# LISP-ENGLISH

## ENGLISH-LISP

LISP was developed in the early Sixties as a list processing language, and has since been widely used in the field of Artificial Intelligence, which involves continually searching and comparing lists of data, relationships and responses. Unlike BASIC, where the emphasis is on the flow of the program through a sequence of instructions and procedures, LISP is a 'functional' language, in which the elementary command set can be built up to form more sophisticated functions with names determined by the programmer. For example:

```
(SETQ ARRAY1 '(4 7 2 5 1))
```

creates a list called ARRAY1 whose elements are the numbers (4 7 2 5 1).

```
(CAR ARRAY1)
```

gives the first element of the list ARRAY1 (4, in this case).

```
(CDR ARRAY1)
```

gives the list ARRAY1 with its first element removed — (7 2 5 1) in this case.

```
(SETQ ARRAY1(CDR ARRAY1))
```

will turn the list ARRAY1 into a copy of itself excluding its first element.

LISP also lends itself to 'recursive' applications — problems that after a simple function is applied are reduced to a smaller but identical problem.

# LOGO-ENGLISH

## ENGLISH-LOGO

LOGO was developed by a psychologist working on Artificial Intelligence in the context of the classroom. It resembles FORTH in both its interactivity and its use of a number of 'primitives' that can be incorporated in user-defined functions. But the fundamental principle it embodies is that the way to learn something is to teach somebody else — namely the computer — how to do it. It is considered an innovative language that will create a completely new way of teaching children to think.

LOGO is usually called a 'turtle' language because it is often used to control a small wheeled robot called a turtle (see page 34).

Here is a LOGO fragment that draws a symbolic house as a square of specified size with a triangle on top:

```
TO TRIANGLE LENGTH
  REPEAT 3(FORWARD:LENGTH RIGHT 120)
END
TO SQUARE LENGTH
  REPEAT 4 (FORWARD:LENGTH RIGHT 90)
END
TO HOUSE LENGTH
  RIGHT 30
  TRIANGLE :LENGTH
  LEFT 90
  SQUARE :LENGTH
END
```

Now typing HOUSE 15 will cause a 'house' with a side length of 15 units to be drawn.

# FORTH-ENGLISH

## ENGLISH-FORTH

FORTH resembles LOGO in being a functional interactive language, but has the important distinction of being the first language other than BASIC to be implemented as native on a home computer — the Jupiter Ace. The language consists of a number of defined functions, called the 'primitives', and has the ability to define new functions in terms of these. Mathematical operations in FORTH are 'stack-oriented', which means that computer memory is treated as an expanding and contracting list of data and this results in the last operation always being at the head of the list. A further consequence of stack-orientation is that algebraic notation is not used. Instead of writing (12 + 4)/2 to find the mean of 12 and 4, in FORTH you must write 12 4 + 2 /, which is the same sum in Reverse Polish rather than algebraic notation.

All this makes FORTH a very different kind of language, forcing a very different view of problem-solving and computer processes. It's almost a step back down the high-level languages hierarchy.

This FORTH fragment defines two new words called SHOUT and CHORUS:

```
: SHOUT (prints "SHAZAM !")
    ."SHAZAM !" ;
: CHORUS (uses SHOUT in a loop)
    0 DO SHOUT LOOP;
```

Now typing n CHORUS will cause SHAZAM ! to be printed n times on the screen.

On these pages, we give you an overview of the most common programming languages available for home computers. As with human languages, the more programming languages you've mastered, the easier it is to adopt a new one.