HC11 Ports and Alternate Functions

Port A (3I, 4O, 1B)
Timer: Input capture, output compare, pulse accumulation, real time interrupt

Port B (8O)
Memory expansion

Port C (8B)
Memory expansion

Port D (6B)
SCI, SPI

Port E (8I)
Analog to digital converter

Each of the pins of these ports can also be used as discrete input or output pins. For example, if you wanted to interface an LCD to the HC11, you would:

1. Choose an output pin. Example: PA7.
2. Complete a standard interface circuit.
    a. Want to protect the microcontroller from unexpected spikes that might occur in the environment. Therefore, a good design will not connect the LED directly to the output pin, but will put in a buffer.

The DAC08 is a digital to analog converter chip.

Port D

SCI – Serial Communications Interface
SPI – Synchronous Peripheral Interface

PortD

7	6	5	4	3	2	1	0
-	-	SS	SCK	MOSI	MISO	Tx	Rx
		SPI				SCI	

Serial: transmits one bit per clock cycle
Parallel: transmits multiple bits per clock cycle. The most common size is byte-wide parallel.

Disadvantage of parallel transmission – there is more room for error. More wire is also needed.

Serial interfaces, while slower, are simpler and cheaper and are therefore the most common solution. Over long distance connections, there is a limited number of conductors.

SCI – Serial Communications Interface

Implements 0 → 5V RS232 serial-like communication

It is not a true RS232 component because it does not implement the non-return to zero behavior. Instead, it is a universal, asynchronous receiver/transmitter (UART).

The MAXIM232 voltage converter is the classic solution for generating RS232 voltages if needed.

As an asynchronous device, there is no clock signal sent from the transmitter to the receiver.

Transmit (Tx)
Recv (Rx)

SPI – Synchronous Peripheral Interface

It is serial.
Since it is synchronous, there is a common clock known as SCK.
The basic transfer size is byte-wide.

The master initiates communication and provides the common clock.
The slave receives information and does not provide the common clock.
The SS pin, when connected to ground, puts the device into slave mode. The HC11's SS pin is unconnected because you often want it to be the master.

MOSI stands for Master out slave in
MISO stands for Master in slave out

The circular structure means that, for every communication, you not only send a byte, but you also receive one. Perhaps you end up ignoring it. But, if the peripheral wants to send you something back, it can.