pS from the **ATASCII** code representation to the internal code representation up to size bS bytes in length.

This is generally useful for putting characters or copying text strings directly to screen memory.

This is the opposite of StrIA().

---

void StrIA(unsigned char *pS, byte bS)

Parameters: pS = Pointer to text string
bS = Size (number) of chars in string to convert
Returns: void
Requires: n/a

Description
Converts elements (characters) of the string referenced by pS from the internal code representation to the **ATASCII** code representation up to size bS bytes in length.

This is the opposite of StrAI().

---

void StrInv(unsigned char *pS, byte bS)

Parameters: pS = Pointer to text string
bS = Size (number) of chars in string to inverse
Returns: void
Requires: n/a

Description
Inverses (inverse video) elements (characters) of the string referenced by pS up to size bS bytes in length.

APE Atari Peripheral Emulator (A8LIBAPE.C)

`void ApeTimeG(char *cB)`

Parameters: `cB` = Pointer to text string to hold date and time
Returns: `void`
Requires: n/a

Description
Queries the SIO chain for the APE device and executes the APE get time call. The result is 6 bytes referencing `DMYHMS` which is stored in the string referenced by `cB`.

The century for the year (Y) is expected to be 2000, and the value will be that of the remaining 2 digit year. Example: 2023 will have the value of 23.

When using this function, make sure you do not have multiple devices in the SIO chain that support the APE Time protocol. Strange results will occur!

FujiNet (A8LIBFUJI.C)

unsigned short FNCheck(void)

Parameters: N/A
Returns: `unsigned short` = Number of bytes waiting
Requires: `A8DEFINES.H`
`A8DEFSIO.H`
`A8DEFFUJI.H`

Description
Queries the FujiNet connection for incoming bytes waiting to be read, and returns the result.

unsigned char FNClose(void)

Parameters: N/A
Returns: `unsigned char` = SIO Status
FNSOK = Success
Requires: `A8DEFINES.H`
`A8DEFSIO.H`
`A8DEFFUJI.H`

Description
Closes the current connection.

unsigned char FNGConfig(td_fncfg *sC)

Parameters: sC = Pointer to memory location of a valid FujiNet configuration structure data type
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H

Description
Reads the configuration data of the FujiNet device and places it in the data structure pointed to sC. A variable for the structure can be instantiated with the td_fncfg data type, and should be passed to FNGConfig by address.

There are 140 bytes in the structure which is comprised of the following fields, all of which are character arrays:

ssid	: 33 bytes	= Connected network SSID name
hostname	: 64 bytes	= Hostname of the FujiNet device
ip	: 4 bytes	= IP address of the FujiNet device
gateway	: 4 bytes	= Gateway address
netmask	: 4 bytes	= Network mask
dns	: 4 bytes	= DNS resolver IP address
mac	: 6 bytes	= MAC address of the FujiNet device
bssid	: 6 bytes	= MAC address of the connected Wi-Fi router
version	: 15 bytes	= FujiNet firmware version number

unsigned char FNOpen(char *cB)

Parameters: cB = Pointer to string containing connection spec
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H

Description
Opens a connection to the address specified in the string pointer cB. cB should point to a character string that *MUST* be 256 bytes in length.

The format of the connection string is:
N:<protocol>:<address>[:<port>][/path]

N:	=	Device Name *(required)*	
protocol	=	Typical web protocol selection *(required)*	
		HTTP://	= HyperText Transfer Protocol
		HTTPS://	= HyperText Transfer Protocol w/SSL
		TCP://	= Transmission Control Protocol (raw)
		UDP://	= User Datagram Protocol (raw)
		FTP://	= File Transfer Protocol
		TNFS://	= Tiny Network File System
address	=	IP address or resolvable host name *(required)*	
:port	=	Port to connect on (optional)	
/path	=	Path to resource (optional)	

unsigned char FNRead(unsigned short iS, unsigned char *cB)

Parameters: iS = Number of bytes to read
cB = Pointer to memory location to place read data
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H

Description
Reads iS bytes from the currently open connection and places the data in the pointer referenced by cB.

unsigned char FNStatus(void)

Parameters: N/A
Returns: unsigned char = Wi-Fi Status
- FNDSIDLE = Wi-Fi is idle
- FNDSNOSSID = No SSID available
- FNDSSCANC = Scan completed
- FNDSACTIVE = Active, connected to Wi-Fi network
- FNDSLCFAIL = Last connect failed
- FNDSWIFILOST = Wi-Fi connection lost
- FNDSWIFIDISC = Wi-Fi explicitly disconnected

Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H

Description
Returns the FujiNet's Wi-Fi status.

void FNTrans(unsigned char bM, unsigned char bD)

Parameters: bM = Translation mode desired
- FNTRNONE = No translation
- FNTRCR = Carriage Return to EOL
- FNTRLF = Line Feed to EOL
- FNTRCRLF = Carriage Return & Line Feed to EOL

bD = Direction of translation
- FNAXREAD = Reading from connection
- FNAXWRITE = Writing to connection
- FNAXUPDATE = Bi-directional

Returns: N/A
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H

Description
Returns the FujiNet's ATASCII EOL translation mode.

unsigned char FNWrite(unsigned char *cB)

Parameters: cB = Pointer to memory location of data to write
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H

Description
Writes the data from the pointer referenced by cB to the currently open connection.

FujiNet Base64 (A8LIBFUJIB64.C)

The Base64 commands have a particular order in which they should be called. See the demonstration application for a complete example. In short, that order, regardless of the operation being an encode or decode, is:

`FNB64Inp()` = Set the input buffer
`FNB64Cmp()` = Compute (Perform) the encode/decode
`FNB64Len()` = Get the length of the result
`FNB640ut()` = Get the output buffer

`unsigned char FNB64Cmp(char cT)`

Parameters: `cT` = Operation type (encode or decode)
`FNLENCODE` = Encode
`FNLDECODE` = Decode
Returns: `unsigned char` = SIO Status
`FNSOK` = Success
Requires: `A8DEFINES.H`
`A8DEFSIO.H`
`A8DEFFUJI.H`
`A8DEFFUJIB64.H`

Description
Performs the computation of the encode or decode on the previously set input buffer. Decoding or Encoding is selected by means of `cT`.

unsigned char FNB64Inp(char cT, char *cB, unsigned short iS)

Parameters: cT = Operation type (encode or decode)
FNLENCODE = Encode
FNLDECODE = Decode
cB = Pointer to text to load into encode or decode input buffer
iS = Number of bytes to load into encode or decode input buffer (size of cB)
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H
A8DEFFUJIB64.H

Description
Loads the FujiNet's Base64 encode or decode input buffer with the string pointed to by cB. The decode or encode input buffer is selected by means of cT. The length of the text to load into the encode or decode input buffer is specified via iS.

unsigned char FNB64Len(char cT, unsigned long *iS)

Parameters: cT = Operation type (encode or decode)
FNLENCODE = Encode
FNLDECODE = Decode
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H
A8DEFFUJIB64.H

Description
Gets the length of the result of the encode or decode of the previously set performed compute. The decode or encode output buffer is selected by means of cT. The buffer length is stored in the long pointed to by iS. The maximum value is 65,535.

unsigned char FNB64Out(char cT, char *cB, unsigned short iS)

Parameters: cT = Operation type (encode or decode)
FNLENCODE = Encode
FNLDECODE = Decode
cB = Pointer to text to encode or decode
iS = Number of bytes to encode or decode (size of cB)
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H
A8DEFFUJIB64.H

Description
Read the result from the last encode or decode operation from the FujiNet's Base64 encode or decode output buffer into the string pointed to by cB. The decode or encode output buffer is selected by means of cT. The length of the text to retrieve from the encode or decode output buffer is specified via iS.

