

K P 8045 10-27-15M1

BINDER No. 211

SUBJECT: EASTMAN KODAK COMPANY, ITS ORGANIZATION, PRODUCTS AND METHODS
Talk Before the Army Industrial College

By *Vergil M. Palmer, engineer of industrial economy*
BLDG. No. DEPT. *Kodak Park Works* DATE *Apr. 28, 1928*

V.H.

INTRODUCTION

Every thoughtful civilian, especially if engaged, as I was, on the production of Army supplies during the late War, realizes the absolute need of a well organized, intelligent and carefully planned coordination between the Nation's industries and the War Department, particularly its Procurement Division.

War is no longer confined to a combat between armed land and naval forces. It is in reality a combat between the total pooled resources of nations, including the entire civil population and all industrial and commercial resources and facilities. It seems probable that in the future, all may even be conscripted.

The Army Industrial College seems to me an exceptionally well thought-out and efficient means of supplying that contact and knowledge necessary as the basis for proper plans of handling probable industrial problems in the event of another national emergency. I am therefore very glad indeed to do what little I may toward this end, by telling you something about our Company, its products, methods and possible war-time problems and requirements.

I am going to show you:

- I. Gen'l Picture
- II. Organization
- III. Sale and Distribution of Products
- IV. Planning & Control

I. GENERAL PICTURE:

A general picture of the Company and its products.

II. ORGANIZATION:

How the Company is organized and how its various functions are supervised.

III. SALE AND DISTRIBUTION OF PRODUCTS:

How the Company's products are sold and distributed throughout the world.

IV. PLANNING & CONTROL:

How the probable demand for various regular products is forecast and how planned and controlled through the various manufacturing processes.

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V. Procurement of Mat'l

V. PROCUREMENT OF MATERIAL:

How raw and other materials are procured and some of our war-time problems.

VI. Selection & Training of Personnel

VI. SELECTION & TRAINING OF PERSONNEL:

Our methods of securing and training personnel and the problem of the loss of men in "key" positions through the draft.

VII. Power Problem

VII. POWER PROBLEM:

Something about our general power consumption and how fuel requirements were reduced during our last emergency.

1. GENERAL PICTURE:

As you know, our Company does a world-wide business with factories, sales branches and stockhouses scattered throughout the world. Its principal offices and main plants are located in Rochester, N. Y., and from there, in general, all activities of the Company are supervised and controlled.

Roughly, our properties and activities may be divided into four groups with common characteristics as to organization and functions. There are:

1. Our American Group

Including our head offices and American plants, sales branches and stockhouses and a foreign sales division controlling South American, Mexican, and Chinese stockhouses and dealers.

2. Our Canadian Group

Comprising our offices and plant in Toronto, Ont., with its branches and stockhouses.

1. Our American Group

2. Canadian

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1. GENERAL PICTURE (Cont'd.)

3. Our British Isles & Continental European Group

Consisting of Kodak Limited with its head administrative and sales office in London, and factories in Harrow, England; Copenick, Germany; Vincennes, France; and Vacz, Hungary.

4. Our Kodak Australasia Group

With head offices at Sidney and factory at Melbourne, Australia, and with its sales branches and stockhouses in Australia, New Zealand and Tasmania.

For a little more detailed picture, I will give you a further description of these groups.

1. American Group

In Rochester, N. Y., we have our "State Street" group of buildings, as we call it. These consist of our Main Office Building, Main Stock, and Rochester Sales Branch and Shipping Building, and our so-called "Camera Works".

This group has a total floor area of a little less than 900,000 square feet, with a total of about 4000 employes, 1300 of whom are in the offices. It is located on the site of the original "home of the Kodak", to which our sixteen-story office building is a sort of monument.

The Main Office Building includes the executive offices, Sales & Advertising, Legal, Accounting, and similar departments.

Camera Works

The Camera Works makes, with few exceptions, our complete line of kodaks and cameras and most of the accessories which go with them, ranging from the inexpensive Brownie to the new Cine Kodak, i.e., the small amateur motion picture camera, and the Kodascope which is the motion picture projector for 16 mm. film.

3. Kodak Ltd.

4. Australasia

1. American

Camera Works

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There are two other plants in Rochester and a third plant of an independent company which we formerly owned. This last is the Folmer-Graflex Corporation, employing about 150 people.

