FORTRAN IV

SPERRY UNIVAC

UP-8813

H

This document contains the latest information available at the time of preparation. Therefore, it may contain descriptions of functions not implemented at manual distribution time. To ensure that you have the latest information regarding levels of implementation and functional availability, please consult the appropriate release documentation or contact your local Sperry Univac representative.

Sperry Univac reserves the right to modify or revise the content of this document. No contractual obligation by Sperry Univac regarding level, scope, or timing of functional implementation is either expressed or implied in this document. It is further understood that in consideration of the receipt or purchase of this document, the recipient or purchaser agrees not to reproduce or copy it by any means whatsoever, nor to permit such action by others, for any purpose without prior written permission from Sperry Univac.

Sperry Univac is a division of Sperry Corporation.

FASTRAND, SPERRY UNIVAC, UNISCOPE, UNISERVO, and UNIVAC are registered trademarks of the Sperry Corporation. AccuScan, ESCORT, PAGEWRITER, PIXIE, and UNIS are additional trademarks of the Sperry Corporation.

This document was prepared by Systems Publications using the SPERRY UNIVAC UTS 400 Text Editor. It was printed and distributed by the Customer Information Distribution Center (CIDC), 555 Henderson Rd., King of Prussia, Pa., 19406.

©1980 — SPERRY CORPORATION PRINTED IN U.S.A.

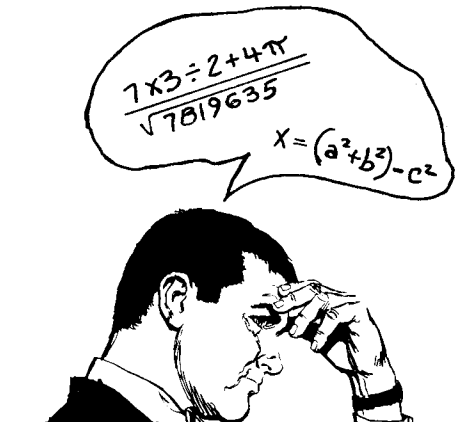
what is FORTRAN IV?

You must use some system of instructions to direct a computer. These instructions are called programming languages and many languages have been developed to solve different data processing situations. FORTRAN IV is a programming language designed for extensive use in mathematical, scientific, and technological areas.

SPERRY UNIVAC FORTRAN IV is based on American National Standard FORTRAN, X3.9-1966, developed by the American National Standards Institute (ANSI). This standard is used by the federal government and has gained wide acceptance in industry. SPERRY UNIVAC FORTRAN IV conforms in all respects to the standard.

what it can do for you

SPERRY UNIVAC FORTRAN IV appeals to the scientific community of computer users because it helps to solve many mathematical and scientific problems. It is particularly good for solving problems that contain many formulas, computations, or variables. It also allows you to use instructions stored on disk, such as common mathematical functions, so that it is not necessary for you to write them yourself.



structure

FORTRAN IV programs consist of one main program and subprograms as you need them. Generally, the main program contains the basic logic required to solve a given problem. The subprograms can be used by the main program to eliminate repetitive coding of procedures used many times in a program.

Basically, FORTRAN IV programs consist of:

1. A statement that indicates whether the program is a main program or a subprogram

2. Nonexecutable statements that describe the arrangement and characteristics of data

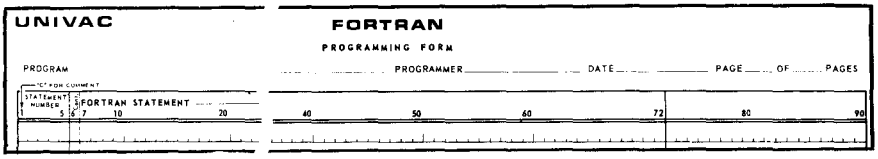
3. Definitions of functions that may be referenced in another statement. These definitions allow a calculation that is required repeatedly in a program to be coded only once.

