

# Programming Language

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The microprocessor receives its instructions from a program stored in memory. These instructions are in form of binary numbers, the only 'language' that the microprocessor, a digital system, 'understands'. This is known as **machine code**.

Humans do not find it easy or efficient to use binary numbers, and so hexadecimal numbering is usually used to enter, or to list the machine code program.

**High level languages** e.g. BASIC, have been developed to make programming easier. These bear a resemblance to everyday English, and we can learn and interpret them much more readily. Recently a number of flowchart based programmers have become readily available, making programming no longer command specific.

An elaborate program called a **compiler** carries out the process of translating the high-level language into machine code. This process slows down the running of the program. Machine code programming is the most efficient in terms of memory space and execution time.

The complete list of instructions, which a particular microprocessor can execute, is called the **instruction set**. Each instruction can be described by a mnemonic, to make it intelligible to us, or as a hexadecimal or binary number. For example, 'incf' stands for 'increment file' meaning 'add one to the number stored in the file (or register) referred to'. The machine code for this instruction is the binary number 001010.

A program, then, is a series of numbers, identifying what instructions the microprocessor must carry out, together with any data it needs to do this. Embedded in the microprocessor itself, is a program containing the sequence of operations needed to execute each instruction.

The PIC program can be saved in two forms, either in machine code or in assembler language, (the mnemonics). The former is called the **object file** and the latter the **source file**.

**Most PIC are classed as electrically-erasable programmable read only memory (EEPROM) devices**, which means once programmed the device will retain that program until it is electrically erased and reprogrammed. This allows devices to be used a number of times for different applications or for the program to be updated at any time.