PROCESS ANALYSIS

Burton Grad, Specialist
Production Control Service

In 1956 an advanced automation project was established within Manufacturing Services to develop new concepts in the planning and operation of the automatic plant of the future. A number of techniques were conceived during the initial stages which are so basic as to have broad application. The "Bulletin" will cover two of the most important of these in this and a subsequent issue. The first will be on Process Analysis and the second on Product Structure Analysis. Co-operating with Production Control Service in this project were: the Specialty Motor Department; all components of Manufacturing Services; the other functional services; and Canning, Sisson and Associates, Los Angeles, consultants on electronic data processing.

To clearly show the flow of information in both the shop and office, a new approach and set of tools were required. Why "Information Process Charting" was needed and how it was applied to the Systems Study follows:

WHAT IS A SYSTEMS STUDY?

A significant portion of every working day is spent on cost improvement projects. These are designed to do a certain part of the business in a more efficient manner; for example, drilling a hole, preparing factory paperwork, obtaining a different purchased part that will perform the same function for less money, design standardization, etc. But how much time is spent examining the interrelationships among the various activities of our business. The "bricks" are analyzed in great detail but composition of the "mortar" is often ignored.

There seems to be many valid reasons for **not** studying the connections between activities. First, it's more difficult, requiring broader knowledge of the total business; next, it often cuts across functions or sub-functions so that no one is quite sure to whom the "joints" belong; finally it takes longer and doesn't have the glory of an immediate reward. Nevertheless, the usual "bits and pieces" approach by itself cannot produce the gains to be realized from a study of the business as a whole.

OBJECTIVES OF A SYSTEMS STUDY

From the very beginning care must be exercised to make this work far more comprehensive than the usual procedures analysis. The pitfall of too much detail must be avoided. Improving a particular process or activity is not the goal, but rather examining the necessity for having the process at all. This is not a hardware-centered approach; it's an effort to find out why things are done at all and then, after constructing a logical pattern for operating the process, to determine the real hardware needs.

SPECIAL ROOMS

Most modern laboratories make extensive use of special rooms to isolate noise, heat, corrosion or to establish temperature, humidity controlled conditions. For example, rooms for housing mass spectiometers, infra-red and ultra-violet spectiometers, electron microscopic and other testing instruments are essential.

types of facilities. Although this report is limited in nature, that is to say, it is a review of chemical laboratories, it has followed a basic approach which may be applied to the planning of various types of laboratories. The books are available on a loan basis and may be obtained from:

Plant Layout & Material Handling Service
Building 32G, Second Floor
Schenectady, New York

FUME HOODS

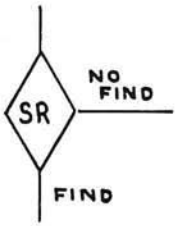
The Minnesota Mining hoods were equipped with a new type of air foil which served to increase the face velocity without increasing the exhausting capacity of the hood. Controls are mounted outside the hood for safety, convenience, and are away from corrosive chemicals.

Therefore, in conducting a Systems Study, the concern is with determining the logical alternative processes by which certain records can flow through a business; secondly, it relates to the control reports which are requested by management and how they are used. It is necessary to know what information is required outside of the organization for legal, government or company reasons, as well as to pinpoint and identify the complex computational and decision-making areas since these will require detailed study before an optimal system can be designed.

Knowing **what** is going on in the business is far more critical in a systems study than **how** it is being performed. For example, who is doing what job, how many clerks are on duty, points of intermediate storage, are of little interest; neither is the physical layout of the office or the types of equipment in use. Exceptions caused simply by internal clerical errors can be ignored.

Unfortunately, conventional charting techniques emphasize just those items with which systems studies are least concerned. Therefore, it was necessary to design a new charting technique which would emphasize the **what** aspect rather than the **details** of current procedures. In addition, this charting process was designed to be broadly applicable whether a manual, punched card, or computer procedure was being analyzed. The result has been called **Information Process Charting.** It consists of a series of basic data processing operations and a procedure for tying these operations together while describing the other information needed for full analysis.

