definite sales territories, together with such facts as population, rural and urban, per capita wealth, etc. This information together with estimates as to probable business activities is used in determining the probable volume of sales that should be expected during a given period.

Based on these sales estimates a production schedule is given to the factory organization for as many months ahead as conditions warrant.

Detailed budgeting, or estimating in detail our financial requirements, has not yet been introduced, though a general forecast is made and a cash budget prepared and corrected from time to time.

IV. SELLING METHODS

As a rule when speaking of a typewriter one is apt to think of the large office type of machine. There is, however, a marked difference between the large machine and the portable. With the former the field is practically limited to business offices where stenographers are employed. In the case of the portable typewriter no such limitations exist, as the majority of machines are sold to individuals for their personal use, for either social or business purposes. It is therefore quite obvious that the selling problems of the two classes are essentially different.

Office machines are rarely sold from a store, but are distributed almost exclusively through salesmen, while portable machines are to a large extent sold in stores. Outside salesmen do not assume the same importance as in the case of large machines. In order to secure any large volume of business under these conditions a relatively large number of dealers are necessary, and as service is a very important factor in the merchandising of the portable typewriter, it is also necessary that the distributors, in the large cities at least, maintain thoroughly equipped repair departments in charge of competent mechanics. In order that the dealer may be induced to maintain such a service department, we consider it essential that he be given exclusive control of a specific territory.

It is plain that with us retail selling is a function of the dealer rather than the home office. In order that we may exercise better control over our dealers we have grouped them into geographical divisions, each division being under the supervision of a division manager who reports directly to the sales manager and who regularly visits all dealers in his division. We also have a traveling service man, reporting regularly and in detail to the home office service department and traveling from one end of the country to the other, instructing service men, and checking complaints.

As an aid to the dealer in developing his territory and his selling organization, the work of the division managers is supplemented by bulletins from the home office, a house organ and occasional conventions. Dealers are supplied with the usual variety of advertising material, including a monthly window display service. While the home office does not bear the expense of local newspaper advertising, it does, where requested, plan all details and supply all material for such campaigns. This local advertising is backed up by a consistent national campaign in the general magazines at the expense of the company.

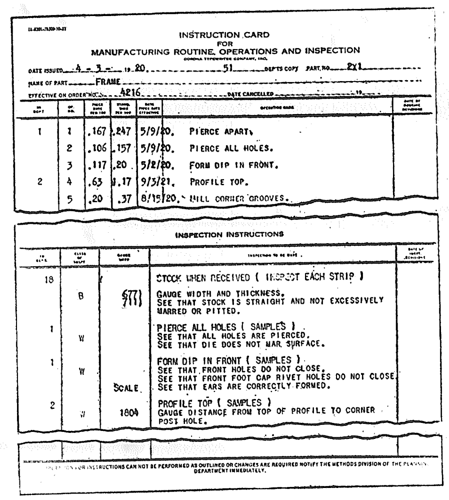
V. MANUFACTURING

1. *Organization on the Basis of Processes*

In many industries the organization is built around certain manufacturing units where a specific product may be manufactured completely. In such industries it is not uncommon to find numerous manufacturing units which are practically complete in themselves although possibly in the same building, and where there may be two or three machine shops, a number of plating or japanning rooms, etc. In our factory we have attempted to thoroughly departmentalize all processes so that all similar operations shall be performed in the same department. For instance, we concentrate all milling operations in the milling department, all punch press operations in the punch press department. There are only a few instances where this plan is not strictly followed. Thus frames have certain operations performed on them before being sent to the drill press department and then they have polishing, bending, riveting and other operations performed upon them in the same department. We do this in order to reduce inventories and to avoid carrying large cushions of comparatively cumbersome and expensive parts.

In order to give some idea of the number of parts manufactured and operations performed, a little data might be of interest. We have recently improved Corona and have not yet compiled this data for the improved model, and I am therefore giving it for the No. 3 model, of which nearly 500,000 have been marketed in the past ten years.

There are 671 parts on the typewriter, 139 on the case, 110 on the folding stand, a total of 920 parts. There are 355 *different* parts on the typewriter, 61 on the case and 37 on the stand, a total of 453 *different* parts. There are 1999 manufacturing operations on the typewriter, 210 on the case, and 205 on the stand, a total of 2,414 operations, exclusive of inspection. To these must be added 38 sub-assembly operations and 15 assembly operations, a total of 53 assembly operations, and a grand total of 2,467 operations of all kinds, exclusive of inspection. If inspections are added, the total number of operations performed amount to approximately 4,600.



