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NASA TECH BRIEF

Goddard Space Flight Center

Mathematical Analysis for the Performance Assessment of Space Communication Parameters, IBM-360 Version

The problem:

To optimize parameter values used in determining the communication capability for a one-way transmission.

The solution:

Calculations to determine communication capability of a pulse or digital transmission link are basically dependent on a single equation which specifies the probability of detection error for one-way transmission.

How it's done:

The variants for the above equation allow, for different types of noise, both modulation and demodulation techniques. This equation also documents the interrelationships among the communication system parameters of range, transmitter power, antenna gains, noise, etc. In an equation with many variables it is possible to trade one parameter against another and still maintain desired performance. This optimization concept was expanded to include all applicable parameter values in the given for both weight and cost. The program COPS (Communication System Optimization Program with Stops), optimizes output and minimizes cost. Fixed values or maximum or minimum values (stops) can be given for any parameter value. The COPS program was written in FORTRAN IV, requiring a fair degree of programming knowledge to utilize it, therefore COPTRAN (Communication System Optimization Program Translator) was written as a buffer program to translate more easily understood terms into statements acceptable by COPS. This should prove to be a useful tool to aid in investigative programs for space communication.

Notes:

1. This program was written in FORTRAN IV for use on an IBM-360.
2. Inquiries concerning this program should be directed to:

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   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30601
   Reference: GSC-11523

Source: L. Grayson of
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