

systems can be set up and tested before commitment is made for the complete system. For example one 20K byte file, describing the ICL management structure, was set up in 45 hours, of which all but about 10% was purely clerical. Files of chemical and biological information have been set up with equivalent amounts of effort. In addition a simulated conversational system (Reynolds, 1970b) was set up in two man-days, including everything from systems design to handpunching the trial data.

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Correspondence

To the Editor
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Sir,

ALGOL in Wonderland; or, there and back again

Professor Barron's recent article (*The Computer Bulletin*, Volume 15, p. 153) has rung with the present writer not so much a bell as a Treble Bob Major. That the situation he describes need never occur can be illustrated by contrasting the ALGOL compilers of two machines. Let us call the first, following Barron, Brand Z—one suspects larger, faster and more elaborate even than his Brand X, but certainly in the top league. It was rumoured before its appearance that Z had a 'good' ALGOL compiler. What this means is now uncertain—'good' compared with those of certain well-known large manufacturers' seems the most likely explanation.

On compilation one can get, on request, a source listing, a fairly useful identifier table, and a not particularly useful core map. If there are errors in the source text, one instead gets a list of error messages, e.g.

DELIMITER MISSING

of which there are about ninety types.

So far, so good, even allowing for the fact that many of the messages are not so immediately informative as the example given. However, the programmer is referred to a line of text, which is not always the offending line. A particularly bad example was when the message

STOP COMPILATION

appeared at the first line of the text, which read

begin

(acceptable, by the way—no question of missing title or anything like that). No other errors were shown. This seems to have occurred because the compiler does more than one scan of the text—an earlier scan (one which, of course, generates no diagnostic messages!) ran into trouble because of some mispunching later, and hence this message appeared at the beginning of the later scan (which, however, is not allowed to proceed and find out for you *where* the mispunching has taken place). A similar situation seems to have been responsible on another occasion for the first line of text, reading

begin integer m, n;

to be greeted with the startling announcement that the declarations had exceeded the (not inconsiderable) capacity of the machine!

Contrast this with what would have happened if the same program had been submitted to another machine, which in this case can be

named: an Elliott 903. This is so small (8K 18-bit words, paper tape input-output, control teletype) that the compiler has to be split, into a translator and an interpreter, and even then the ALGOL is a subset. The translator produces (in one scan, as the source program is going through the tape reader) an object version on paper tape. Simultaneously one can obtain on the teletype a list of the relative machine addresses of every **end**, label, and the start of every **procedure**. These are invaluable at run time; run-time error messages give the relative address of the point of breakdown, which in most programs means that the area of search can be narrowed down to a statement or two. And there is even a second, 'return' address given which, in the case of an error in a procedure body, helps one to find at which call the error occurred.

If errors are encountered at translation time, an error number is given (up to 112, so with warnings as well there are over 20 extra error types compared with Z; nearly all are accurately diagnosed). The offending line of text is shown, *and the character at which the error was detected*. This last facility means that an experienced programmer seldom needs to look up the meaning of the error number in his pocket manual; while its value to beginners (particularly where consequential errors are concerned) is immense—it is an extremely valuable teaching aid.

This system is not perfect. For example, it would be a great improvement to have, with the relative address of each **end**, the relative address of the matching **begin**; but there is a limit to what can be done in 8K of store.

But this is the point; the example shows that good diagnostics are not beyond the wit of man to devise, nor too wasteful of valuable store and processor time to be worth including. If good ALGOL diagnostics can be had on a machine with 8K store, they can be had with Brand Z, Brand X, or any other. And, in case computer manufacturers start making remarks about it being all very well for universities to spend their time devising fancy systems, it should perhaps be recorded that the Elliott 903 compiler is the manufacturers' own.

Yours faithfully,

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