INSTRUCTION CARD
FOR
MANUFACTURING ROUTINE, OPERATIONS AND INSPECTION
CORONA TYPEWRITER COMPANY, INC.

DATE ISSUED 4 - 3 - 1920. 51 DEPTS COPY PART NO. 2X1
NAME OF PART FRAME
EFFECTIVE ON ORDER NO. 4216 DATE CANCELLED 19

1	1	.167	.247	5/9/20.	PIERCE APART.	
	2	.106	.157	5/9/20.	PIERCE ALL HOLES.	
	3	.117	.20	5/2/20.	FORM DIP IN FRONT.	
2	4	.63	1.17	9/3/21.	PROFILE TOP.	
	5	.20	.37	8/15/20.	MILL CORNER GROOVES.	

INSPECTION INSTRUCTIONS

18			STOCK WHEN RECEIVED (INSPECT EACH STRIP)	
	B	5771	GAUGE WIDTH AND THICKNESS. SEE THAT STOCK IS STRAIGHT AND NOT EXCESSIVELY MARRED OR PITTED.	
1	W		PIERCE ALL HOLES (SAMPLES) SEE THAT ALL HOLES ARE PIERCED. SEE THAT DIE DOES NOT MAR SURFACE.	
1	W	SCALE.	FORM DIP IN FRONT (SAMPLES) SEE THAT FRONT HOLES DO NOT CLOSE. SEE THAT FRONT FOOT CAP RIVET HOLES DO NOT CLOSE. SEE THAT EARS ARE CORRECTLY FORMED.	
2	W	1804	PROFILE TOP (SAMPLES) GAUGE DISTANCE FROM TOP OF PROFILE TO CORNER POST HOLE.	

IF OPERATIONS OR INSTRUCTIONS CAN NOT BE PERFORMED AS OUTLINED OR CHANGES ARE REQUIRED NOTIFY THE METHODS DIVISION OF THE PLANNING DEPARTMENT IMMEDIATELY.

Fig. 2. Operation Routine Card, Front and Back.

2. *Control of Operations*

(a) Standardization

Mechanical Methods. All methods are carefully studied by the methods division of the planning department before manufacturing routines are written, and these studies are supposed to be sufficiently exhaustive so that few changes, if any, will have to be made once they have been established as standard practice. In establishing these routines the methods division consults with the experimental and designing department and with the production equipment engineering department, gathering together all of the necessary data bearing on the material and tools. Based on the information gathered the data is written up on operation routine cards (Fig. 2) which contain the routine of all parts and give the various operations performed on the parts, including all inspection necessary.

Chemical Methods. The same procedure is followed as in the case of mechanical methods except that instead of a highly skilled mechanical technician the work is in charge of a chemist.

Tools and machines. In so far as possible all production tools are manufactured in our own plant. The only time that this is not done is when changes in design may be made and the time is quite limited, in which case, rather than enlarge our tool room temporarily, we send some of the work outside. Machinery on the other hand is never specially made if we can secure results with a standard product. We should prefer to buy a standard machine and adapt it to special needs rather than to make it or have it made specially to our design. With machines we endeavor to hold to close standardization so that we may have as many machines of like design and capacity as possible, but with tools we endeavor to specialize highly in order to secure maximum production of the highest quality at the lowest cost. Tools are designed by the tool designing division of the production equipment engineering department from part blue prints furnished by the experimental and designing department, which is not a part of the factory organization but belongs to the general administrative organization. (It is, in fact, the engineering department of our industry in so far as engineering is applied to the construction and operation of a typewriter). Machines are grouped so that routing is facilitated through our being able to route work to any machine in a group.

Designing, building and issuing production tools. Whenever a new part or design is released by the experimental department a sample part and blue print of the part are issued by them, giving tolerances and size, and grade of stock to be used. These are sent to the production equipment engineering department so that the necessary tools for manufacturing may be designed. After the tools are designed, the prints are issued to the tool room and the tools built. Upon completion and inspection of each tool, sample parts are submitted to the experimental and designing department for approval, and when they are approved the tool is turned over to the methods division of the planning department who set up and operate the tool and issue the proper routine instruction card covering its use. The sample parts made by the tool must be approved by the parts inspection department before the tool may be placed in the tool crib available for production.

All tools and gauges are numbered, and stored in the tool crib by operations, so that in ordering out