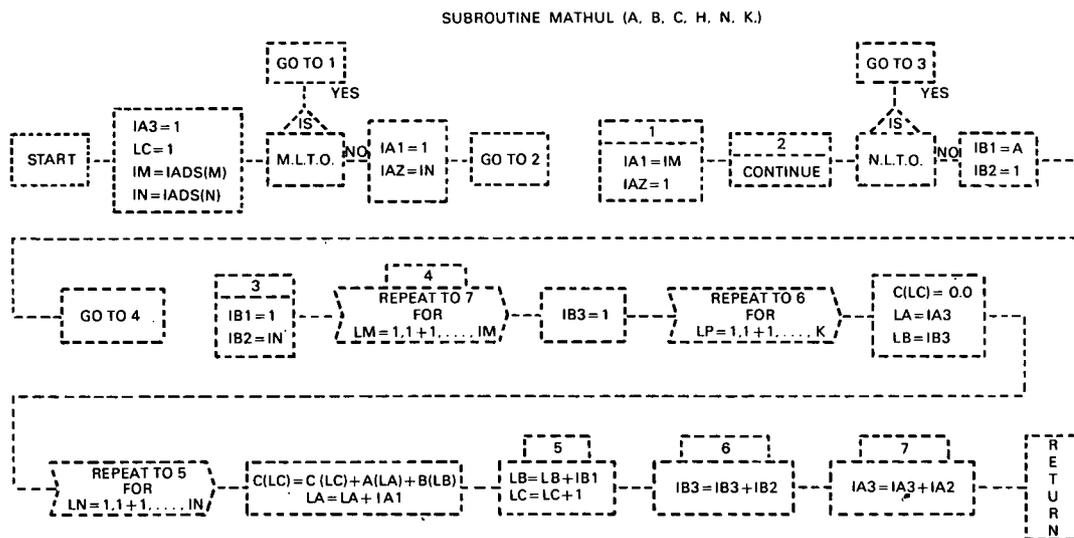


# NASA TECH BRIEF



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## Fortran Program Flowchart Is Automatically Produced



### The problem:

Computer programs, particularly complex Fortran programs can ordinarily be understood only with the aid of a program flowchart. In addition to their time consuming preparation, hand-drawn flowcharts must be constantly updated as changes are made in the program or the original flowchart will be completely unrelated to the final program.

### The solution:

A computer under control of a program called FLO-TRAN automatically produces flowcharts of Fortran program source decks fed to it. The computer output unit produces the flowcharts on either 35mm film or paper.

### How it's done:

The FLO-TRAN flowcharting control program is entered into the computer in the form of a binary deck

assembled from the original MAP (Macro Analysis Program) source deck. This prepares the computer for Fortran source decks and special control instructions prepared by the individual desiring the flowchart.

The interpretive section of the FLO-TRAN control program reads and interprets each of the inputs and transfers control to the executive section, which performs the necessary task. When a Fortran source deck is encountered, control is transferred to a translator that interprets and classifies the Fortran inputs. The translator then combines the information from the source cards with the control words necessary to produce the desired flowchart symbol. As the information is being processed, a binary output tape is produced that contains all the necessary source and control data to generate the flowchart on the peripheral graphic output unit.

(continued overleaf)

**Notes:**

1. The special control instructions of FLO-TRAN permit easy titling, listing, and insertion of special symbols.
2. When changes are made to the original source deck, FLO-TRAN will readily produce a new flow-chart incorporating the changes.
3. Since the translator is an isolated part of the FLO-TRAN program, the program can be modified to produce flowcharts of source programs written in other programming languages.
4. FLO-TRAN could point out more efficient routes that sections of the source program should take.
5. FLO-TRAN could materially aid a programmer to "de-bug" a new program.
6. New users of a program can use FLO-TRAN to understand the overall "logic" of the original programmer.
7. Inquiries concerning this innovation may be directed to:  
Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama, 35812  
Reference: B66-10062

**Patent status:**

No patent action is contemplated by NASA.

Source: David J. Clark and Donald Williams  
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under contract to  
Marshall Space Flight Center  
(M-FS-369)