4. Executable statements that specify actions needed by your program

5. An END statement that terminates your program

how to use it

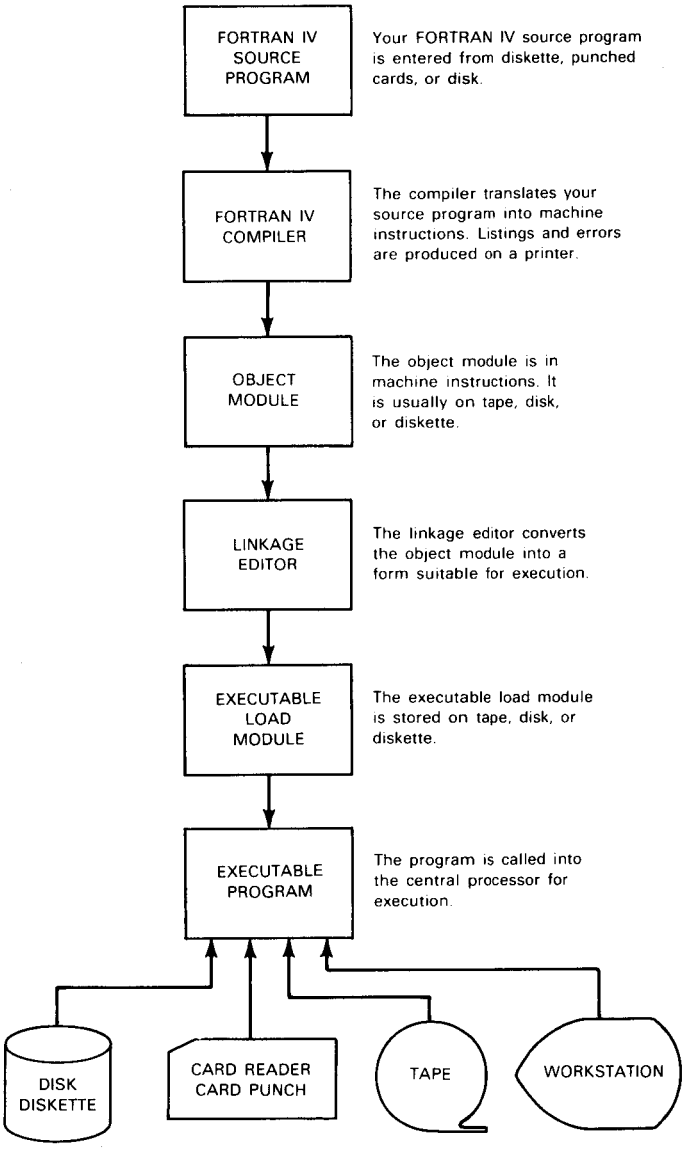
The FORTRAN IV program you write is called a *source program*. You write the FORTRAN IV statements on a *coding form*:



In addition to your source program, you must also use *job control statements* that tell the computer how you want your FORTRAN IV program executed and what computer facilities are needed (tapes, disks, etc). You enter your source program and job control language by diskette, punched cards, or disk.

Before the computer can use your data, the source program must be translated into machine instructions understood by the computer. This translation is done by the FORTRAN IV *compiler* supplied by Sperry Univac. The compiler analyzes the source program and produces an *object module*. This translated output of the FORTRAN IV compiler is automatically connected to all required system services by a system utility called the *linkage editor*. The resulting *load module* is now ready for execution.

GENERATION OF A FORTRAN IV PROGRAM



When it is executed, the program may use a variety of input/output devices.

workstation support

You can use the keyboard and screen at the workstation to interactively develop your programs at compilation and test your programs during execution.

You can compile your programs at a workstation. Then, at execution time, you use the workstation to access or enter data in the same way you would use a card reader or printer for input/output. This allows you to get immediate feedback in the solution of problems during the execution of your program. With the workstation, you have the flexibility to try different methods of solution in rapid succession. The entry of data at the workstation prevents many errors, since you can see that the data you enter is correct. Error messages that aid you in correcting errors appear on the workstation screen during the execution of your program.

Screen formats also can aid you in program development. During the execution of your program, you can use screen formats that you

created earlier to assist you in solving problems at the workstation. These screen formats can include prompting questions to guide you as to which path to chose to solve a problem. For instance, you may devise three formats (which might include a question-and-answer dialog) that could solve a problem in three different ways. You pick the format that is best for the solution of your problem. Thus, screen formats make your programming efforts more efficient.

You'll find that the workstation is a valuable tool in the interactive development of your programs.

advantages

Why is FORTRAN IV so appealing to users? Because:

- *English-like statements and standard mathematical notation* make the programs easy to code, understand, and use. Extra documentation is often not needed. For example, to find the average of two numbers, you could use this statement:

  AVRGE = (A + B) / 2.0

- *Training time is low* for new programming personnel because FORTRAN IV resembles language ordinarily used for the solution of problems. There are only about 40 statements for you to learn and understand.

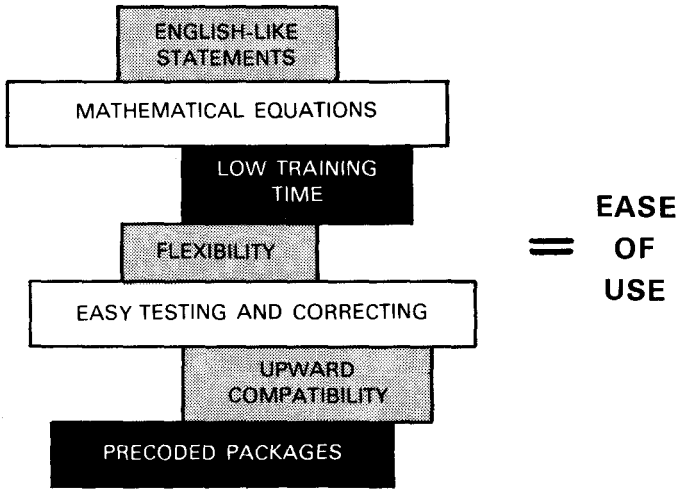
- *Programs are easy to test and correct* because there is a printed listing of the source statements, an error diagnostic listing, and a main storage map. Error messages appear at the workstation screen during the execution of your program.

