# NASA TECH BRIEF
## Goddard Space Flight Center

## Optical Design and Analysis Program

### The problem:

Existing computer programs for optical system analysis and telescope design have several drawbacks: ambiguity in diagnosing input data errors; dependence on a specific system configuration; inconvenient input data format; bulky size, requiring the use of large computers; and function intradependence, preventing the program from being trimmed or modified to fit a particular computer or system.

### The solution:

A new computer program provides efficient handling of optical analysis equations, from both the general skew and paraxial ray standpoints, and is sufficiently general in approach to accept a wide variety of systems which can be introduced in a convenient form. Meaningful diagnostic messages are generated to aid the user in pinpointing any inconsistencies in the system definition.

### How it's done:

The program uses standard optical system analysis equations, as outlined in the "Military Standardization Handbook of Optical Design." It is designed to trace the exact paths of up to 800 representative rays through any number of symmetric or asymmetric optical systems. Rays may also be traced two at a time through a paraxial ray trace.

The functions of the program are segmented and the functions within each segment are defined such that, while the segments are not autonomous, the program can be converted to other computers or other languages, and changes in method can be incorporated easily.

The program is sufficiently general in approach to accept a large spectrum of systems defined by normal, tilted, or decentered planar surfaces. Rotationally symmetric quadric, aspheric, and deformed spheric and conic surfaces may be input in any combination of up to 22 surfaces per system.

### Notes:

1. This program is written in FORTRAN IV for the CDC-3000L computer, and is small enough to be executed on other small computers. The program uses approximately 21,000 24-bit words of core.
2. Requests for further information may be directed to:

   COSMIC
   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30601
   Reference: B71-10456

### Patent status:

No patent action is contemplated by NASA.

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