NASA TECH BRIEF

Computer Program Determines Inventory Size

The problem:

To determine the optimum size of a small inventory of relatively complex or expensive items.

The solution:

A FORTRAN IV computer program that calculates the optimum initial inventory size in a problem based on minimum costs for the assumed model of inventory behavior, and within the restraints of relevant cost and time factors specified by the user, for the specific problem.

How it's done:

The program is based on a model that assumes a small replenishable inventory of expensive items that are withdrawn according to a Poisson distribution with some known average rate. Withdrawal of an item from inventory creates an immediate reorder, and delivery time intervals are assumed to be exponentially distributed. Queues are not considered in the model; that is, service is instantaneous and requests for unavailable items are cancelled immediately.

The inventory control program is also particularly applicable to damageable and repairable items. In this situation the number of items that fail in a given time interval is assumed to be Poisson distributed and the repair or replacement times are exponentially distributed.

The cost function for controlling this type of inventory balances the cost of acquiring items that may never be used against the cost, due to unfilled demands. The optimum initial stock size is determined by the minimization of total costs in this balance. This is established on the basis of a solution of differential equations for the first and second moment of the inventory-size distribution.

The computer program that performs this optimization is written in FORTRAN IV and is limited to inventories of size 40. The required input parameters to the program are the failure or withdrawal rates, replenishing rate, cost factors, and the time interval over which the inventory is to be controlled.

Notes:

1. This program can be used in situations where the initial cost of purchase is large, when there is a need for a balanced inventory, on a short production run, or in a similar situation where there is a relatively small inventory of expensive or complex parts.

2. Inquiries concerning this innovation may be directed to:

    Technology Utilization Officer
    Marshall Space Flight Center
    Huntsville, Alabama 35812
    Reference: B66-10506

Patent status:

No patent action is contemplated by NASA.

Source: Hans Kaspar
of North American Aviation, Inc.
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Category 01