PROSE KERNAL ROUTINES (last updated 01-09-2011)

To call a PROSE kernal routine, load register A with the routine label, set other CPU registers as appropriate for the required routine and do a call.lil to “prose_kernal”. EG: To print a line of text:

```
ld hl,message_txt     ; string location
ld a,kr_print_string      ; desired kernal routine
call.lil prose_kernal     ; call PROSE kernal routine
```

File System:

kr_mount_volumes
kr_get_device_info
kr_check_volume_format
kr_change_volume
kr_get_volume_info
kr_format_device
kr_make_dir
kr_change_dir
kr_parent_dir
kr_root_dir
kr_delete_dir
kr_open_file
kr_set_file_pointer
kr_set_load_length
kr_read_file
kr_erase_file
kr_rename_file
kr_create_file
kr_write_file
kr_get_total_sectors
kr_dir_list_first_entry
kr_dir_list_get_entry
kr_dir_list_next_entry
kr_read_sector
kr_write_sector
kr_file_sector_list
kr_get_dir_cluster
kr_set_dir_cluster
kr_get_dir_name
kr_get_disk_sector_ptr
kr_parse_path

Serial Comms:

kr_serial_receive_header
kr_serial_receive_file
kr_serial_send_file
kr_serial_tx_byte
kr_serial_rx_byte

Keyboard and Mouse:

kr_wait_key
kr_get_key
kr_get_key_mod_flags
kr_get_keymap_location
kr_set_mouse_window
kr_get_mouse_position
kr_get_mouse_counters
kr_set_pointer
kr_get_joysticks

Text / Display:

kr_print_string
kr_clear_screen
kr_plot_char
kr_set_pen
kr_get_pen
kr_background_colours
kr_set_cursor_position
kr_draw_cursor
kr_remove_cursor
kr_set_cursor_image
kr_scroll_up
kr_os_display
kr_get_video_mode
kr_set_video_mode
kr_get_charmap_addr_xy
kr_get_cursor_position
kr_wait_vrt
kr_char_to_font

Strings:

kr_compare_strings
kr_hex_byte_to_ascii
kr_ascii_to_hex_word
kr_get_string

Environment variables:

kr_set_envar
kr_get_envar
kr_delete_envar

Timer:

kr_time_delay
kr_set_timeout
kr_test_timeout
kr_read_rtc
kr_write_rtc
kr_init_msec_counter
kr_read_msec_counter

Sound:

kr_play_audio
kr_disable_audio

Memory:

kr_get_mem_base
kr_get_mem_top
kr_allocate_ram
kr_deallocate_ram

Misc:

kr_get_version
kr_dont_store_registers

Notes:

When a Z80 mode program calls the PROSE kernal, location pointer registers such as HL in the example above automatically have their MSB [23:16] set to the MBASE register by the Kernal routine.

All DISK routines set the zero flag on return if the operation was successful. If the zero flag is not set, CPU register "A" will contain an error code (see PROSE manual for list). Other routines set the flags as shown below.

IX and IY are preserved by all kernal routines, assume all other registers are trashed unless otherwise stated.

---

kr_mount_volumes

Action: Rescans hardware for storage devices.

Input :

- E (0= Show device list, 1 = Mount quietly)

Output: None

---

kr_get_device_info

Action: Returns info about the storage devices

Input : None

Output:

- HL = Location of device info table
- DE = Location of driver table
- B = Device count
- A = Currently selected driver

---

kr_check_volume_format

Action: Checks if currently selected volume is formatted to FAT16

Input : None

Output: See error codes

---

kr_change_volume

Action: Changes volume selection

Input :

- E = Desired volume number

Output: See error codes

---

kr_get_volume_info

Action: Returns info about storage volumes.

Input : None

Output

- HL =location of volume mount list (see PROSE manual for info)
- B = volume count
- A = currently selected volume

---

kr_format_device

Action: Formats a device to FAT16 (no MBR is created and the entire device is treated as one volume, max 2GB)

Input :

- E = device
- HL = location of desired volume label

Output: See error codes

---

kr_make_dir

Action: Creates a new directory

Input :

- HL = Location of zero-terminated dir name

Output: See error codes

---

kr_change_dir

Action: Changes current directory

Input :

- HL = Location of zero-terminated dir name

Output: See error codes

---

kr_parent_dir

Action: Moves towards the root directory by one place

Input : None

Output: See error codes

---

kr_root_dir

Action: Sets the root dir as the current directory

Input : None

Output: None

---

kr_delete_dir

Action: Removes an (empty) directory

Input :

- HL = Location of zero-terminated dir name

Output: See error codes

---

kr_open_file

Action: Opens a file so that data from it may be loaded.