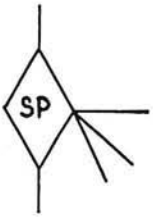
THE CHARTING SYMBOLS



Search means to extract a particular record from a file of similar records which are sequenced by the field on which the search is being conducted.
Illustrations: Search the Planning File for the Planning Card covering part number 374255-1.

Search the Model List File for the Horsepower Rating of Model 732458.

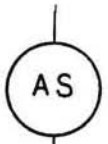
1. Select, Search (SR)



Separate means to select one or more records from a group or file, according to a key field.
Illustrations: Separate the copies of the Purchase Order by destination.

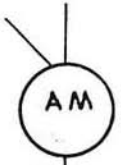
Separate from the open order file all orders more than 2 weeks overdue.

2. Select, Separate (SP)



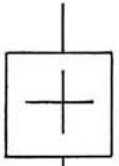
3. Arrange, Sequence (AS)

Sequence means to arrange a group of records into ascending or descending order according to a key field.
Illustrations: Sequence time cards by employee pay number.
Sequence stock withdrawals by part number.



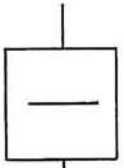
4. Arrange, Merge (AM)

Merge means to combine 2 or more groups of records which are already in sequence into a single sequence.
Illustrations: Merge the new Parts Lists with the Parts Lists File by Parts Lists number.
Merge the employee time cards with the employee vouchers by employee pay number.



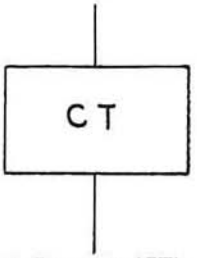
5. Modify, Insert (+)

Insert means to create a new record or to add one or more fields of information to an existing record.
Illustrations: Prepare a new Purchase Order
Sign a Freight Bill



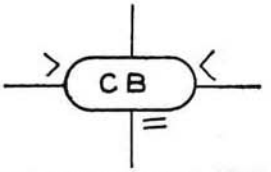
6. Modify, Delete (–)

Delete means to remove one or more fields of information from an existing record.
Illustration: Delete an employee's pay number from the active employee ledger.



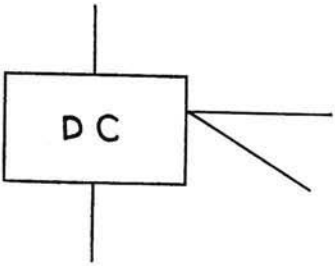
7. Compute (CT)

Compute refers to an arithmetic formula incorporating the four basic arithmetic operations: Add, subtract, multiply and divide. It does not contain any comparison or choice operations. If the result of a computation is used in a comparison, this should be indicated separately .
Illustrations: Total weekly pay equals hourly rate times number of hours worked.
Stock on hand at end of period equals initial stock plus receipts minus disbursements.



8. Compare, Branch (CB)

Compare and Branch is the basic choice operations which involves a defined or fully prescribed decision.
Illustrations: If the product model number is incomplete, then pass the order to Engineering. If an employee's accumulated salary year-to-date is greater than $4200, do not deduct social security.



9. Decision-Making (DC)

Decision making is the higher level of Compare and Branch when a choice is not based on a clear cut set of rules. In other words, judgment is involved in a decision-making process; it is possible for a decision-making operation to indicate what factors are considered and often even the relative importance of these factors. Nevertheless, to the extent that the exact "weights" can be determined and all alternate paths noted the operation degenerates into Compare and Branch and is no longer of decision-making stature.

Illustrations: Determine the quantity of Model XYZ that will be sold within the next 12 month period. Decide whether a job applicant is suitable for a particular task.

