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INFORMATION-HANDLING
FOR ACCELERATOR CONTROL
(Introductory Remarks to a Series
of Reports on the Subject)

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Internal Memorandum

M Report No. 265-A

May 1961

Project M
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Stanford, California

INFORMATION-HANDLING FOR ACCELERATOR CONTROL

An information-handling subsystem is an integral part of any control system and its nature substantially affects the control operation. A control system is made up of three subsystems: (1) Measurement, (2) Information-handling, and (3) Activation. The measurement subsystem provides the original data necessary for control purposes. The activation subsystem makes the actual changes and adjustments to the components as needed for control of the process. The information-handling subsystem ties together the measurement and activation subsystems to effect control.

The principal functions of the information-handling subsystem are data assembly and transmission, data processing, and information presentation. In this concept of control the decision-making function is also included in the information-handling system. The input to the information system is measured or observed data. The output is information to be used in changing the measured conditions, either immediately for direct control, or at some deferred time for indirect control.

In practice, information-handling subsystems encompass a wide range. For example, a wire which ties together a thermocouple and a relay to accomplish temperature control of some device is the most elementary type of information system. This is one extreme. At the other extreme are the enormous complexes needed for information-handling in control of automated industrial or military processes. There will be literally thousands of individual or local control circuits, complete in themselves, needed for protection or regulation of accelerator components.

The series of reports introduced here is concerned with the larger scope of accelerator control, the over-all control needed for operation and maintenance of the two-mile machine as a complete ensemble. There will be a minimum of five reports in this series, each covering a major aspect of information-handling. The titles of the reports are:

1. Data Communication.
2. Data Processing.
3. Information Presentation.
4. Decision Making.
5. Handling of Special, Low-Volume Requirements.

Each report will be in two parts. The first part will be devoted to technical considerations pertinent to the accelerator application. The second part will investigate cost factors and include some budgetary cost estimates in those areas where sufficient insight exists as to the eventual equipment requirements. The reason for two-part reports is that technical considerations can be viewed as truisms which will pertain, regardless of final information-handling requirements. Any presentation of this aspect will have some permanent value. On the other hand, cost factors and estimates are based upon equipment configurations and are almost wholly dependent upon the assumption of a finite set of requirements. At this phase of the program there is little substance to estimates of either volume or nature of the information-handling requirement for control purposes and, consequently, the cost aspects of these reports have been separated to emphasize their limited use. In many instances assumptions will be needed in order to bridge the gaps where requirements are not presently formulated or are incomplete. Furthermore, the extent of the investigations in some areas will be shallow, as a complete analysis of an information system of the scope needed for accelerator control is obviously beyond the capabilities of one person. Despite these limitations, the reports should serve a useful purpose in, first, revealing the existence and basic nature of the requirements of an information-handling subsystem and, second, showing the scope of work encountered in this area, including some estimate of the technology and costs involved. Cost estimates are based upon specific equipment configurations. For the most part these configurations will include a range of possibilities covering more than one technical approach. In the future, when adequate talent is acquired, these reports may serve as the basis for the thorough engineering study needed before final system design decisions are made.