FujiNet Hash (A8LIBFUJIHASH.C)

The Hash commands have a particular order in which they should be called. See the demonstration application for a complete example. In short, that order is:

FNHashInp() = Set the input buffer
FNHashCmp() = Compute (Perform) the hash
FNHashOut() = Get the output buffer

Note there is no length function. The SHA hashes have a preset output length.

---

unsigned char FNHashCmp(byte bT)

Parameters: bT = Hash type
FNHASHMD5 = MD5 (currently not implement within FujiNet firmware)
FNHASHSHA1 = SHA1
FNHASHSHA2 = SHA256
FNHASHSHA5 = SHA512
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H
A8DEFFUJIHASH.H

Description
Performs the hash computation on the previously set hash input buffer. The hash type is selected by means of bT.

unsigned char FNHashInp(char *cB, unsigned short iS)

Parameters: cB = Pointer to text to load into hash input buffer
iS = Number of bytes to load into hash input buffer (size of cB)
Returns: unsigned char = SIO Status
FNSOK = Success
Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H
A8DEFFUJIB64.H

Description
Loads the FujiNet's hash input buffer with the string pointed to by cB. The length of the text to load into the hash input buffer is specified via iS.

unsigned char FNHashOut(byte bT, byte bH, char *cB)

Parameters: bT = Hash type
- FNHASHMD5 = MD5 (currently not implement within FujiNet firmware)
- FNHASHSHA1 = SHA1
- FNHASHSHA2 = SHA256
- FNHASHSHA5 = SHA512

bH = Output type
- FNHASHOBIN = Binary
- FNHASHOHEX = Hexadecimal

cB = Pointer to character buffer to hold hash

Returns: unsigned char = SIO Status
- FNSOK = Success

Requires: A8DEFINES.H
A8DEFSIO.H
A8DEFFUJI.H
A8DEFFUJIB64.H

Description
Read the result from the last hash operation from the FujiNet's hash output buffer into the string pointed to by cB. The hash type is selected by means of bT. The output type is selected with bH, and can be binary or hexadecimal. Both the hash type and output need to be specified so the proper size to retrieve can be computed.

The output buffer should be sized large enough to hold the hash. The size varies by hash type and output type. Use this table to determine size:

Hash Type	Output Binary Size	Output Hexadecimal Size
FNHASHMD5	16	32
FNHASHSHA1	20	40
FNHASHSHA2	32	64
FNHASHSHA5	64	128

Miscellaneous (A8LIBMISC.ACT)

byte IKC2ATA(byte bN)

Parameters: bN = Internal key code
Returns: byte = ATASCII character code
Or unconverted internal code (see Description)
Or KNOMAP (199) for internal codes with no character mapping (see Description)
Requires: A8DEFINES.H

Description
Converts internal key code to ATASCII character code.

Performs conversion for all internal key codes with value less than 192. If the internal code passed in is greater than 191, it is returned unmodified. If the internal code passed in is greater than 127 and does not have a character mapping, KNOMAP (199) is returned. Key code 199 is not bound to any keystroke combination.

byte WaitYN(byte bD)

Parameters: bD = Flag for display of ? prompt
WON = Display ? prompt
WOFF = Do not display ? prompt
Returns: byte = 1 for Y or y pressed
0 for N or n pressed
Requires: A8DEFINES.H
Standard - PEEK(), POKE(), cputc()

Description
Waits for a Y or N keystroke. Upper and lower case letters are accepted. Will optionally display a '?' character at the current virtual window system cursor location if bD is set to WON.

The keypress is consumed before returning.

word WaitKCX(byte bI)

Parameters: bI = Flag to execute inverse function or not
WON = Yes
WOFF = No
Returns: word = key code value of key pressed
KFHLP = Help key
KF1 = F1 key (1200XL/1400XL/1450XLD only)
KF2 = F2 key (1200XL/1400XL/1450XLD only)
KF3 = F3 key (1200XL/1400XL/1450XLD only)
KF4 = F4 key (1200XL/1400XL/1450XLD only)
KCAP = Caps key
KINV = Inverse key
KCOPT = Option key
KCSEL = Select key
KCSTA = Start key
Requires: A8DEFINES.H
Standard - PEEK(), POKE()

Description
Waits for any keystroke, function key, or console key press. Function keys include HELP, and F1 through F4. This function will process transient keys Caps and Inverse as well as returning the key stroke value. This means caps-lock will be toggled on and off as the key is pressed.

The transient inverse keystroke will be toggled only if bI is passed as WON.

The keypress is consumed or debounced as necessary before the function returns.

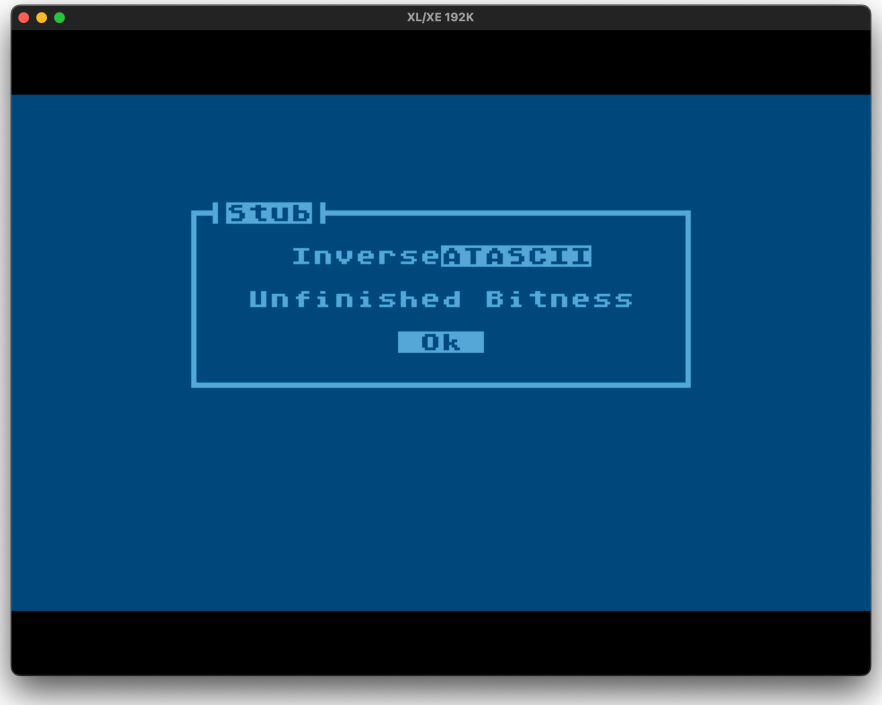
This is intended for use on XL/XE computers.