This plant manufactures the Airplane, Graflex, Eastman View, and Cirkut Cameras, together with such specialties as, the Finger-print camera. They also make a complete line of professional, studio and other accessories. In all there are from 400 to 500 different articles manufactured.

The Hawk-Eye Plant

Employing about 554 people.

This plant occupies over 100,000 square feet of floor space. It is devoted almost exclusively to the manufacture of the high-grade lenses required for our own use. These vary in size from the tiny anastigmat for the Cine-Kodak, to one half as big as a nail keg for aerial use in photographing whole country-sides from elevations miles above the ground.

Kodak Park Works

Employing about 7000 people.

This is our largest and most important plant. It covers about 400 acres with 180 buildings, representing a total floor area of over 4,000,000 square feet. It has its own railroad with over 7 1/4 miles of standard gauge track, including sidings, two fireless locomotives, and 25 box, flat and tank cars.

Next to the U. S. Mint, Kodak Park is the greatest user of silver in the world.

Its products are photographic film, including roll film, Film Packs, Commercial, Portrait, X-Ray and moving picture film (both standard 35 mm. size and 16 mm. Cine-Kodak); photographic papers, of which there are approximately 150 kinds; dry plates; photographic chemicals; Kodalac paint and varnishes; artificial leather; and sundries of various kinds and descriptions too numerous to mention.

Folmer-Graflex

Hawk-eye

Kodak Park

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I should not fail to mention, however, the synthetic organic chemicals produced by our Synthetic Organic Laboratory. Their production was begun first as a patriotic service during the War when European sources of supply were cut off and the chemicals were unobtainable in this country. Their production has since been continued. They are produced at a loss but are made available as a definite and important contribution to American scientific progress.

This plant manufactures much of its own raw materials, such as paper for photographic purposes, gelatine, nitric, sulphuric, pyrogallol, and other acids, silver nitrate crystals, paper and wooden boxes, metal cans, and similar accessories.

Tennessee Eastman Corp.

Outside of Rochester, we have at Kingsport, Tenn., The Tennessee-Eastman Corporation which manufactures the products of wood distillation, such as, wood alcohol, acetone, acetate of lime, chemical and technical charcoal, and like chemicals.

Eastman Chemical Corp.

In Passaic, N. J., we have the Eastman Chemical Corp., manufacturing a line of chemicals special to our business.

Tapprell-Loomis Co.

In Chicago, we have the Tapprell-Loomis Company making a line of photographic supplies, such as photographic albums, picture mounts, etc.

2. Canadian Group

In our second, or Canadian Group, we have the Canadian Kodak Company, Limited, located in Toronto. This plant covers twenty-five acres. It is located on the main line of the Canadian-Pacific R.R. and consists of six main concrete buildings, with a total floor space of 10½ acres. This plant employs about 1000 people.

This plant covers about 25 acres, has about 25 acres under roof and employs about 1000 people. It

Tennessee
Eastman
Corp.

Eastman
Chemical
Corp.

Tapprell
Loomis
Co.

2. Canadian

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Canadian Group (Cont'd.)

In a way, this plant is a combination of our Kodak Park and Camera Works, since we assemble there, cameras and manufacture photographic supplies. The plant has its own executive and sales forces.

3. British Isles and Continental European Group

3. English
Kingsway

In this group there are four sales divisions and four factories. The central control and administration offices are located at the Kingsway offices in London. Here also is located the Kodak Limited Sales Division which handles sales for the British Isles and Colonies, including India, Egypt, South Africa, the Straits Settlements, and the Dutch East Indies; altogether 900 employees.

Kodak-Pathe

Kodak-Pathe

The second sales division is the Kodak-Pathe, located in Paris. This division handles sales for France, the French Colonies and southern and southwestern Europe, including Holland and Switzerland.

Kodak Aktien-Gesellschaft

Kodak A.G.

The third division is the Kodak Aktien-Gesellschaft, located in Berlin. This division handles sales for Germany, Denmark, the Balkans, Hungary, Austria and for northwestern Europe.

Cine Film Sales

Cine Film Sales

The fourth sales division is the Cine Film Sales Division located at Kingsway.

Cine film sales are not covered by the three previously mentioned divisions, but are handled for the entire territory through this separate division.

The four plants are, first,

Kodak Limited

Kodak Ltd.
Harrow

Located at Harrow, about 15 miles outside of London. This plant covers about 28 acres, has about 15 acres under roof and employees about 1600 people. It

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Kodak Limited (Cont'd.)

manufactures a complete line of photographic plates, paper, film and cameras.

