

# 1.7 Programmable Components

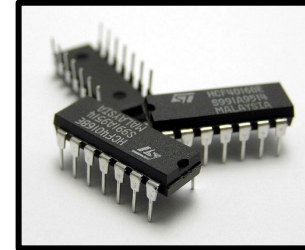
## System Diagrams

These explain how a system works using a simple block diagram. Separate inputs, processes/decisions and outputs are placed in individual boxes. They are linked with arrows (showing the direction or flow) to create a system or subsystem.



### Integrated Circuit

Also known as microchips, integrated circuits are capable of performing specific tasks. ICs can come in different shapes and sizes but most come in a **dual in line (DIL)**. There are many different types of IC, a programmable IC is called a **microcontroller**.



A **dual in line (DIL)** package which means it has a rectangular housing and two parallel rows of electrical connecting pins.

### Microcontrollers

**Microcontrollers (Peripheral Interface Controller PICs)** enable smaller circuits to be produced as they can perform multiple processes. As fewer components are needed boards can be made smaller and often the power consumption is reduced.

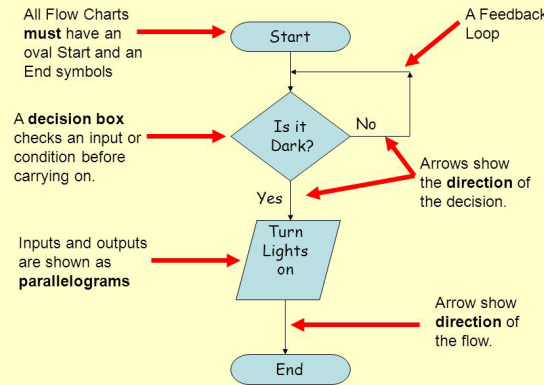
## Flow Charts

Flow charts are a more detailed way to graphically represent systems and can be used to program PICs instead of writing complex programs in a computer language. As a computer program is usually a set of questions with a yes or no answer.

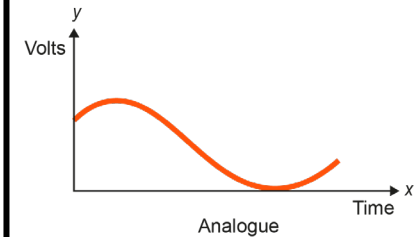
### Key components:

Start / End	Arrows	Input / Output	Process	Decision

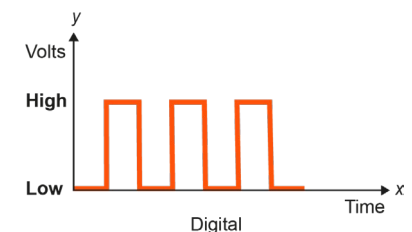
## Flow Chart Example



**Analogue signals** have an infinite range of values between the minimum and maximum points



**Digital signals** are either on or off, and are usually represented by a **0** for off and a **1** for on



**Closed loop systems** rely on a decision and feedback loop to continually monitor and respond to an input or change sensed in the surrounding environment. The output can directly influence the input.

An **open loop system** is a simple linear, sequential process. When the program has been triggered, the flowchart will perform the routine **once** and then **Stop**.

A **Feedback loop** is a loop in a program that goes back to an earlier point to keep repeating that part of the program.

**Time delay** is a program instruction that says 'wait 10' means the program will wait 10 seconds then go on to the next instruction.

A program can be told to **count** how many times it gets an input.