Usage Examples

Stub Programs

Stub Window

This demonstrates the very basics of the window system. It shows how to include the library and open a window.



File: STUBWIN.C

```
// ------------------------------------------------------------
// Program: stubwin.c
// Desc...: A8 Library Stub Window Program
// Author.: Wade Ripkowski
// Date...: 20220826
// Notes..: cl65 -v [-O] -t atarixl stubwin.c -o stubwin.xex
// ------------------------------------------------------------

// Pull in include files
#include <stdio.h>
#include <conio.h>
#include <string.h>
#include <atari.h>

#include "a8defines.h"
#include "a8defwin.h"
```

```
#include "a8libstr.c"
#include "a8libwin.c"
#include "a8libmisc.c"


// ------------------------------------------------------------
// Func...: void main(void)
// Desc...: Main routine
// ------------------------------------------------------------
void main(void)
{
    // Variables
    byte bW1;

    // Init Window System
    WInit();

    // Open window
    bW1 = WOpen(8, 5, 24, 9, WOFF);
    WOrn(bW1, WPTOP, WPLFT, "Stub");
    WPrint(bW1, 5, 2, WOFF, "Inverse");
    WPrint(bW1, 12, 2, WON, "ATASCII");
    WPrint(bW1, WPCNT, 4, WOFF, "Unfinished Bitness");
    WPrint(bW1, WPCNT, 6, WON, " Ok ");

    // Wait for a keystroke or console key
    WaitKCX(WOFF);

    // Close window
    WClose(bW1);

    // Exit
    return;
}
```

Stub Application Shell

This demonstrates a shell application using the window system. It shows how to include the library and build the foundation of a larger application.

File: STUBAPP.C

```
// ------------------------------------------------------------
// Program: stubapp.c
// Desc...: A8 Library Stub Application
// Author.: Wade Ripkowski
// Date...: 20220826
// Notes..: cl65 -v [-O] -t atarixl stubapp.c -o stubapp.xex
// ------------------------------------------------------------

// Pull in include files
#include <stdio.h>
#include <conio.h>
#include <unistd.h>
#include <string.h>
#include <atari.h>

#include "a8defines.h"
#include "a8defwin.h"
#include "a8libmisc.c"
#include "a8libstr.c"
#include "a8libwin.c"
#include "a8libgadg.c"
#include "a8libmenu.c"
```

```
// Prototypes
void About(void);
void SubMenu3(void);


// ------------------------------------------------------------
// Func...: void About(void)
// Desc...: About Dialog
// ------------------------------------------------------------
void About(void)
{
    byte bW1;

    // Show window
    bW1 = WOpen(1, 6, 38, 14, WOFF);
    WOrn(bW1, WPTOP, WPLFT, "About");
    WPrint(bW1, WPCNT,  1, WOFF, "Demo Application");
    WPrint(bW1, WPCNT,  2, WOFF, "Version 1.00-C");
    WPrint(bW1, WPCNT,  3, WOFF, "(C) 2022  Wade Ripkowski");
    WPrint(bW1, WPCNT,  5, WOFF, "Application to demonstrate");
    WPrint(bW1, WPCNT,  6, WOFF, "the C library.");
    WPrint(bW1, WPCNT,  7, WOFF, "Converted from Action!.");
    WPrint(bW1, 4,      9, WOFF, "V1-2021-Atari8: Action!");
    WPrint(bW1, 2,     10, WOFF, "V1-C-2022-Atari8: C (CC65)");
    WPrint(bW1, WPCNT, 12, WON, " Ok ");

    // Wait for key
    WaitKCX(WOFF);

    // Close window
    WClose(bW1);

    return;
}


// ------------------------------------------------------------
// Func...: void SubMenu3(void)
// Desc...: Sub menu routine
// ------------------------------------------------------------
void SubMenu3(void)
{
    byte bW1, bC;
    byte bD = FALSE;
    unsigned char *pcM[4] = { " Sub-Item 1 ", " Sub-Item 2 ", " Sub-Item 3 " };

    // Open window
    bW1 = WOpen(16, 10, 14, 5, WOFF);
    WOrn(bW1, WPTOP, WPLFT, "Sub-Menu");

    // Loop until exit
    while (! bD)
    {
        // Display menu and get choice
        bC = MenuV(bW1, 1, 1, WOFF, 1, 3, pcM);
```

```
        // Process choice
        switch (bC)
        {
            case 1: GAlert(" Sub-Item 1 selected. ");
                    break;

            case 2: GAlert(" Sub-Item 2 selected. ");
                    break;

            case 3: GAlert(" Sub-Item 3 selected. ");
                    break;

            case XESC: bD = TRUE;
                       break;
        }
    }

    // Close window
    WClose(bW1);

    return;
}


// ------------------------------------------------------------
// Func...: void main(void)
// Desc...: Main routine
// ------------------------------------------------------------
void main(void)
{
    // Variables
    byte bW1, bW2, bC;
    byte bD = FALSE;
    unsigned char *pcM[6] =
      { " Sub-Menu 1 ", " Sub-Menu 2 ", " Sub-Menu 3 ", " About      ", " Exit       " };

    // Setup screen
    WInit();

    // Set Background
    WBack(14);

    // Open header window
    bW1 = WOpen(0, 0, 40, 3, WON);
    WPrint(bW1, WPCNT, 1, WOFF, "A P P L I C A T I O N");

    // Open menu window
    bW2 = WOpen(13, 7, 12, 9, WOFF);
    WOrn(bW2, WPTOP, WPCNT, "Menu");

    // Loop until done (Exit selected)
    while (! bD) {
        // Call menu
        bC = MenuV(bW2, 1, 2, WOFF, 1, 5, pcM);
```

```
        // Process choice
        switch (bC)
        {
            case 1: GAlert(" Sub-Menu 1 selected. ");
                    break;

            case 2: GAlert(" Sub-Menu 2 selected. ");
                    break;

            case 3: SubMenu3();
                    break;

            case 4: About();
                    break;

            case 5: bD = TRUE;
                    break;
        }

        // Exit on ESC as well
        if (bC == XESC)
        {
            bD = TRUE;
        }
    }

    // Close windows
    WClose(bW2);
    WClose(bW1);

    // Exit
    return;
}
```

Demo Programs

Demonstration Application

This demonstrates a fully functioning application using the window system, and several gadgets. It shows how to include the library and build the foundation of a larger application.