Kodak Pathe

The Kodak Pathe Plant is located at Vincennes, just outside of Paris. This plant employs 900 to 1000 people and manufactures different kinds of photographic film and powders and solutions.

Kodak A.G. (Factory)

The Kodak Aktien Gesellschaft is at Copenick, just outside of Berlin. It employs, at this time, between 500 and 700 people. This plant, recently acquired, will manufacture a complete line of photographic products.

Vatz

The fourth and last European plant is at Vatz, Hungary, near Budapest. This plant employs about 150 to 200 people and makes photographic paper only.

4. Kodak Australasia Group

In Australia, there is the Kodak Australasia Limited Company. This is operated as an independent organization, but we own 51% of the stock. The factory is at Melbourne with executive and sales offices at Sidney and other sales branches at Adelaide and other Australian and New Zealand points.

Altogether, there are employed a little less than 1000 in this group. The factory makes photographic paper, coats film base, and finishes up and handles cameras received from United States, Canada and England.

Sales Branches

In addition, the Company has sales branches in New York, Chicago and San Francisco, and 29 stockhouses in this country and other sales branches and retail

Kodak-
Pathe
PlantKodak
A.G.
FactoryVatz
Plant4. Kodak
Austra-
lasia
GroupSales
Branches

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stores throughout the world, some

40 in Europe
 8 in Africa
 10 in Asia
 9 in Australia
 4 in New Zealand
 6 in South America
 1 in Mexico
 1 in Cuba
 1 in Hawaii

These will be mentioned ^{again} in connection with our third heading covering the distribution of product. In all, the Company has a total of 21,000 employes throughout the world.

Total
 Employed
 21,000

II. ORGANIZATION

In general, it has been Mr. Eastman's policy to avoid over centralization. The idea has been to supervise managers, rather than to attempt to manage through centralization from afar. Over organization holds many dangers. Managers are therefore allowed a wide range of latitude as to ways and means of accomplishing their objectives, the entire test being how well these objectives are attained. Our organization is therefore built up chiefly on a unit basis.

Chairman, Board of Directors

At the head, is Mr. Eastman. He is the Chairman of the Board of Directors. To him reports the Ass't to the Chairman who is in charge of Office Management and Statistics.

President

Next, we have the President, Mr. W. G. Stuber, who, in addition to his presidential duties, functions as vice-president, directly responsible for the maintenance of our standard of excellence of photographic quality throughout all of our plants, both here and abroad.

Vice-Pres. & Gen. Manager

Next, comes Mr. Frank W. Lovejoy, Vice President and General Manager. Directly under Mr. Lovejoy come the managers of our various groups and plants. These

Chairman,
 Board of
 Directors

President

Vice-Pres.
 & Gen.Mgr.

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managers report back for guidance on matters of policy, but otherwise are independent up to the point of results achieved. They are left free to discover and follow the best ways to get these results.

Vice-Pres. & Secretary

Next, we have a vice-president who is also the Company's secretary in charge of the Legal Department.

Vice-Pres. in Charge of Sales Policies

Then we have a vice-president in charge of sales policies, including foreign and domestic advertising.

To the Vice-President and General Manager report the Company's treasurer, the managers of our domestic plants, and also the heads of such departments as our Research Laboratory, our Department of Industrial Relations, the Patent Department, and Production Planning Departments.

Under the supervision of the Vice-President in charge of Sales Policies, comes the General Sales Manager in charge of domestic sales, the Manager of Cine or Moving Picture sales, the Manager of X-Ray Sales, the Manager of Chemical Sales, the Manager of Export Sales, the Manager of Government and Aero Sales, the Advertising Department, and the Manager of our Service Department. Under this division also comes supervision over the design of all the Company's labels and containers. This department also includes the Manager of Stockhouses and supervision over the Company's retail stores.

Kodak Park Organization

As an illustration of our plant organization, we will consider that of our Kodak Park Works. Here, we have a Works' Manager with two Assistant Managers; one with supervision over production and the other responsible for engineering and maintenance, including the generation of power, plant layout and expansion, fire protection, plant protection, accident prevention, and like activities.

Vice-Pres
&
Secretary

Vice-Pres
In Charge
of Sales
Policies

Kodak
Park
Organiz-
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Kodak Park Organization (Cont'd.)

Production Division

Production Div.

