Neo6502 API

The Neo6502 API is a messaging system. Messages are passed through a block of memory stored from $FF00 to $FF0F which is allocated as below.

There are *no* methods of directly accessing the hardware.

Address	Contents		
$FF00	Group. API Commands are grouped by functionality ; so group 1 is the system function, and group 2 is the console I/O function for example. Once a non zero value is written here the system will respond by setting values in the other registers appropriately, at the end they will clear this location.		
$FF01	Function. A command within the group, so for example Group 1 command 0 writes a value to the console, and Group 1 command 1 reads the keyboard		
$FF02	Return any error values, 0 = no error.		
$FF03	Information	7	Set to ‘1’ if the ESCape key has been pressed. This is not automatically reset.
		6	Unused
		5	Unused
		4	Unused
		3	Unused
		2	Unused
		1	Unused
		0	Unused
$FF04-B	Parameters, known as Params 0 through 7. These can be combined to form 16 or 32 bit integers.		
$FF0C-F	Reserved		

In the include file neo6502.inc the value of the first is the identifier ControlPort. This also has addresses of WaitMessage, SendMessage and some helper functions.

Messages are sent as follows.

1	Wait for any pending command to complete. There is a subroutine WaitMessage which does this for the developer
2	Set up the parameters if any. For example printing a character to the console is done by putting its ASCII value into $FF04.
3	Setting the function code at $FF01
4	Writing the command to $FF00. This h*as* to be done last as setting it to non zero before the parameters are set up may cause the message to be processed. On a technical point, both implementations process the message immediately on write.
5	Optionally, wait for completion. Some commands, e.g. 2,2 which reads from the keyboard queue return a value in a parameter. Things like writing to the console do not need to wait for completion, as any subsequent command will wait for the command to complete as per 1.

There is a support function SendMessage which inlines the command and function e.g. this code from the Kernel.

```
    jsr  KSendMessage        ; send command 2,1 read keyboard
    .byte 2,1
    jsr  KWaitMessage        ; waiting for message to be sent back
    lda  DParameters         ; read result
```

You could write this as the following – it's just more longwinded.

```
    lda  #1                  ; do command 2,1
    sta  DFunction
    lda  #2
    sta       DCommand
Loop:
    lda  DCommand            ; signal done by this being zero
    bne  Loop
    lda  DParameters         ; get result
```

Group	Func	Description
1	0	Resets the messaging system and its components. Should not normally be used.
	1	Return the value of the 100Hz system timer in Params 0-3
	2	Return the state of keyboard key Param0 in Param0
	3	Execute BASIC *(Loading currently does not work)*
	4	Print the list of people involved, stored in Flash to save memory.
2	0	Write character Param0 to the console. 32-127 are standard ASCII, 8 is Backspace, 13 Return. There are other console codes documented later.
	1	Read and remove a key press from the keyboard queue into Param0 , this is the ASCII value of the keystroke. If there are no key presses in the queue, Param0 is zero. Note that this method is *not* for games, where key presses and releases replace a joystick. The system maintains a bit array to check if keys are pressed.
	2	Check to see if the keyboard queue is empty. If it is Param0 is $FF, otherwise it is $00
	3	Input the line the screen is currently on to YX as a length prefixed string, put the cursor on the line below the line input, handles multiple line input.
	4	Define function key Param0 to be the length prefixed string at Param2/3
	5	Use bits 0..5 of P1-7 to define a font character P0 (192-255)
3	1	Display the directory
	2	Load a file from name Param0/1 (Length prefixed) to address Param2/3, error code in Param0. If the address is $FFFF the file is loaded into the graphic memory area used for sprites, tiles, images.
	3	Save a file to name Param0/1 (Length prefixed) from address Param2/3 length Param4/5 bytes, error code in Param0.
4	0-15	Binary mathematics operations
	16-31	Unary mathematics operations
	32-47	Miscellaneous operations.
5	1	Set Colour to And P0, Xor P1. Solid flag in P2. Dimension in P3, Flip bits in P4 (0 = horizontal, 1 = vertical)
	2	Draw line. P01,P23 → P45,P67
	3	Draw rectangle. P01,P23 → P45,P67

	4	Draw ellipse. P01,P23 → P45,P67
	5	Draw pixel. P01,P23
	6	Draw string at P01,P23 text at P45 (length prefixed) in current col/size
	7	Draw image at P01,P4 is image ID, current size and flip
6	1	Reset the sprite system
	2	Update Sprite P0 : Position is (P1P2,P3P4) Image is P5 (bits 0-5 are sprite number, bit 6 indicates 32 bit – NOT the same as the image number in the graphics system, bit 7 is clear), P6 the flip value (bit 0 horizontal, bit 1 vertical, bit 2-7 clear). To not update a value set its byte values to $80 (or $8080 for a coordinate). The coordinates cannot be set independently Sprite 0 is the turtle sprite.
	3	Hide sprite P0
	4	P0 is non-zero if the distance between the centre of sprites P0 and P1 is less than or equal to P2
	5	Return coordinates of sprite P0 in P1P2,P3P4
7	1	Read default controller. Bits are (from zero) Left, Right, Up, Down, A, B ; active high, unused are zero.
8	1	Reset the sound system, empty queue, silence
	2	Reset a sound channel, P0 = channel, indexed from zero
	3	Play the startup beep
	4	Queue a sound : P0 = channel, P1P2 = frequency P3P4 = duration in ms, P5 = sound type (beeper = 0, the only type currently supported)
	5	Play sound effect P1 on channel P0

Console Codes

The following are console codes, and can be printed using chr$(n) and also related to the character keys returned by inkey$(). The key() function uses physical key numbers.

Number	Control	Function
1	A	Cursor Left
4	D	Cursor Right
5	E	Insert
6	F	Page Down
7	G	End
8	H	Backspace
9	I	Tab
10	J	Line Feed
12	L	Clear Screen
13	M	Carriage Return/Enter
18	R	Page Up
19	S	Cursor Down
20	T	Cursor Home
22	W	Cursor Up
24	X	Cursor Reverse
26	Z	Delete
27	[	Escape
80-8F (hex)	N/A	Set Foreground to 0-F
90-9F (hex)	N/A	Set Background to 0-F