File: APPDEMO.C

```
// ------------------------------------------------------------
// Program: appdemo.c
// Desc...: A8 Library Demo Application
// Author.: Wade Ripkowski
// Date...: 20220825
// License: GNU General Public License v3.0
// Notes..: cl65 -v [-O] -t atarixl appdemo.c -o appdemo.xex
// ------------------------------------------------------------

// Pull in include files
#include <stdio.h>
#include <conio.h>
#include <unistd.h>
#include <string.h>
#include <atari.h>

#include "a8defines.h"
#include "a8defwin.h"
#include "a8libmisc.c"
```

```
#include "a8libstr.c"
#include "a8libwin.c"
#include "a8libgadg.c"
#include "a8libmenu.c"

#define PERF_TEST

// Prototypes
void DoSpin(void);
byte FormInput(void);
void ProgTest(void);
void About(void);


// ------------------------------------------------------------
// Func...: void FormInput(void)
// Desc...: Demo use of input gadgets
// Returns: TRUE if accepted, else FALSE
// Notes..: Maximum local variable stack space is 256 bytes.
//          MUST use pragma static-locals to move variables to
//          BSS segment due to total size in this function.
// ------------------------------------------------------------
#pragma static-locals(push, on)
byte FormInput(void)
{
    byte bR = FALSE, bRA = 1, bRB = 1, bChap = GCOFF, bChbp = GCON, bChcp = GCOFF, bV = 10;
    byte bW1, bW2, bM, bA, bB, bC, bD, bVp, bRAp, bRBp, bCha, bChb, bChc, bL = 0;
    // Regular buttons, radio buttons, and data field names
    unsigned char *paB[3] = { "[ Ok ]", "[Cancel]" },
                  *prA[4] = { "One", "Two", "Three" },
                  *prB[4] = { "Choice A", "Choice B", "Choice C" },
                  *paD[5] = { "Numer", "Alpha", "AlNum", "Any.." };
    // Input strings & navigation strings
    unsigned char cA[41], cB[41], cC[41], cD[41],
                  cF[15], cI[15], cR[15], cX[15],
                  cT[15];

    // Define navigation strings
    sprintf(cF, "Nav:%c%c%c%c%c%c%c   ", CHUP, CHDN, CHLFT, CHRGT, CHTAB, CHESC, CHBTRGT);
    sprintf(cI, "Nav:%c%c%c%c^cS^cE", CHLFT, CHRGT, CHESC, CHBTRGT);
    sprintf(cR, "Nav:%c%c%c%c%c%c %c  ", CHUP, CHDN, CHLFT, CHRGT, CHTAB, CHESC, CHBTRGT);
    sprintf(cX, "Nav:X %c%c%c     ", CHTAB, CHESC, CHBTRGT);

    // Define input string defaults
    strcpy(cA,  "-100.00                                  ");
    strcpy(cB,  "This string has something to edit in it!");
    strcpy(cC,  "                                         ");
    sprintf(cD, "%cAny character string!%c                 ", CHBALL, CHBALL);

    // Set radio button and spinner previous selection defaults
    bRAp = bRA;
    bRBp = bRB;
    bVp = bV;

    // Reset clock
    OS.rtclok[1] = 0;
```

```
OS.rtclok[2] = 0;

// Open window & draw form
bW1 = WOpen(2, 4, 36, 18, WOFF);
WOrn(bW1, WPTOP, WPLFT, "Input Form");
WOrn(bW1, WPTOP, WPRGT, "Edit");
WOrn(bW1, WPBOT, WPLFT, cF);

WPrint(bW1, 1, 1, WOFF, "Data Fields");
WPrint(bW1, 2, 2, WOFF, "Numer:");
WPrint(bW1, 2, 3, WOFF, "Alpha:");
WPrint(bW1, 2, 4, WOFF, "AlNum:");
WPrint(bW1, 2, 5, WOFF, "Any..:");
WPrint(bW1, 2, 6, WOFF, "Spin.:");
GSpin(bW1, 8, 6, 0, 100, bVp, GDISP);

WPrint(bW1, 1, 8, WOFF, "Radio Buttons (h)");
GRadio(bW1, 2, 9, GHORZ, GDISP, bRAp, 3, prA);

WPrint(bW1, 1, 11, WOFF, "Radio Buttons (v)");
GRadio(bW1, 2, 12, GVERT, GDISP, bRBp, 3, prB);

WPrint(bW1, 20, 11, WOFF, "Check Boxes");
WPrint(bW1, 25, 12, WOFF, "Milk");
WPrint(bW1, 25, 13, WOFF, "Bread");
WPrint(bW1, 25, 14, WOFF, "Butter");
GCheck(bW1, 21, 12, GDISP, bChap);
GCheck(bW1, 21, 13, GDISP, bChbp);
GCheck(bW1, 21, 14, GDISP, bChcp);

GButton(bW1, 21, 16, GDISP, 2, paB);

// Display fields as is
WPrint(bW1, 8, 2, WOFF, cA);
WPrint(bW1, 8, 3, WOFF, cB);
WPrint(bW1, 8, 4, WOFF, cC);
WPrint(bW1, 8, 5, WOFF, cD);

// ----- Performance Test Display Begin -----
// Open progress bar window
bW2 = WOpen(7, 10, 24, 4, WOFF);
WPrint(bW2, 2, 1, WOFF, "Timing:");

// Display initial progress bar
GProg(bW2, 2, 2, 0);

// Cycle border through 100 colors
for (bL = 0; bL < 100; bL++) {
    // Change color and update progress bar
    OS.color4 = bL;
    GProg(bW2, 2, 2, bL);
}

// Reset border color
OS.color4 = 0;
```

```
// Close progress bar window
WClose(bW2);

// Display time it took to draw screen
sprintf(cT, "Jiffies: %5d", OS.rtclok[2] + OS.rtclok[1] * 256);
GAlert(cT);
// ----- Performance Test Display End -----

// Loop until form accepted
do {
    // ----- Display Input Fields -----
    // Show navigation info
    WOrn(bW1, WPBOT, WPLFT, cI);

    // Edit fields
    bA = GInput(bW1, 8, 2, GNUMER, 27, cA);
    bB = GInput(bW1, 8, 3, GALPHA, 27, cB);
    bC = GInput(bW1, 8, 4, GALNUM, 27, cC);
    bD = GInput(bW1, 8, 5, GANY, 27, cD);

    // ----- Spinner Input -----
    bV = GSpin(bW1, 8, 6, 0, 100, bVp, GEDIT);
    if (bV != XESC) {
        bVp = bV;
    }

    // ----- Display Radio Buttons - horizontal -----
    // Show navigation info
    WOrn(bW1, WPBOT, WPLFT, cR);

    // Process buttons
    bRA = GRadio(bW1, 2, 9, GHORZ, GEDIT, bRAp, 3, prA);

    // If not bypass, set previous selected value
    if (bRA != XESC) {
        bRAp = bRA;
    }

    // Redisplay buttons
    GRadio(bW1, 2, 9, GHORZ, GDISP, bRAp, 3, prA);

    // ----- Display Radio Buttons - vertical -----
    bRB = GRadio(bW1, 2, 12, GVERT, GEDIT, bRBp, 3, prB);

    // If not bypass, set previous selected value
    if (bRB != XESC) {
        bRBp = bRB;
    }

    // Redisplay buttons
    GRadio(bW1, 2, 12, GVERT, GDISP, bRBp, 3, prB);

    // ----- Display Check Boxes -----
    // Set footer
    WOrn(bW1, WPBOT, WPLFT, cX);
```

```
        // Display checkbox and get choice
        bCha = GCheck(bW1, 21, 12, GEDIT, bChap);

        // If not ESC, set previous value
        if (bCha != XESC) {
            bChap = bCha;
        }

        GCheck(bW1, 21, 12, GDISP, bChap);

        // Display checkbox and get choice
        bChb = GCheck(bW1, 21, 13, GEDIT, bChbp);

        // If not ESC or TAB, set previous value
        if (bChb != XESC) {
            bChbp = bChb;
        }

        // Display checkbox and get choice
        bChc = GCheck(bW1, 21, 14, GEDIT, bChcp);

        // If not ESC or TAB, set previous value
        if (bChc != XESC) {
            bChcp = bChc;
        }

        // Set footer
        WOrn(bW1, WPBOT, WPLFT, cF);

        // Prompt to accept form and redisplay buttons
        bM = GButton(bW1, 21, 16, GEDIT, 2, paB);
        GButton(bW1, 21, 16, GDISP, 2, paB);
    } while (bM == XTAB);

    // Check for acceptance (OK button), and set exit flag
    if (bM == 1) {
        bR = TRUE;
        GAlert("Doing something with entered data...");
    }

    // Close window
    WClose(bW1);

    return(bR);
}
#pragma static-locals(pop)


// ------------------------------------------------------------
// Func...: void ProgTest(void)
// Desc...: Demos window status and progress bar.
// ------------------------------------------------------------
void ProgTest(void)
{
    byte bW1, bW2, bL, bS;
    unsigned int iV;
```

```
    // Open status window
    bW1 = WOpen(9, 2, 20, 14, WOFF);
    WOrn(bW1, WPTOP, WPLFT, "Status");
    WPrint(bW1, 1, 1, WOFF, "Window Status");
    WPrint(bW1, 1, 2, WOFF, "------ ------");

    // Open progress bar window
    bW2 = WOpen(7, 18, 24, 4, WOFF);
    WPrint(bW2, 2, 1, WOFF, "Progress:");

    // Display initial progress bar
    GProg(bW2, 2, 2, 0);

    // Loop through each window handle
    for (bL=0; bL < 10; bL+=1) {
        // Get the window status
        bS = WStat(bL);

        // Print the window handle #
        WPos(bW1, 6, 3+bL);
        WPut(bW1, bL+48);

        // Print the window handle status
        WPrint(bW1, 8, 3+bL, WOFF, (bS == WON ? "Used" : "Free"));

        // Update progress bar
        iV = ((bL + 1) % 10) * 10;
        if (iV == 0) {
            iV = 100;
        }
        GProg(bW2, 2, 2, (byte) iV);

        // Wait 1 second
        sleep(1);
    }

    GAlert(" Press a key to continue. ");

    // Close windows
    WClose(bW2);
    WClose(bW1);

    return;
}


// ------------------------------------------------------------
// Func...: void About(void)
// Desc...: About Dialog
// ------------------------------------------------------------
void About(void)
{
    byte bW1;

    // Show window
```