The Production Division is divided into three groups of departments, with a General Superintendent in charge of each group, and a superintendent in charge of each department.

For example: Our Photographic Paper Group is responsible to a General Superintendent under whom come the

- Superintendent of Paper Mill
- Superintendent of Baryta Coating of Paper
- Superintendent of Sensitized Photographic Coating of Paper
- Superintendent of Inspection, Coating and Packing of Paper

Engineering & Maintenance

Engineering & Maintenance

The Engineering & Maintenance Department is directly under the supervision of a department superintendent.

From the previous enumeration of the products manufactured at our Kodak Park Works, it will be noted that in a way this plant is like an aggregation of factories, each with its own products or lines of products, each under its own superintendent, each tied in with the central organization, and each dependent for engineering and maintenance service upon the centralized engineering department.

In our industry, this engineering and maintenance department function is very important. Manufacturing processes are almost always in the process of evolution and development with changes and improvements constantly under way.

15 to 20 Trades

15 to 20 Trades

Roughly, we have from fifteen to twenty trades represented in this department with a total of 1100 to 1200 men employed. The activities include the design and construction of new buildings, automatic machinery and equipment for carrying out the various chemical processes, supervision over the generation of power, and the maintenance of the entire plant.

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III. SALE AND DISTRIBUTION OF PRODUCTS

In the United States, our products are distributed from our four Sales Branches. These are located in Rochester, New York City, Chicago, and San Francisco. To them, we ship our principal products in carload lots from our Branch Shipping Department located at Kodak Park. These Branches are responsible for the distribution in their respective territories.

29 Stock Houses

We also have about 29 stockhouses scattered throughout the country. The stockhouses supply professional photographers, principally, and such small dealers as are not large enough to do business directly with the Branch houses. The Branches reship to the stockhouses within their respective territories. The stockhouses very often have their own salesmen and carry the accounts of their small dealers, in which case they assume responsibility for the account. Of the regular dealers supplied by the Branches, there are over 16,000. For them, credit is passed upon by the central Credit Department at Rochester. Goods are billed from the Branch houses, but the account is kept at Rochester through duplicate invoices.

Export Sales

The Export Sales Department in Rochester handles sales through our Sales Branches in South America, Mexico, China, and Japan.

Canadian Sales

Canadian Kodak Company, Limited, handles its own production and sales and ships its own products throughout the Dominion

British Isles & Continental Europe

The European Companies' control I have already covered. I might add, however, that uniformity as to general policies is assured through frequent meetings of the Committee of Management, the membership of which includes:

III. SALE
&
DIS-
TRI-
BU-
TION

29 Stock
Houses

Export
Sales

Canadian
Sales

British
Isles &
Continental
Europe

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British Isles & Continental Europe (Cont'd.)
(Committee of Management)

The Chairman of the European Board.
The Sec'y. of the European Board.
The Manager of European Factories.
The Managing Directors of the 4 Sales Divisions.
An Inter Company Representative.
A Continental Sales Advisor.

The general scheme of handling manufactured product is to manufacture in large quantities in those places where, through specialization, such manufacturing is the cheapest. Where labor rates or other conditions make it advisable, raw or partly processed parts are supplied from another plant and are then finished and completely assembled locally.

Thus, for example, our Canadian and English plants are supplied from Rochester with such small camera parts, as can be most economically manufactured there. These parts go with others into the completed cameras.

Film base, also, ready for the various photographic sensitizing emulsions is furnished from Rochester for Canadian Kodak Limited, Kodak Limited, England, and Kodak Australasia, where it is put through the numerous finishing operations and manufacturing processes which go to make the finished product. This method is advisable because of the very extensive and expensive equipment required for the manufacture of this material. Thru this method the need of duplication of expensive equipment is avoided.

IV. PLANNING AND CONTROL

The problem of accurately anticipating the probable demand for a product as varied and widespread as ours is extremely complicated. This is so, not only because of our world-wide distribution and such political influences as this involves, but also because of the very nature of the product.

IV. PLAN-
NING
&
CONTROL

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IV. PLANNING AND CONTROL (Cont'd.)

Photographic film and paper, particularly paper, are not entirely stable. They deteriorate with age and the product therefore must be dated, and provision made that it is used up before the expiration of the time, as denoted by this dating.

Fluctuation of Demand

The demand fluctuates not only within wide limits for the different months throughout the year, but this demand also varies widely depending upon whether or not we have an early spring, good vacation weather, good and prosperous times, etc. In some lines - photographic paper, for example - there is a heavy demand just before the Christmas season. This also applies to some extent to the amateur cameras which are purchased as Christmas gifts.