10. Connection, Entry (EN)

An entry serves to start a routine or to bring additional information into it. It may come from another part of the same chart or from a different activity entirely.

Illustrations: The customer order entering the requisition service routine.

The pay voucher coming to Cost Accounting from Payroll.

11. Connection, Exit (EX)

An exit is the means by which an activity is terminated. It may either go to another part of the same chart or it may go to another activity.

Illustrations: All requisitions requiring special engineering review go to Engineering.

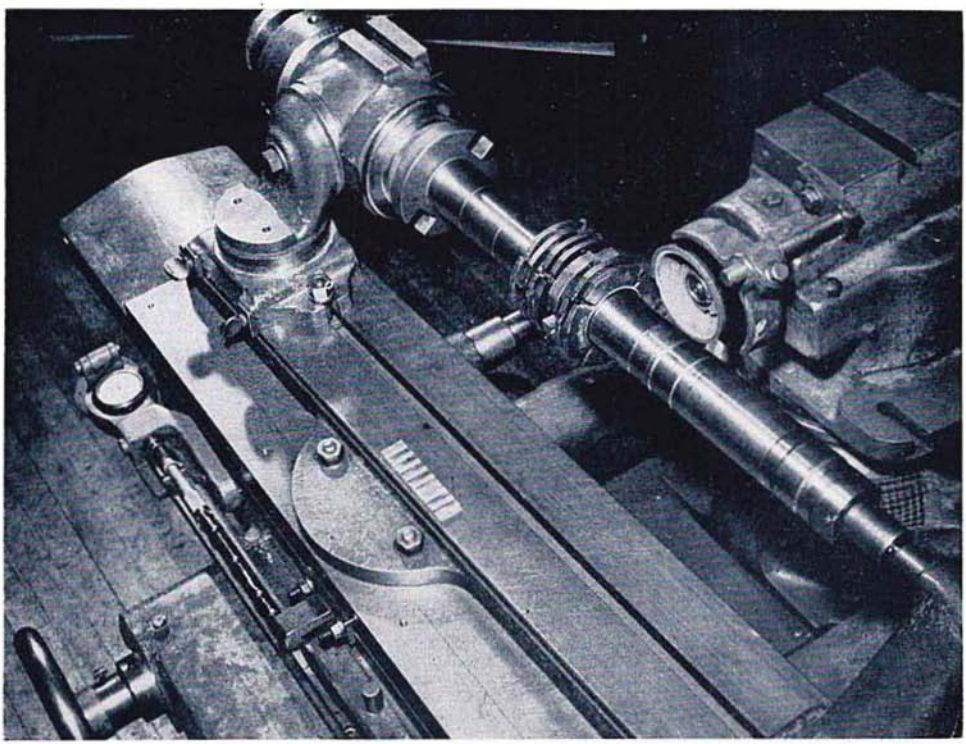
A pay check is given to an employee for his previous week's work.

The Information Process Charting Technique was applied to analyzing the eighty activities which make up a General Electric business. It took approximately six hundred pages of charts and over one hundred man weeks of work to complete the job, but there is now available a complete describtion of a business which should save considerable time and money on any future study.

READERS EXCHANGE

Contributions to this column should be addressed to—
The Editor, Manufacturing Services Bulletin, Building 69, Room 151, Schenectady, N. Y.

MICROMETER END MEASURE INSTALLATION



Installation of Micrometer End Measures, track and indicator on a Cincinnati #2 Cutter Grinder permits the grinding to .0002-inch tolerances on insert type staggered tooth gang fly cutters while still on the milling arbor. Cutter blades should be spaced 90 degrees from adjoining cutter blades, and a narrow cup wheel should be used. Side and O.D. of cutters can ge ground in one setup.

This method eliminates the need for removing and respacing cutters. Setup and grinding times can be reduced up to 75 percent.

Contributed by:
M. E. Johnson
Specialist-Mechanical
Aircraft Products Dept.
Johnson City, N. Y.