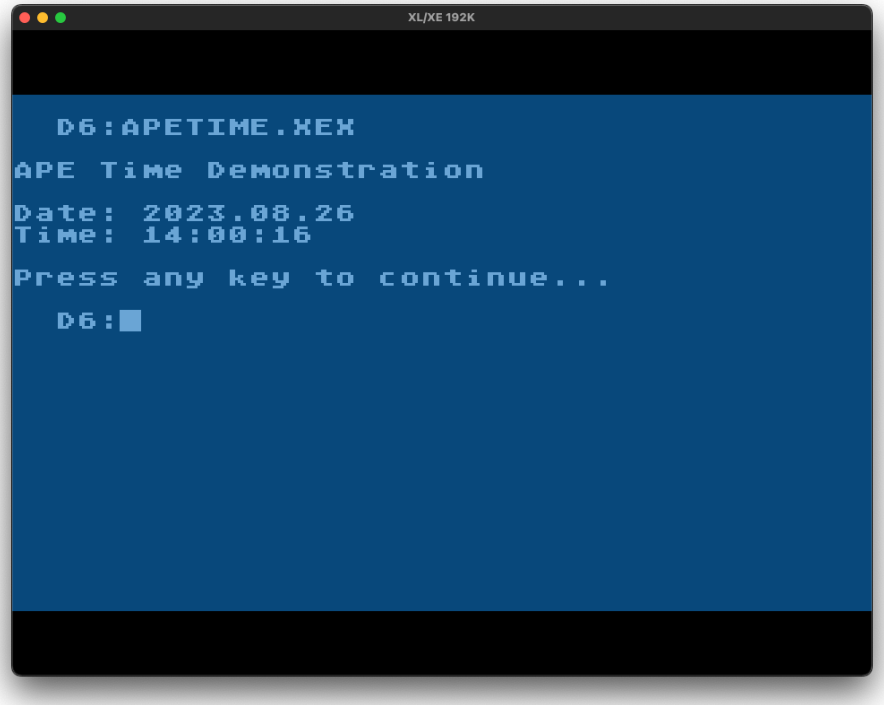
```
    bW1 = WOpen(1, 6, 38, 14, WOFF);
    WOrn(bW1, WPTOP, WPLFT, "About");
    WPrint(bW1, WPCNT,  1, WOFF, "Demo Application");
    WPrint(bW1, WPCNT,  2, WOFF, "Version 1.00-C");
    WPrint(bW1, WPCNT,  3, WOFF, "(C) 2022  Wade Ripkowski");
    WPrint(bW1, WPCNT,  5, WOFF, "Application to demonstrate");
    WPrint(bW1, WPCNT,  6, WOFF, "the C library.");
    WPrint(bW1, WPCNT,  7, WOFF, "Converted from Action!.");
    WPrint(bW1, 4,      9, WOFF, "V1-2021-Atari8: Action!");
    WPrint(bW1, 2,     10, WOFF, "V1-C-2022-Atari8: C (CC65)");
    WPrint(bW1, WPCNT, 12, WON, " Ok ");

    // Wait for key
    WaitKCX(WOFF);

    // Close window
    WClose(bW1);

    return;
}


// ------------------------------------------------------------
// Func...: void SubMenu(void)
// Desc...: Sub menu routine
// ------------------------------------------------------------
void SubMenu(void)
{
    byte bW1, bC = 1;
    byte bD = FALSE;
    unsigned char *pcM[4] = { " Sub-Item 1 ", " Sub-Item 2 ", " Sub-Item 3 " };

    // Open window
    bW1 = WOpen(16, 10, 14, 5, WOFF);
    WOrn(bW1, WPTOP, WPLFT, "Sub-Menu");

    // Loop until exit
    while (! bD) {
        // Display menu and get choice
        bC = MenuV(bW1, 1, 1, WOFF, bC, 3, pcM);

        // Process choice
        switch (bC)
        {
            case 1: GAlert(" Sub-Item 1 selected. ");
                    break;

            case 2: GAlert(" Sub-Item 2 selected. ");
                    break;

            case 3: GAlert(" Sub-Item 3 selected. ");
                    break;

            case XESC: bD = TRUE;
                       break;
        }
```

```
    }

    // Close window
    WClose(bW1);

    return;
}


// ------------------------------------------------------------
// Func...: void main(void)
// Desc...: Main routine
// ------------------------------------------------------------
void main(void)
{
    // Variables
    byte bW1, bW2, bC = 1;
    byte bD = FALSE;
    unsigned char *pcM[6] =
      { " Input Form   ", " Progress Bar ", " Sub-Menu     ", " About        ", " Exit         " };

    // Setup screen
    WInit();
    WBack(14);

    // Open header window
    bW1 = WOpen(0, 0, 40, 3, WON);
    WPrint(bW1, WPCNT, 1, WOFF, "D E M O N S T R A T I O N");

    // Open menu window
    bW2 = WOpen(12, 7, 16, 9, WOFF);
    WOrn(bW2, WPTOP, WPCNT, "Menu");

    // Loop until done (Exit selected)
    while (! bD) {
        // Call menu
        bC = MenuV(bW2, 1, 2, WON, bC, 5, pcM);

        // Process choice
        switch (bC) {
            case 1: FormInput();
                    break;

            case 2: ProgTest();
                    break;

            case 3: SubMenu();
                    break;

            case 4: About();
                    break;

            case 5: bD = TRUE;
                    break;
        }
```

```
        // Exit on ESC as well
        if (bC == XESC) {
            bD = TRUE;
        }
    }

    // Close windows
    WClose(bW2);
    WClose(bW1);

    // Exit
    return;
}
```

