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PRACTITIONERS OF M.A.C.A.

AND

COMPUTING GROUP ORGANIZATION
It has been proposed that a group, or several groups, of women be set up in the Engineering Department at Curtiss in order to increase the accuracy of and speed of such work. It is known that the clerical work at Curtiss is done almost entirely by women who are more or less specialized in the clerical work. The clerical work is usually done with good engineering attitude ratings, and the clerical work is usually done with good engineering attitude ratings. The clerical work is usually done with good engineering attitude ratings. The clerical work is usually done with good engineering attitude ratings.

This memo was originally prepared by A. V. O. from Mr. E. H. C. and as suggested in some detail. It is generally agreed that the clerical work is quite satisfactory and economical. It is recommended that an experiment along these lines be initiated at Curtiss.
To: Mr. R. A. Darby

Subject: Computing Group Organization & Practices at L.N.A.E.

Reference: (a) Conferences with Mr. Hume, Mr. Miller, Miss Tucker, Mr. Beough, Miss Valentine, etc.

April 21, 1942

For possible use in instituting a similar group for the general use of the Curtiss-Wright Engineering personnel (in particular, Flight Test, Aerodynamics, Wind Tunnel and Structures), we have made some inquiries about the present set-up of the Computing Group, which seem to work very successfully, here at the L.N.A.E., of the N.A.E.A.

The idea and organization of the computing section grew rapidly within the last two years, when the number of computers nearly doubled. Although there are approximately 75 computers now as compared with about 450 engineers (total employees at L.N.A.E., 1,100), there was at first, some opposition to the plan to begin with only a handful of machines. The first organization was conducted as a computing "pool," such as a typing pool. All the work was turned out at first to the present central pool, because there was some saving in equipment and the facilities for teaching and delegation of each type of work could be done more efficiently in this way.

Now that the idea has won general acclaim, the "pool" has decreased in size, but there are now individual computing groups attached to each Section (such as Aerodynamics, Physical Research, etc.), and each Section has several groups (consisting of about an average of three computers) attached to each Tunnel or Laboratory. Some tunnels have as many as ten computers while others have one computer who often devotes a part of her time to typing and secretarial duties. This is a rather recent innovation, developing from the desire of the L.N.A.E. to formalize their work and reports more than it has in the past. To this end the computers have been urged to attend reading classes in such subjects as mechanical drawing and typing. These classes are open to the public at the local high school. Typing, much of the data and charts now obtained in any of the sections is created in a neater and more uniform manner than the former free-hand and often pencilled and hurried data sheets.

The central pool still does the overflow work from the various sections, or that from small sections or individuals not having a computer permanently assigned to them. The central pool also serves as a training center and personal supply station, since from this greater variety of its work, a trainer's ability can better be judged and guided to best advantage there.
Each section has a head computer, but this designation is not very formal, and it is not necessarily an indication of her earning a greater salary, especially among the smaller groups. A larger section is apt to have a acknowledged head computer, however, who is recognized as such by salary and authority. Her duties, besides including the usual computing work, consist of the delegation of the work items, and the laying out of a program and method of work on each project sent to her section. It is generally felt that the ability of the head computer in the direction of delegating responsibility and getting the most volume of work from her available group is the predominant factor in the efficiency and general working atmosphere of the whole group.

The personal qualifications for these computers are not very rigid. These computers are all women who have obtained their jobs through the Civil Service. Some entered merely through the "unclassified" or non-examination-required type of application, the selection being made merely on the basis of stated education and experience. Even in this case the candidates were chosen, it seems, from lists with various designations, for example - Engineering aid, which merely requires a sort of general intelligence tests. The girls who operate the comptometers have usually passed a proficiency test of that type of machine, and they are usually not college graduates. There is ample room for their talents, however, because the volume of work often necessitates computers who can perform the routine machine operation with great speed, but who need not have such logical insight into why the results should be or how they should check, etc.

The heads of the groups are college graduates, as are the majority of all the computers. Preference is given to those with major interests in mathematics or science (preferably physics), but of late these restrictions are being lowered so that one college course in mathematics has been accepted as qualifying. A good number of the computers are former school teachers. Their ages may average near 30, but there are a surprising number nearer 50 years old. There is no restriction because of marriage; in fact, some of the computers are wives of the engineers of various classification here at N.A.C.A.

What opposition there seemed to have been toward establishing the computer groups was directed mostly toward the expense of the computing equipment. The automatic computing machines and comptometers cost over $500.00 each, while they may not even be available today. The automatic calculator is usually the Friden or Karmen, while the comptometer was the Contotest (Trade Name). The computers were furnished with 20 inch (top-log duplex) slide rules. Each computing section has one slide rule at least, but in some sections (such as one case where a section contains three girls) each of the computers has own.
The author of the letter expresses his gratitude to the recipient for the assistance provided. He mentions the importance of maintaining the friendship and the mutual respect between them. The letter contains a thoughtful and heartfelt message, reflecting the deep connection between the two individuals.
There is a large amount of simple calculation required in the work here at N.A.C.A. Most tunnels have means for taking photographs of banks of nearly a hundred manometers at a time. The computers read off the liquid levels and complete the analysis. On the other hand, some of the calculations are sent to the computers in the form of complicated formulas which necessitate a knowledge of trigonometry and sometimes of mathematics involving the calculus. In general, however, the group head would reduce this more complicated work down to tabular form requiring rather routine operations before it would be given to the machine operator. Most of the work coming from the engineers is accompanied by a memo of calculating instructions or word-of-mouth explanations. The computers in any one section soon learn what the usual type of calculation required of them would be. Special data sheets and forms are usually available for the more common calculations.

The consensus of all employees here at the N.A.C.A. is that the plan is very effective and satisfactory.

R. H. Craner

RHC/gcd

CC: Messrs. Child, R.E.
    Flader
    Hahn
    Jenkins
    Kerr
    Noble
    Moore