Method of Forecasting

The general method of anticipating the demand for our regular product is to forecast the future by past experience, and to establish probable trends based upon this experience. There are certain correlations between our sales and general business indicators such as bank deposits and labor employment. Before we can properly plan our production and control it to the established schedules, we must therefore have ample records and necessary data. This data is collected, collated and supplied to our various departments by a central statistical department, with an auxiliary statistical department located at the Kodak Park plant.

Staff Service to Other Depts.

The work of the Statistical Department is a staff service to the other departments. Chart I shows its activities. Among these, it furnishes data to the Purchasing Department on the index number of prices, market conditions, trends, forecasts for general commodities, for raw materials purchased, and for construction materials, giving in addition information regarding seasonal variation in prices, regarding sources of supply and markets, total consumptions and inventories.

Fluctuation of Demand

Method of Forecasting

Central & K.P. Statistical Depts

Staff Service To other Depts.

Chart I

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It supplies information to the Planning Department covering,

- (1) Seasonal variation in sales of principal products,
- (2) Long time trends in sales of these products,
- (3) Forecasts and barometers against which correlations have been established,

all of these indicating probable future sales for certain products. Among these barometers are, bank clearings outside of New York City, price indices, like for example the Irving Fisher Indices, employment indices, etc.

Production Depts.

For the production departments, it supplies information covering output, costs, cost trends; comparative plant, department, and employee efficiency; idle machinery, etc.

Distribution Dept.

For the Distribution Department, it gathers information covering finished stocks, shipments, unfilled orders, branch stocks, comparative branch expenses and the same data for the stockhouses.

Sales Dept.

For the Sales Department, it furnishes data on orders received, sales by principal products, periodical sales, trends, sales by geographical divisions, per capita sales in cities, states and countries, etc.; computes indices of Purchasing Power; and sets quotas for sales for various districts.

Advertising Dept.

In a similar way, pertinent data is supplied to the Advertising, Administrative, and Industrial Relations Departments.

Basis of Reports Made by Statistical Department:

As to the data upon which such reports are based, let us consider, for example, the question of Purchasing Power for the different states. This would be determined from the following data:

Production Depts.

Distribution Dept

Sales Dept.

Advertising Dept.

Basis of Reports Made By Statistical Dept.

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- (1) Number of persons reporting an income over \$1500.00
- (2) Average income, as obtained from the Report of the National Bureau of Economic Research on Distribution of Income by States.
- (3) Automobile registration (pleasure cars)
- (4) Proportion of dwellings equipped with electricity and telephone.
- (5) Expenditure for luxuries and pleasure estimated from the Excise Tax taken from the annual report of the Commission for Internal Revenue.
- (6) Magazine circulation
- (7) Interest in education, based on
 - (a) Expenditures for education
 - (b) Relation of daily average attendance at school to the total number of children from five to eighteen years of age.
- (8) Foreign-born population
- (9) Rural population
- (10) Scenery and resorts

Each state is rated in each of these elements, being arranged in rank from the highest to the lowest, with the median considered as 100. A weighted index is then computed for each state for all factors combined.

Article by Mr. Folsom

If this organization and the functions of the Statistical Department are of particular interest, I would refer you to the article by Mr. M. B. Folsom, head of this department, in the January, 1924, issue of, "The Harvard Business Review".

Article
By Mr.
Folsom

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Planning

Planning

The object of planning is to maintain stock on as low a basis as is practicable, considering the seasonal fluctuations and demand for the product, to procure maximum turnover; and to plan for even production schedules throughout the different months of the year.

Reformed Calendar

Reformed Calendar

I should interject here perhaps, the explanation that for accounting and control purposes we adopted, effective January 1st, 1928, the so-called "Reform Calendar", with 13 equal periods of four weeks each and with each day of the week falling upon the same date, in place of the regular calendar with its 12 unequal months.

Centralized Planning Dept.
Issues Definite Quantity Orders

Central-
ized
Planning
Dept.
Issues
Definite
Quantity
Orders

Using the information furnished by the Statistical Department, the Centralized Planning Department forecasts the probable demand for the major items of our product and issues to the different plants definite quantity orders for the ensuing month's production, together with the probable output for the next succeeding five months, covering in all, the requirements for a period of six months.

