



formed as a result of an operation in one of the registers is zero. For example, we can step through a table of values by loading the total number of values into a register and subtracting one from the total every time we deal with a value. When the total reaches zero, the condition code bit tells the processor it has no more items in the table to deal with and can go on to another instruction. This type of instruction allows us to perform selection (IF statements) and looping (FOR... NEXT, WHILE... WEND, REPEAT... UNTIL statements).

Many processors maintain a *zero page*, which normally consists of the first 256 memory locations (from hex 0000 to 00FF). Values stored here can be accessed using an eight-bit address, thus making the instructions shorter and quicker to perform. The 6809 processor generalises this concept by having an eight-bit *direct page* register that provides the extra eight bits of the full address when referring to the zero page. By changing the value in this register, the zero page can be positioned anywhere in memory, or you can even have more than one of them.

A machine code program will consist of a sequence of instructions intermingled with data and addresses. Some people can actually program satisfactorily dealing directly with numeric values for all these quantities, but most of us would find this rather difficult. The Assembly language of a processor enables us to write machine code programs using much more convenient

mnemonics (for instructions) and labels (for addresses and data). Thus, for example, if we need to load the data at a memory location into the accumulator we can write:

```
STORE FCB 0
```

to reserve a place in the memory that we can refer to as STORE, in which we have temporarily placed a zero. FCB is not really an instruction, but a directive telling the program that translates Assembly language into machine code that it must substitute a particular address whenever it encounters the word STORE. Later in the program when we want the value stored there to be loaded into the accumulator we can use the instruction:

```
LDA STORE
```

which will take whatever value is stored there and load it.

Assembly language programs need translating before they can actually be run and this is the job of a program called the *assembler*. These do not need to be complicated programs because there is almost a one-to-one relationship between the Assembly language statements we write and their machine code equivalents. All that has to be done is to make the substitution and keep track of which names refer to which values or addresses.

In the next instalment, we shall study the internal structure of the 6809 processor more closely, and start to look at what instructions we have available to us.

#### Popular Choice

The two most popular 6809 machines are both home computers: the Dragon 32K and 64K, and the Tandy Color Computer. There is also a wide variety of 6809 development systems in use in universities and polytechnics. The Tandy Color Computer and the two Dragon models are very similar internally, and although Dragon Data has left the computer marketplace, Tandy has agreed to provide software and technical support for Dragon users.