Input :

- HL = Location of zero-terminated file name

Output: If zero flag set:

- HL = start cluster of file
- C:DE = length of file (32 bit)

Else: see error codes

---

kr_set_file_pointer

Action: Moves the file pointer to a position within the currently opened file

Input :

- C:DE (32 bit file pointer)

Output: None

---

kr_set_load_length

Action: Sets the maximum data transfer length for a file read

Input :

- DE = load length (24 bit)

Output: None

---

kr_read_file

Action: Reads data from the currently opened file

Input :

- HL = load address

Output: see error codes

---

kr_erase_file

Action: Deletes a file

Input :

- HL = Location of zero-terminated file name

Output: See error codes

---

kr_rename_file

Action: Renames a file or directory

Input :

- HL = Location of original name
- DE = Location of new name

(Both strings should be zero terminated.)

Output: See error codes

---

kr_create_file

Action: Creates a new file (zero bytes) for writing data to.

Input :

- HL = location of zero-terminated file name

Output: See error codes

---

kr_write_file

Action: Appends data to an existing file

Input :

- HL = location of zero terminated filename
- DE = source address of data
- BC = length (24 bit)

Output: See error codes

---

kr_get_total_sectors

Action: Returns the total capacity (in sectors) of the currently selected volume

Input : None

Output:

- DE = sector count (24 bit)

---

kr_dir_list_first_entry

Action: Returns the first line of a directory

Input : None

Output: If zero flag set:

- HL = Location of null terminated filename string
- C:DE = Length of file (if applicable)
- B = File flag 0 = File, 1 = Dir

Else: see error codes

---

kr_dir_list_get_entry

Action: Returns a line from directory

Input : None

Output: If zero flag set:

- HL = Location of null terminated filename string
- C:DE = Length of file (if applicable)
- B = File flag 0 = File, 1 = Dir

Else: see error codes

---

kr_dir_list_next_entry

Action: Returns next line of directory

Input : None

Output: If zero flag set:

- HL = Location of null terminated filename string
- C:DE = Length of file - if applicable)
- B = File flag 0 = File, 1 = Dir

Else: see error codes

---

kr_read_sector

Action: Reads a sector from the specified device to the target address

Input :

- HL = destination address
- C:DE = sector (32 bit)
- B = device number

Output: See error codes

---

kr_write_sector

Action: Writes a sector from specified address to the specified device

Input :

- HL = source address
- C:DE = sector (32 bit)
- B = device number

Output: See error codes

---

kr_file_sector_list

Action: Used to obtain a list of the sectors that a file occupies

Input :

- HL = cluster
- E = sector within cluster

Output:

- E = Next sector offset
- HL = Updated cluster
- BC = Location of variable holding 32 bit sector (LSB)

[Also see error codes]

Notes: First call "kr_open_file" with the filename in HL as normal. On exit, HL will be equal the first cluster that the file occupies. Clear E (as we're starting at the first sector of a cluster), and call "kr_file_sector_list". On return E and HL are updated to the values required for the next time the routine is called and BC points to the lowest significant byte of the sector address (LBA0). Copy the 4 bytes from BC to BC+3 to your sector list buffer and loop around, calling "kr_file_sector_list" for as many sectors as are used by the file (simply subtract 512 from a variable holding the file size every call until variable is =< 0)

---

kr_get_dir_cluster

Action: Reads the cluster location of the current directory

Input : none

Output:

- DE = current dir's cluster address

---

kr_set_dir_cluster

Action: Sets the current directory cluster location

Input :

- DE = cluster address to set as current dir

Output: none

---

kr_get_dir_name

Action: Returns current directory name

Input : None

Output:

- HL = location of directory name ASCII string

[See also error codes]

---

kr_get_disk_sector_ptr

Action: Returns location of LSB of LBA sector variable and location of sector buffer for external drivers

Input : none

Output:

- HL = location of LSB of 32-bit sector address variable
- DE = location of sector buffer

---

kr_parse_path

Action: Sets the current directory by following a path string.

