

# — OVERLAY BASIC —

It is possible to write reasonably structured, fast BASIC programs using BBC-BASIC. Among the features which make this possible is the way programs can be broken down into small building blocks, namely procedures and functions. It has been said that no building block of program should become larger than one page of text so the BBC-BASIC procedures are essential to good programming. Unfortunately with BBC-BASIC (and most others) the entire program (procedures included) must be resident in memory all the time.

Ordinary BBC-BASIC, therefore, has two significant disadvantages. Firstly it is easy to run out of memory. Secondly, it is awkward to generate a library of useful procedures which can easily be incorporated into many programs. The practice of using and building upon a library of procedures is fundamental to cost-effective, worthwhile programming. It allows new programs to be built on the shoulders of others. The concept is implicit in languages such as FORTRAN, Pascal, C, Logo etc. and the technique should be practiced by students of all ages.

OVERLAY BASIC uses a classical computer technique to get around these two disadvantages, namely overlaying. Others have produced, and sometimes sold, overlaying methods for the BBC-micro which usually require the programmer to take special actions, make special  $\leftarrow$  calls, linenumbers the procedures in a non-contradictory way etc. OVERLAY BASIC is different.

OVERLAY BASIC is totally transparent. You call procedures in the usual way (PROCname), the only difference is that the procedure you are calling need not be in memory at the time. It will be automatically hauled in from disc, used and forgotten, leaving room for the next procedure. You do not have to worry about linenumbers clashing, local variables remain local (as usual). In other words OVERLAY BASIC is a product which distinguishes itself by what you don't see. Procedures do not have to clutter up your program (and mind) and you can enjoy the main advantage of having named procedures; you can develop libraries of procedures for your own or shared needs.

It works in the classical way. Your program uses BBC-BASIC as normal but as soon as the PROCEDURE NOT FOUND (or function) error is generated the OVERLAY BASIC EPROM intercepts the error and immediately looks for the procedure on disc in the appropriate library. Once found, the procedure is loaded into the BASIC 'stack' (along with the usual parameters). PAGE is then set to point to the beginning of the procedure and the procedure is executed, consequently the linenumbers cannot clash with the rest of the program. Since the procedure (or function) is on the stack which is 'elastic' it does not have to be a particular size. Unlike overlay systems described in some books the overlaid procedure can call other procedures, either already in memory (itself for example) or from disc; the stack simply builds down to accommodate them all. As each procedure is finished, it, and its local variables, are removed from the stack leaving room for more.

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OVERLAY BASIC also has some utilities which make it easier to manipulate programs. If you are in an overlaid procedure when an error (or escape) occurs the error message tells you that you are indeed in an overlay. If you then LIST you will only see the errant routine. It can then be corrected, PSAVEd (procedure save) and you can return to the main program by typing MAIN. OVERLAY BASIC was indispensable for developing the SoftOscilloscope program (an analogue data gathering and display program, also available from Elsevier-BIOSOFT). The SoftOscilloscope program contains over 32k of BASIC (let alone data, mode 4 graphics and a chip) but it was easy to develop and can be run using an ordinary BBC-B computer with DFS.

Unlike large programs which require extra hardware memory, large overlaying programs and procedure libraries can easily be distributed to unmodified computers. A 'run time module' RAM version of OVERLAY BASIC is included on the disc. This allows overlaying programs to run on computers *without* the OVERLAY BASIC chip. This is particularly useful in schools and universities. Only the library of distributed procedures and functions can be executed as the OVERLAY system saves the procedures in a protected form. It is difficult even to examine the procedures without the EPROM, especially if the escape key is disabled. This makes a procedure library much more like those found on 'professional' systems which have huge libraries of callable subroutines.

OVERLAY BASIC has been used on BBC-B, B+ and Master computers which use, BASIC 1, BASIC 2, BASIC 4 together with Acorn DFS and ADFS, Watford DFS, Solidisk ADFS and DFS. In each case it took advantage of most of the extensions; it is particularly effective with a Winchester disc and ADFS.

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