Sundry items, such as printing frames, developing tanks, etc., are manufactured in quantities most economical to the production departments. This necessarily means, that the quantity produced often covers three months' requirements. Consequently, the Planning Department issue orders covering quarterly requirements, with instructions to make deliveries on definite dates throughout that time. In this way the manufacturing department is able to have in process a lot large enough to produce economically and at the same time follow the quantities as called for by the Planning Department's schedule.

The quantities of these orders is determined after consultation with the manufacturing department as to economical manufacturing lots, and orders as placed are corrected from the calculated amounts, as may be necessary to obtain this objective.

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Blanket Orders Broken Down By Plant Production Depts.

The orders from the Centralized Planning Department are blanket orders. They are not detailed and itemized. These blanket orders received by the different plants are then broken down into elemental requirements and handled in regular routine by the plant production departments.

Orders for Cameras, for example, give the total quantities of cameras which will be required and show a dissection in quantity between those for which parts only are to be made and furnished to the Canadian and English plants and those which are to be finished complete at Rochester. They also show the allocation of these latter to our various distribution districts. In other words, figures are given showing the quantity to be distributed locally, the quantity to be allocated to the Rochester Foreign Sales Division, the quantity to be distributed through Kodak Australasia, and the quantity of parts to be shipped to Canada and Europe on account of Kodak Limited's plant at Harrow.

Our stock of kodaks is about a 2.7 months' supply, making a turnover of about 4.5, which we think is very good, considering that the average turnover for clothing, drug store accessories, and hardware stores is 3.1.

Planning Dept. Has 4 Sub Groups

The Planning Department has four sub groups:

- (1) There is the group controlling schedules and trends of production of sundries, chemicals, nitrocellulose solutions, and Premium cameras.
- (2) There is the group having control over all of our various kinds of photographic film, except standard motion picture film.
- (3) A group having control over kodaks and lenses.
- (4) A group having control over motion picture film.

Blanket Orders Broken Down By Production Depts.

Planning Dept. Has 4 Sub Groups

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In addition to this, there is then the Kodak Park Planning Department which controls the production for that Plant.

Charts Product "B" Sales

Charts
Product
"B"
Sales

I believe an illustration from the charts prepared will make more plain the detail of this planning. Referring to Chart II, showing Product "B" Sales, the light line shows the variation within the month, and, from month to month, in the quantity of this product sold. The heavy black line shows the twelve months' average sales. Each month, the new monthly figure is added and the oldest month is dropped off, so that this is a twelve months' moving average. The path of this line shows the general trend and the dash line drawn in shows the average of "mean" of the moving average and establishes the definite trend from which under normal conditions, with no unusual factors cropping up, future sales can be quite definitely predicted. Our Statistical Department have even established definite algebraic formulae for these geometric curves.

Sometimes the best of plans go astray. After years of fair consistency, the curve suddenly dropped. This was not unexpected, however, as it is the result of the protective tariff walls that have been thrown up around the various European countries due to present economic conditions. This has nourished competition and cut our export sales. The product is an unimportant one with us, but the curve shows very graphically how close world affairs must be studied and coordinated with statistics, if planning and scheduling is to be entirely successful.

It will be noted that this plot is made on logarithmic paper and against a vertical logarithmic scale.

Having forecast the probable demand for the product, the next problem is to provide for an even production schedule. The purpose is to have the production schedule uniform throughout the year, with the exception of the two months of June and July, when it is desirable to reduce the production approximately 20%.

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**Product "B",
Normal Season Variation**

Product "B"
Normal
Season
Variation

On a uniform production schedule throughout the year, we would of course produce $8 \frac{1}{3}\%$ of the yearly output each month. With the allowance for vacations out, we plan to produce 8.62% of our product in each of the ten months and 6.9% during the two summer or vacation months. Referring therefore, to Chart III, Product "B", Normal Season Variation in Production, Sales and Stock, the dash line shows this planned production schedule in percentage of the total year's business.

Production

From past records, the probable monthly sales is plotted in percentage of total yearly sales. This is expressed by the continuous heavy line.

Sales

We next wish to determine what stock we must carry in anticipation of these sales. Arbitrarily, we decide because of the perishable nature of our product under summer conditions of temperature and humidity, that we wish a minimum stock on hand on August 31st, and that this shall be 2.5% of the year's output. This establishes arbitrarily our stock for this point.