Input:

- HL = location of zero-terminated path string (string format EG: "vol0:tests/phil" ..

"games/chfight/chfight.ezp")
- E = 0: The last element in the string is a filename, so stop parsing there.
- E = 1: All elements of the string are folder names.

Output:

- HL = location of filename part of string (when mode 0 is used)

---

kr_wait_key

Action: Pauses until a key is pressed

Input : None

Output:

- A = Scancode of keypress
- B = ASCII character as defined by keymap and modified by shift/alt/CRTL as applicable. B = 0 if no applicable ASCII data.

---

kr_get_key

Action: Returns any keypresses that are in the buffer (does not wait)

Input : None

Output: If zero flag is set:

- A = New scancode
- B = ASCII character as defined by keymap and modified by shift/alt/CRTL as applicable. B = 0 if no applicable ASCII data.

Else: No new key data is in the buffer

---

kr_get_key_mod_flags

Action: Returns the status of the modifier keys

Input : None

Output: A: Bits:

- 0 - left shift
- 1 - left/right ctrl
- 2 - left GUI
- 3 - left/right alt
- 4 - right shift
- 5 - right GUI
- 6 - Apps

---

kr_serial_receive_header

Action: Waits for a file header from serial port

Input:

- HL = location of zero-terminated filename
- E = timeout allowance in seconds

Output:

If zero flag set, all OK, xDE returns location of serial file header

Else, A =

$83 : timed out error
$84 : memory address out of range
$85 : comms error
$86 : checksum bad
$87 : Incorrect file

---

kr_serial_receive_file

Action: Waits for a serial file transfer following the reception of a header

Input :

- HL = load address

Output: If zero flag is set, all OK.

Else, A =

$84 : memory address out of range,
$85 : comms error
$86 : checksum error

---

kr_serial_send_file

Action: Sends a file to the serial port

Input :

- HL = filename location
- DE = source address
- BC = length

Output: If zero flag is set, all OK.

Else, A=

$81 = Save length zero,
$84 = memory address out of range
$85 = comms error

---

kr_serial_tx_byte

Action: Sends a single byte to the serial port

Input :

- E = byte to send

Output: None

---

kr_serial_rx_byte

Action: Waits for a single byte from serial port

Input :

- E = timeout allowance in seconds

Output: Zero Flag set if byte received OK, Else operation timed out (A = $83)

---

kr_print_string

Action: Writes a string of text to the display at the current cursor position and in the current pen colour

Input :

- HL (Zero-terminated ASCII string location)

Output:

- HL = address of the string terminating zero + 1 (BC and DE are preserved)

---

kr_clear_screen

Action: Clears the display window

Input : None

Output: None

---

kr_wait_vrt

Action: Waits for the Vertical Retrace flip-flop to become set (ie: the last scanline of display)

Input : None

Output: None

---

kr_set_cursor_position

Action: Moves the cursor position to a specific place

Input :

- B = x char coord
- C = y char coord

Output: Zero flag is set if coordinates are within the display window, unset if not.

---

kr_plot_char

Action: Plots a character at a specific location in current pen colour (doesn't affect cursor position)

Input :

- B = x char coord
- C = y char coord
- E = ASCII char to plot

Output: Zero flag is set if coordinates are within the display window, unset if not.

---

kr_set_pen

Action: Changes the current pen colour

Input :

- E = pen colour:

Bits [7:4] = background colour selection [3:0] = character's pixel colour selection.

Output: None

---

kr_background_colours

Action: Changes the palette of 16 colours used by the OS

Input :

- HL (location of colour data, standard 16 words of "0RGB" format)

Output: None

---

kr_draw_cursor

Action: Draws the cursor image as defined by the routine "kr_set_cursor_image"

Input : None

Output: None

---

kr_get_pen

Action: Returns the current pen colour

Input : None

Output:

- E = pen colour:

Bits [7:4] = background colour selection [3:0] = character's pixel colour selection.

---

kr_scroll_up

Action: Scrolls the display up a line

Input : None

Output: None

---

kr_os_display

Action: Restores the display hardware settings to that used by the OS (useful only if the area of VRAM used by PROSE were not overwritten.)