Demonstration APE Time Application

This is a very simple demonstration of a call to the APE device to get the current date and time, then displays it on the screen. It shows how to include the library. It does not use the TUI (text user interface) components or the FujiNet components of the library.



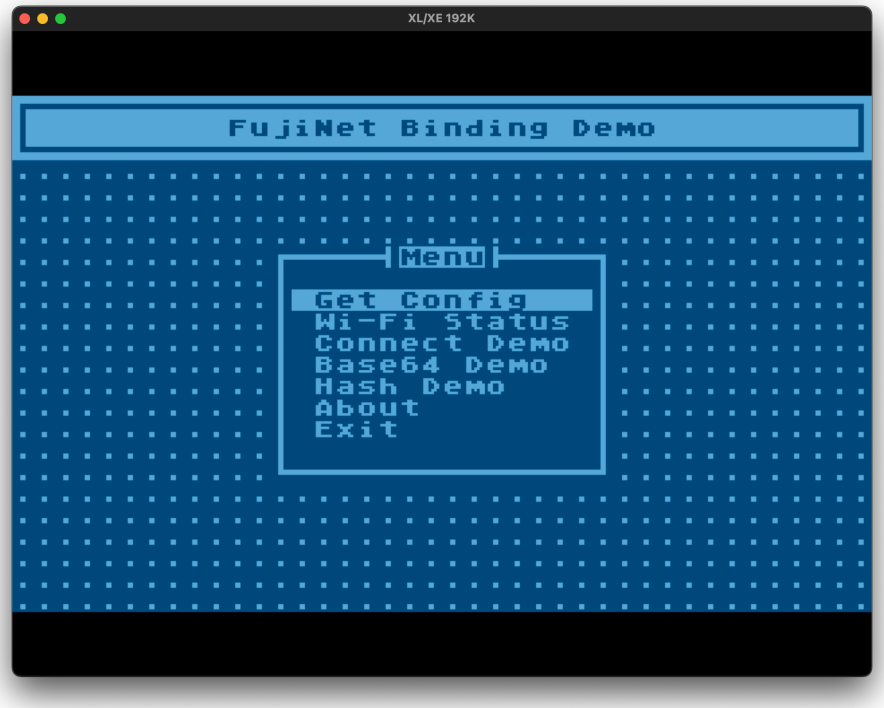
File: APETIME.C

```
// ------------------------------------------------------------
// Program: apedemo.c
// Desc...: Gets date/time from APE (via FujiNet or other APE device)
// Author.: Wade Ripkowski
// Date...: 2023.02.09
// Notes..: cl65 -v [-O] -t atari apedemo.c -o apedemo.xex
// ------------------------------------------------------------

// Pull in include files
#include <stdio.h>
#include <atari.h>
#include <conio.h>
#include <unistd.h>

#include "a8defsio.h"
#include "a8libape.c"


// ---------------------------------
// Main Routine
// ---------------------------------
```

```
void main(void)
{
    // Storage for 6 bytes preset to 0
    char bDT[6]={ 0, 0, 0, 0, 0, 0 };

    // Call time routine with the storage array
    ApeTimeG(bDT);

    // What time is it?
    printf("\nAPE Time Demonstration\n\n");
    printf("Date: 20%d.%02d.%02d\n", bDT[2], bDT[1], bDT[0]);
    printf("Time: %02d:%02d:%02d\n\n", bDT[3], bDT[4], bDT[5]);

    // Wait for a keystroke
    printf("Press any key to continue...\n");
    while (! kbhit()) {};
}
```

Demonstration FujiNet Application

This is a demonstration of using the TUI (text user interface) library along with the FujiNet library. It shows how to include the libraries when building an application that uses both parts of the library.



