PROVISIONAL

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THE USE OF

FORTRAN

ON THE

ELLIOTT 503 DIGITAL COMPUTER

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INTRODUCTION

One of the chief advantages of the implementation of ALGOL on the 503 is to make possible the use of programs and procedures written by users of other computers. Many of these programs have been written by leading mathematicians and represent the latest advances in computing techniques.

However, since FORTRAN has been in general use for longer than ALGOL, it is inevitable that some routines are available in FORTRAN which have not yet been written in ALGOL. Some of these routines will be peculiar to a particular installation, or written for a special job; and others will be available to those who have access to the SHARE library. In order to make use of such routines on the 503, it will be necessary to recast the text into ALGOL. This would not be a difficult task since the languages are very similar, and where they differ, ALGOL is the more powerful. Nevertheless, the recasting of the text would require fairly detailed knowledge of both languages, and it would be a tiresome job, liable to lead to numerous human errors.

To avoid this difficulty a program will be provided to perform the conversion automatically on the computer. This program is designed to accept either the original FORTRAN cards if these are available, or alternatively, a version of the program transcribed onto paper tape directly from a SHARE listing. There will be no need for any "pre-editing" of the text, or any human intervention at all.

The use of ALGOL as an intermediate language in the conversion of FORTRAN to machine-code offers several advantages. Firstly, it will help the ALGOL programmer to understand the computing process involved in a FORTRAN program; secondly, he will be able to make adaptations or improvements to the ALGOL text if this is required. But most important of all, FORTRAN functions and subroutines will be converted to ALGOL procedures, which can then be incorporated in any program, the main part of which can still be written in ALGOL. Experience with program interchange has shown that the transfer of subroutines, or procedures, is far more valuable than the transfer of complete programs, which are often too specifically oriented to the needs of a particular installation. None of these advantages would be available if the translation were made directly into machine code.

The emphasis placed on ALGOL in the conversion scheme has yet another direct advantage; it encourages the use of that language as the single standard method of programming the 503. The implementation of a more FORTRAN-oriented scheme might have the effect of dividing 503 users into two mutually exclusive groups, writing in different languages, and having no means of communication. This used to be a common situation between users of computers of different makes or manufacturers. It was hoped that the introduction of Automatic Programming would alleviate this difficulty; it turns out that some

computers will have so many different languages that program interchange between installations will be impossible even when they own identical computers.

There is another disadvantage in disseminating several programming languages. The users of each language will no longer be able to benefit from the undivided attention of the manufacturer in the provision of maintenance, improvements, and auxiliary services. This current range of these services include, in the case of ALGOL :

1) The updating of the translator to incorporate advances in programming and compiling techniques.
2) The publication of textbooks and reference manuals for the users of the language.
3) The provision of educational courses for training of programmers.
4) An advisory service to deal with customer's queries and difficulties.
5) The production and publication of a library of programs and subroutines.
6) Assistance to the Users Group in the testing, description and distribution of programs and subroutines.

For these reasons, even the largest computer manufacturers have decided to standardise on a single programming language. The choice for the Elliott 503, in

common with most other European computers, has fallen upon ALGOL 60, which is recognised as the best language generally available for those who have no prior commitment to some other programming language. It represents an advance over FORTRAN, similar to the advance made by FORTRAN over a good symbolic assembly language.

The decision to adopt ALGOL as a standard for the 503 does not mean that we shall neglect customers who use FORTRAN. The main requirement of such customers is to be able to run their existing FORTRAN programs immediately on delivery of the 503. This is ensured by their conversion into ALGOL, and subsequent translation by the 503 ALGOL compiler.

The second requirement is to be able to transfer data between the 503 and other computers; possibly the one which has been replaced by the 503, or possibly one owned by a different branch of the same company. Alternatively, the use of an existing IBM 1401, or other off-line peripheral devices may considerably increase the power of a 503 installation. To meet this need, the input and output devices of the 503 are IBM compatible, and a software package based on the FORTRAN system is available. This package is integrated into the ALGOL systems, and FORTRAN-type input and output statements will accept and produce the very same type of records and formats as are accepted and produced by any IBM or IBM-compatible computer.

The third requirement of FORTRAN users is to make the change-over to ALGOL as speedy and painless as possible. In order to assist the reorientation of programmers, we provide a short manual, which gives all information necessary for a FORTRAN programmer to write in ALGOL. Furthermore we will arrange a one-day conversion course at the convenience of the customer. It is expected that a few hours study and a little practice is sufficient to gain a working knowledge of ALGOL; an understanding of the more advanced features can be acquired at leisure.

It cannot be denied that a change-over from one language to another is a matter involving some initial inconveniences, even if the new language represents a significant advance on the old. Nevertheless, the inconvenience involved in a change-over from FORTRAN to ALGOL is hardly more serious than that involved in the change-over between two versions of FORTRAN, for example - 1620 FORTRAN and 7090 FORTRAN II, or 7090 FORTRAN II and FORTRAN IV. It is hoped that the compensating rewards will be greater in the case of ALGOL than in the case of FORTRAN.