Input : None

Output: None

---

kr_get_video_mode

Action: Returns the OS video mode and size of the OS window (in characters)

Input : None

Output:

- A = Video Mode
- B = Columns
- C = Rows

---

kr_get_charmap_addr_xy

Action: Returns address of character map and attribute map for a specific coordinate

Input :

- B = x coord
- C = y coord

Output:

- HL = OS character map address
- DE = OS attribute map addresss

---

kr_get_cursor_position

Action: Returns cursor position

Input : None

Output:

- B = x char coord
- C = y char coord

---

kr_set_video_mode

Action: Sets the Video Mode

Input: E,

- E= 0 : 80x60
- E=1 : 80x30
- E=2 : 40x60
- E=3 : 40x30

Output: Zero Flag set if all OK. Error code 88h if A is out of range.

---

kr_set_cursor_image

Action: Selects which character is to be used for the cursor.

Input :

- E: ASCII character to use (EG: 05fh = underscore, 07fh = solid block)

Output: None.

---

kr_remove_cursor

Action: Removes the cursor image from the character map (replaces with character that was saved by kr_draw_cursor)

Input : None

Output: None

---

kr_char_to_font

Action: Patches the PROSE font (allows user defined characters)

Input :

- E = ASCII character to change HL = address of font data (8 bytes)

Output: None

---

kr_set_envar

Input :

- HL = location of zero-terminated variable name string
- DE = location of zero-terminated variable value string

Output: ZF set if OK

---

kr_get_envar

Input :

- HL = location of zero-terminated variable name string

Output: ZF set if name found

- DE = location of zero-terminated variable value string

---

kr_delete_envar

Input :

- HL = location of zero-terminated variable name string

Output: ZF set if OK

---

kr_set_mouse_window

Action: Sets the constraining dimensions for absolute mouse pointer position

Input :

- HL = width of window in pixels
- DE = height of window in pixels

Output: None

---

kr_get_mouse_position

Action: Returns the absolute position of the mouse pointer within the window button status and scroll wheel counter (if applicable)

Input: None

Output: If zero flag is set:

- HL = x coord
- DE = y coord
- A = buttons. Bit 0 = left, bit 1 = right, bit 2 = middle
- B = mouse wheel counter (always zero if no mouse wheel)

If zero Flag is not set mouse is not enabled

---

kr_get_mouse_counters (previously “kr_get_mouse_motion”)

Action: Returns the current value of the (wrap around) mouse counters button status and scroll wheel counter (if applicable)

Input : None

Output: If zero flag is set:

- HL = x coord
- DE = y coord
- A = buttons. Bit 0 = left, bit 1 = right, bit 2 = middle
- B = mouse wheel counter (always zero if no mouse wheel)

If zero Flag is not set mouse is not enabled

---

kr_time_delay

Action: Pauses (Granularity of 30 microseconds)

Input :

- DE = 32768Hz ticks to pause. (Max value 65535, IE: 2 seconds)

Output: None

---

kr_compare_strings

Action: Compares ASCII strings, ignoring the case.

Input:

- HL = location of string 1
- DE = location of string 2

- B = count of characters to compare

Output: Zero flag set if strings are the same

---

kr_hex_byte_to_ascii

Action: Puts ascii version of hex byte at (HL) and (HL+1)

Input :

- HL = Desired location for ASCII output
- E = byte to convert

Output:

- HL=HL+2

---

kr_ascii_to_hex_word

Action: Converts ASCII hex characters to 24 bit hexadecimal number

Input:

- HL = location of ASCII string (Note: routine scans for first non-space character)

Output:

If zero flag set:

- DE = result

Else, A =

$81: No ASCII chars
$82: Bad ASCII chars

---

kr_get_string

Action: Waits for user to enter a string of characters followed by return (Escape quits)

Input :

- HL = location of string
- E = max number of characters.

Output: If zero flag set, all OK:

A = number of characters entered.

Else: A =

$80 if ESC was pressed
$81 if no characters were entered

---

kr_get_version

Action: Returns version info for OS and Hardware

Input : None

Output:

- HL = Version of PROSE OS (numeric)
- DE = version of AMOEBA FPGA config (numeric)

---

kr_dont_store_registers

Action: Prevents the OS caching the contents of the CPU registers when an app returns control to it.