File: FUJIDEMO.C

```
// ------------------------------------------------------------
// Program: fujidemo.c
// Desc...: A8 FujiNet Binding Demo Application
// Author.: Wade Ripkowski
// Date...: 20230825
// License: GNU General Public License v3.0
// Notes..: cl65 -v [-O] -t atari fujidemo.c -o fujidemo.com
// ------------------------------------------------------------

// Pull in include files
#include <stdio.h>
#include <conio.h>
#include <unistd.h>
#include <string.h>
#include <stdlib.h>
#include <fcntl.h>
#include <atari.h>

#include "a8defines.h"
#include "a8defwin.h"
#include "a8defsio.h"
#include "a8libmisc.c"
#include "a8libstr.c"
```

```
#include "a8libwin.c"
#include "a8libgadg.c"
#include "a8libmenu.c"
#include "a8libfuji.c"
#include "a8libfujib64.c"
#include "a8libfujihash.c"


// Prototypes
void About(void);
void TestCfg(void);
void TestCon(void);
void TestB64(void);
void TestHash(void);


// Globals
static unsigned char cU[256] = "N:HTTP://68k.news:80/";


// ------------------------------------------------------------
// Func...: void About(void)
// Desc...: About Dialog
// ------------------------------------------------------------
void About(void)
{
    byte bW;

    // Show window
    bW = WOpen(1, 6, 38, 10, WOFF);
    WOrn(bW, WPTOP, WPLFT, "About");
    WPrint(bW, WPCNT, 1, WOFF, "FujiNet Binding Demo");
    WPrint(bW, WPCNT, 2, WOFF, "Version 1.00");
    WPrint(bW, WPCNT, 3, WOFF, "(C) 2023  Wade Ripkowski");
    WPrint(bW, WPCNT, 5, WOFF, "A8 C-Library FujiNet");
    WPrint(bW, WPCNT, 6, WOFF, "binding demonstration.");
    WPrint(bW, WPCNT, 8, WON, " Ok ");

    // Wait for key
    WaitKCX(WOFF);

    // Close window
    WClose(bW);
}


// ------------------------------------------------------------
// Func...: void TestCon(void)
// Desc...: Open, get and Close test.
// ------------------------------------------------------------
void TestCfg(void)
{
    td_fncfg sC;
    unsigned char bS, cL[33];
    byte bW;
```

```
    // Clear memory
    memset(cL, 0, 32);

    // Get config into structure
    bS = FNGConfig(&sC);

    // Check status and report
    if (bS != FNSOK) {
        GAlert("Connect: Failed to get config!");
    } else {
        // Open window
        bW = WOpen(3, 5, 34, 17, WOFF);
        WOrn(bW, WPTOP, WPLFT, "Configuration");
        WPrint(bW, 1, 2, WON, "Version");
        WPrint(bW, 1, 5, WON, "Hostname");
        WPrint(bW, 1, 8, WON, "IP");
        WPrint(bW, 1, 11, WON, "SSID");

        // Fill in values from the returned structure
        // Version
        WPrint(bW, 1, 3, WOFF, sC.version);

        // Hostname, copy up to 32 chars for window constraints
        strncpy(cL, sC.hostname, 32);
        WPrint(bW, 1, 6, WOFF, cL);

        // IP address, clear the line buffer and build new string from the bytes
        memset(cL, 0, 32);
        sprintf(cL, "%03d.%03d.%03d.%03d", sC.ip[0], sC.ip[1], sC.ip[2], sC.ip[3]);
        WPrint(bW, 1, 9, WOFF, cL);

        // SSID, clear the line buffer, copy up to 32 chars for window constraint
        memset(cL, 0, 32);
        strncpy(cL, sC.ssid, 32);
        WPrint(bW, 1, 12, WOFF, cL);

        // OK "button"
        WPrint(bW, WPCNT, 14, WON, " Ok ");

        // Wait for key
        WaitKCX(WOFF);

        // Close window
        WClose(bW);
    }

}


// ------------------------------------------------------------
// Func...: void TestCon(void)
// Desc...: Open, get and Close test.
// ------------------------------------------------------------
void TestCon(void)
{
    byte bW;
```

```
unsigned char *cB;
unsigned char cL[37];
unsigned char bS = 0, bL = 0;

// Get some memory and clear it
cB = malloc(768);
memset(cB, 0, 767);
memset(cL, 0, 36);

// Open window
bW = WOpen(1, 1, 38, 22, WOFF);
WOrn(bW, WPTOP, WPLFT, "Connect Demo");
WPrint(bW, 1, 1, WOFF, "URL:");
WPrint(bW, 6, 1, WOFF, cU);
WDiv(bW, 2, WON);
WPrint(bW, WPCNT, 2, WON, " Page Source ");
WDiv(bW, 19, WON);
WPrint(bW, WPCNT, 20, WON, " Ok ");

// Open connection
bS = FNOpen(cU);

// Set translation mode
FNTrans(FNTRLF, FNAXUPDATE);

// Check status and report
if (bS != FNSOK) {
    GAlert("Connect: Failed to open!");
}

// Get data
bS = FNRead(598, cB);

// Check status and report
if (bS != FNSOK) {
    GAlert("Connect: Failed to read!");
}

// Close connection
bS = FNClose();

// Check status and report
if (bS != FNSOK) {
    GAlert("Connect: Failed to close!");
}

// Display data
for (bL = 0; bL < 16; bL ++) {
    strncpy(cL, cB + (bL * 36), 36);
    WPrint(bW, 1, 3 + bL, WOFF, cL);
}

// Wait for key
WaitKCX(WOFF);

// Close window
```

```
    WClose(bW);

    // Free memory
    free(cB);
}


// ------------------------------------------------------------
// Func...: void TestB64(void)
// Desc...: Base64 test (encodes then decodes).
// ------------------------------------------------------------
void TestB64(void)
{
    unsigned char *cS = "InverseATASCII";
    unsigned long iS;
    unsigned char cB[FNHASHLENHSHA5 + 1], cL[33];
    byte bW;

    // Clear memory
    memset(cB, 0, FNHASHLENHSHA5);
    memset(cL, 0, 32);

    // Open output window
    bW = WOpen(3, 8, 34, 9, WOFF);
    WOrn(bW, WPTOP, WPLFT, "Base64 Demo");
    WPrint(bW, 1, 1, WOFF, "Text:");
    WPrint(bW, 7, 1, WOFF, cS);
    WDiv(bW, 2, WON);
    WPrint(bW, WPCNT, 2, WON, " Encoded ");
    WDiv(bW, 4, WON);
    WPrint(bW, WPCNT, 4, WON, " Decoded ");
    WDiv(bW, 6, WON);
    WPrint(bW, WPCNT, 7, WON, " Ok ");

    // ----- Encode the string -----
    // Push the unencoded string to the FN input buffer
    FNB64Inp(FNLENCODE, cS, strlen(cS));