- *FORTRAN IV is flexible* so that you can enter your data from diskette, punched cards, workstation, or disk.

- *Upward compatibility* with larger SPERRY UNIVAC computer systems is possible since FORTRAN IV is standardized.

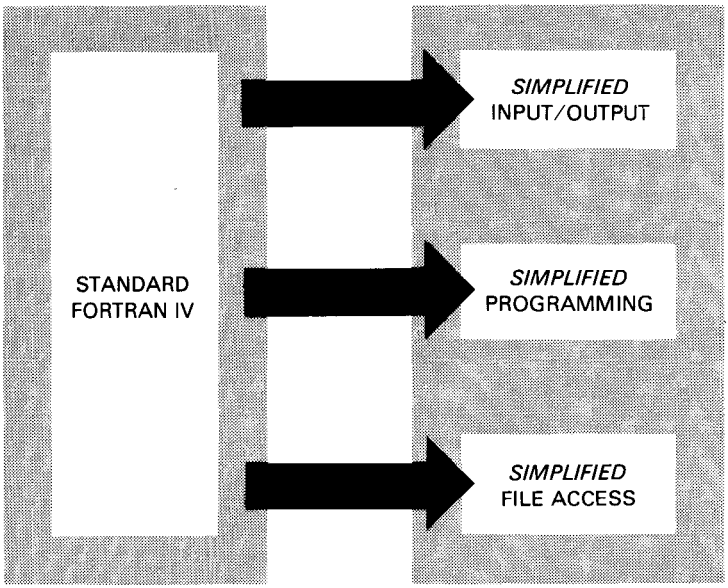
- *Precoded packages* in standard FORTRAN can be used with your application programs to simplify your programming efforts.

All these advantages make FORTRAN IV *easy to use*; that's why it's so popular.



extensions to the standard

SPERRY UNIVAC FORTRAN IV complies with all aspects of the ANSI standard. To increase the utility of SPERRY UNIVAC FORTRAN IV, we've made many extensions to the standard. These additional features give you simplified input/output of data, ease of programming, and direct access files (that is, files whose records are accessed in any order). These extensions make our FORTRAN IV even more powerful and useful. See your local Sperry Univac representative for documentation on these extensions.



programming aids

SPERRY UNIVAC FORTRAN IV provides many aids to make programming easier. For example, you can direct the compiler to produce several types of listings to reduce your efforts when writing and correcting FORTRAN IV programs:

- A *source code listing* shows the program as it is compiled.
- A *diagnostic error listing* provides a detailed account of the errors the compiler encounters.
- A *storage map* shows the layout of all variables and data in the program.

During execution of your program, error messages appear at the workstation screen.

sample program

This sample program illustrates the use of some of the SPERRY UNIVAC FORTRAN IV language elements. The program processes a simple problem, so not all the features of FORTRAN IV are used.

This program allows you to calculate the average of a series of numbers. The lines preceded by the letter *C* indicate comment lines that only provide documentation; they do not affect the execution of the program. Notice that the program contains a loop, which allows you to repeat a procedure as many times as you want without respecifying the statements.

SAMPLE PROGRAM

```
C COMPUTE AVERAGE OF NUMBERS
C INITIALIZE COUNT AND TOTAL
      KOUNT = 0
      TOTAL = 0
C OBTAIN VALUE
   30 READ(1,10) VALUE
   10 FORMAT (G10.0)
C TEST FOR END DATA
      IF(VALUE .GT.9.0E8) GO TO 20
C UPDATE RUNNING TOTAL AND RUNNING COUNT
      TOTAL = TOTAL + VALUE
      KOUNT = KOUNT + 1
C REPEAT LOOP FOR MORE VALUES
      GO TO 30
C COMPUTE AVERAGE AFTER LAST VALUE
   20 XMEAN = TOTAL / KOUNT
C PRINT AVERAGE AND TERMINATE
      WRITE(3,40) XMEAN
   40 FORMAT(' AVERAGE VALUE = ',F10.5)
      STOP
      END
```

summary

SPERRY UNIVAC FORTRAN IV is a programming language developed for mathematical and scientific processing needs. Programming in FORTRAN IV is easy because it consists of English-like statements and mathematical equations. Workstation support allows you to interactively develop your programs at compilation and test your programs during execution. You save considerable time in training, programming, and correcting programs. These qualities have made FORTRAN IV one of the most widely used languages for scientific users.