Input : None

Output: None

---

kr_read_rtc

Action: Reads the real time clock data

Input : None

Output:

- HL = location of ez80 time data:

(sec, min, hr, d.o,w, date, mon, year, century)

---

kr_write_rtc

Action: Writes data to the real time clock

Input :

- HL = location of ez80 time data

(sec, min, hr, d.o.w, date, mon, year, century)

Output: None

---

kr_get_keymap_location

Action: Returns location of keymap within the OS

Input : None

Output:

- HL = location of keymap data within OS

---

kr_get_mem_base

Action: Returns the first available address (IE: not used by the OS) in system RAM, VRAM A and VRAM B

Input : none

Output:

- HL = first free system RAM address
- DE = same for VRAM A
- BC = same for VRAM B

---

kr_play_audio

Action: Plays sound samples

Input :

- HL = Address of sound description table
- C = channel enable bits.

Output: None

Notes: The sound description table format is:

```
00h [3 bytes]   ;location (address in VRAM B)
03h [3 bytes]   ;length in bytes
06h [3 bytes]   ;loop location (address in VRAM B)
09h [3 bytes]   ;loop length in bytes
0ch [2 bytes]   ;period constant (see hardware manual)
0eh [1 bytes]   ;volume (0-64)
```

The channel enable bits set in C specify which channels are to play the sound:

```
Bit 0 = channel 0
Bit 1 = channel 1
Bit 2 = channel 2
etc etc
```

---

kr_disable_audio

Action: Silences all channels by disabling the audio hardware and silencing each channel's volume register

Input : none

Output: none

---

kr_get_joysticks

Action: Reads status of joystick pins

Input : none

Output:

- E = joystick 0
- D = joystick 1

Bits:

Bit 0 = Up
Bit 1 = Down
Bit 2 = Left
Bit 3 = Right
Bit 4 = Fire 0
Bit 5 = Fire 1

Note: Bit set = direction / button asserted.

---

kr_set_timeout

Action: Sets the timeout period (in 32768 Hz ticks), max 65536 (two seconds) and starts the countdown

Input :

- DE = time-out value

Output: none

---

kr_test_timeout

Action: Reports on status of time out flag

Input : none

Output: ZF not set if timed out (no time-out if zero flag set)

---

kr_set_pointer

Action: Initializes + enables / disables the mouse pointer sprite.

Input:

- E: 1 = Enable pointer, 0 = disable pointer
- D: = 1 Use default PROSE pointer (no other registers required)
- = 0 Use custom pointer, the following parameters are required:

- HL = location of sprite data in system memory (copied to end of sprite RAM by this routine). Sprite data consists of the definition pixel data followed by:

$xx (byte) - first palette index used by sprite
$xx (byte) - number of colours (words) in palette data

then.. palette data

- C = pointer sprite height in lines (max 32)
- B = palette 0-3 to use for pointer (and all) sprites

Output: Returns with Zero Flag not set if mouse driver was not activated.

---

kr_allocate_ram

Action: Sets aside an area at the top of memory for a specific use

Input :

- BC = number of bytes to allocate
- E = 0 : allocate system RAM
- 1 : allocate VRAM_A (Video RAM)
- 2 : allocate VRAM_B (Sprite/Audio RAM)

Output:

- HL = address of allocated RAM, Zero Flag set if allocated OK

Notes : Apps only need to allocate memory if it is to be protected from program loads etc after the app has exited to PROSE. EG: driver code. Otherwise apps can assume they have the entire (non-protected) RAM range to themselves, checking the free location range with "kr_get_mem_base" and "kr_get_mem_top"

---

kr_deallocate_ram

Action: Releases an area of RAM. IE: Moves the current allocation pointer upwards.

Input :

- BC = number of bytes to deallocate
- E = 0 : Deallocate system RAM,
- E = 1 : deallocate VRAM_A (Video RAM)
- E = 2 : deallocate VRAM_B (Sprite/Audio RAM)

Output: None

---

kr_get_mem_top

Action: Returns the maximum free address locations in system RAM, VRAM A and VRAM B

Input : none

Output:

- HL = system RAM high
- DE = VRAM_A high (Video RAM)
- BC = VRAM_B high (Sprite/Audio RAM)

---

kr_init_msec_counter

Action: Initializes and clears the millisecond/millisecond counter, enables the required interrupt

Input :

- E, 1 = enable, 0 = disable

Output: None

---

kr_read_msec_counter

Action: Returns second and millisecond counter values

Input : none

Output:

- HL = Seconds count (24 bit)
- DE = Milliseconds count (0-999)