    // Perform the encode
    FNB64Cmp(FNLENCODE);

    // Get the length of the result
    FNB64Len(FNLENCODE, &iS);

    // Get the encoded string from FN
    FNB64Out(FNLENCODE, cB, iS);

    // Show encoded
    WPrint(bW, 1, 3, WOFF, cB);

    // ----- Decode the string -----
    // Push the encoded string to the FN input buffer
    FNB64Inp(FNLDECODE, cB, iS);

    // Perform the decode
    FNB64Cmp(FNLDECODE);
```

```
    // Get the length of the result
    FNB64Len(FNLDECODE, &iS);

    // Clear buffer before getting result
    memset(cB, 0, 128);

    // Get decoded string from FN
    FNB64Out(FNLDECODE, cB, iS);

    // Show decoded
    WPrint(bW, 1, 5, WOFF, cB);

    // Wait for key
    WaitKCX(WOFF);

    // Close window
    WClose(bW);
}


// ------------------------------------------------------------
// Func...: void TestHash(void)
// Desc...: Hash test (SHA1).
// ------------------------------------------------------------
void TestHash(void)
{
    unsigned char *cS = "InverseATASCII";
    unsigned char cB[165], cL[33];
    byte bW;

    // Clear memory
    memset(cB, 0, 164);
    memset(cL, 0, 32);

    // Open output window
    bW = WOpen(3, 4, 34, 16, WOFF);
    WOrn(bW, WPTOP, WPLFT, "Hash Demo");
    WPrint(bW, 1, 1, WOFF, "Text:");
    WPrint(bW, 7, 1, WOFF, cS);
    WDiv(bW, 2, WON);
    WPrint(bW, WPCNT, 2, WON, " SHA1 ");
    WDiv(bW, 5, WON);
    WPrint(bW, WPCNT, 5, WON, " SHA256 ");
    WDiv(bW, 8, WON);
    WPrint(bW, WPCNT, 8, WON, " SHA512 ");
    WDiv(bW, 13, WON);
    WPrint(bW, WPCNT, 14, WON, " Ok ");

    // ----- SHA1 -----
    // Push the string to the FN input buffer
    FNHashInp(cS, strlen(cS));

    // Perform the hash
    FNHashCmp(FNHASHSHA1);
```

```
// Get the hash string from FN as hex
FNHashOut(FNHASHSHA1, FNHASHOHEX, cB);

// Show hash across 2 lines
strncpy(cL, cB, 20);
WPrint(bW, 1, 3, WOFF, cL);
strncpy(cL, cB+20, 20);
WPrint(bW, 1, 4, WOFF, cL);

// Clear memory
memset(cB, 0, FNHASHLENHSHA5);

// ----- SHA256 -----
// Push the string to the FN input buffer
FNHashInp(cS, strlen(cS));

// Perform the hash
FNHashCmp(FNHASHSHA2);

// Get the hash string from FN as hex
FNHashOut(FNHASHSHA2, FNHASHOHEX, cB);

// Show hash across 2 lines
strncpy(cL, cB, 32);
WPrint(bW, 1, 6, WOFF, cL);
strncpy(cL, cB+32, 32);
WPrint(bW, 1, 7, WOFF, cL);

// Clear memory
memset(cB, 0, FNHASHLENHSHA5);

// ----- SHA512 -----
// Push the string to the FN input buffer
FNHashInp(cS, strlen(cS));

// Perform the hash
FNHashCmp(FNHASHSHA5);

// Get the hash string from FN as hex
FNHashOut(FNHASHSHA5, FNHASHOHEX, cB);

// Show hash across 4 lines
strncpy(cL, cB, 32);
WPrint(bW, 1, 9, WOFF, cL);
strncpy(cL, cB+32, 32);
WPrint(bW, 1, 10, WOFF, cL);
strncpy(cL, cB+64, 32);
WPrint(bW, 1, 11, WOFF, cL);
strncpy(cL, cB+96, 32);
WPrint(bW, 1, 12, WOFF, cL);

// Wait for key
WaitKCX(WOFF);

// Close window
WClose(bW);
```

```
}


// ------------------------------------------------------------
// Func...: void main(void)
// Desc...: Main routine
// ------------------------------------------------------------
void main(void)
{
    // Variables
    byte bW1, bW2;
    byte bC = 1, bD = FALSE;
    unsigned char *pcM[8] =
      { " Get Config   ", " Wi-Fi Status ", " Connect Demo ", " Base64 Demo  ", " Hash Demo    ", "
About        ", " Exit         " };
    unsigned char bS = 0;

    // Setup screen
    WInit();

    // Set Background
    WBack(14);

    // Open header window
    bW1 = WOpen(0, 0, 40, 3, WON);
    WPrint(bW1, WPCNT, 1, WOFF, "FujiNet Binding Demo");

    // Open menu window
    bW2 = WOpen(12, 7, 16, 11, WOFF);
    WOrn(bW2, WPTOP, WPCNT, "Menu");

    // Loop until done (Exit selected)
    while (! bD) {
        // Call menu
        bC = MenuV(bW2, 1, 2, WOFF, bC, 7, pcM);

        // Process choice
        switch (bC) {
            // Get config
            case 1: TestCfg();
                    break;

            // Get device status
            case 2: bS = FNStatus();
                    switch (bS) {
                        case FNDSIDLE: GAlert("FujiNet Idle");
                                       break;
                        case FNDSNOSSID: GAlert("FujiNet No SSID");
                                         break;
                        case FNDSSCANC: GAlert("FujiNet Scan Complete");
                                        break;
                        case FNDSACTIVE: GAlert("FujiNet Active");
                                         break;
                        case FNDSLCFAIL: GAlert("FujiNet Last Connect Failed");
                                         break;
                        case FNDSWIFILOST: GAlert("FujiNet WiFi Connect Lost");
```

```
                                    break;
                        case FNDSWIFIDISC: GAlert("FujiNet WiFi Disconnected");
                                    break;
                    }
                    break;

            // Open and close test
            case 3: TestCon();
                    break;

            // Base64 test
            case 4: TestB64();
                    break;

            // Hash test
            case 5: TestHash();
                    break;

            // About box
            case 6: About();
                    break;

            // Exit
            case 7: bD = TRUE;
                    break;
        }

        // Exit on ESC as well
        if (bC == XESC) {
            bD = TRUE;
        }
    }

    // Close windows
    WClose(bW2);
    WClose(bW1);

    // Set Background
    WBack(0);

    // Exit
    return;
}
```