Stock

We will assume also, for the present, that we have stock on hand so that we are in a position to make shipment of our August monthly sales quantity. It is obvious that our September 30th stock will be equal to our stock at the end of August, plus production for the month of September, minus September sales. This establishes our September 30th stock point. Similarly, for the other months throughout the year, stock points are calculated and from this, the dotted stock curve is drawn in.

Obviously, the total quantity as represented by the areas beneath the production and sales line are equal and the quantity representing the stock throughout the year is in excess of this. This chart shows that while the monthly average production is $8 \frac{1}{3}\%$, the average monthly stock on hand is about twice this, or $16 \frac{2}{3}\%$ of the total years' output. The effect of variable monthly sales quantities, and the effect in the form of capital tied up in stock, is also graphically visualized.

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Product "E"
Production, Sales & Stock

Product "E", Production, Sales & Stock

Reference to Chart IV, Product "E", Production, Sales and Stock, shows how this normal stock line is used for production control as applied to any particular product.

This time we have taken a different product and have faked the curve in order to illustrate two or three principles. Upon this chart, we start with the estimated weekly production line, the estimated monthly sales, and the normal stock line determined as just described. We next decide that there may be a permissible plus or minus variation from the stock line of 25%. This, then, establishes the maximum and minimum stock lines. From these, we plot against the estimated weekly production, the actual weekly production (this is the heavy black line), and we plot the weekly actual sales, accumulating these week by week within the given month.

From the actual production, actual sales and previous stock, we can readily obtain the new stock quantity on hand. This is shown by the upper heavy line.

The chart visualizes, therefore, what is actually taking place and immediately shows up discrepancies between the estimated and actual sales, or the estimated and actual production. Consider the week ending January 5th, for example: Production for this week was 8000, whereas it should have been 15,000. Sales were 12,000, giving a net loss of 4000, a drop of this amount in the actual stock line.

Function of Stock Ahead

Function of Stock Ahead

The real function of the stock ahead is to serve as a cushion to absorb irregularities in production, and the real function of the stockkeeper is to carry his stocks and place his orders with the idea of maintaining this even flow of production. Previous to the use of maximum and minimum limits, and before actual sales were visualized, upon seeing his stock diminishing the stockkeeper would order an unusually large supply of parts, almost always making an additional allowance to "play safe", with the result that the production department

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might receive an order for more than twice the average monthly consumption. When the next month's sales reactions set in, the stockkeeper found himself receiving twice the normal consumption of stock, while his deliveries were low. As a result, he would stop placing production orders, so that the tendency was, in attempting to hold to a proper stock level, to intensify the variations in this level.

Again referring to the chart, it will be noted that beginning in May, the accumulated monthly sales have consistently exceeded the estimated sales quantities, and as a result, the actual stock line has dropped so that upon November 1st it is out of bounds and is below the established minimum. New increased monthly sales figures for November and December are therefore plotted, based on this experience and the monthly production schedule is increased from 15,000 to 18,000, to meet this.

K.P. Planning Dept.

At Kodak Park, our different manufacturing departments have departmental stockrooms. Requisitions upon the Purchasing Department are made out in accordance with the production schedule supplied to the department superintendent by the Kodak Park Planning Department. Copies of such purchase requisitions are submitted to and checked by the Planning Department to insure control over stores.

The services of the Planning Department have been found to be of great value in controlling stock on hand of both finished and raw materials, and in keeping the heads of the manufacturing departments constantly advised as to just where they are as against their production schedule and required stock on hand.

The department is to the business what a navigating officer is to the ship. It advises at all times where each department on the plant, as a whole, is on its course of yearly production.

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K.P.
Planning
Dept.

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V. PURCHASING RAW & OTHER MATERIALS

A list of the materials used in our business would be long and most comprehensive. Suffice it to say, that it includes, not only every conceivable domestic material, but also practically every conceivable material from the "Seven Seas".

Production
Materials
Requisitioned by
Dept.
Stores-keepers

Production materials are requisitioned by our departmental storeskeepers. These clear through the department heads and are controlled through copies which go to the Planning Department for their check. These requisitions ordinarily are for material as per definite specifications and authorize the Purchasing Department to order the material in question, stating the specification number, what is desired, date wanted, and information as to place of disposition of material when received by our central Receiving Department. They obviously also give the necessary data for disposition of cost of material by our Costing Department, and information for the proper auditing of supplier's invoice and authorization for its payment.

Buy in Open Market

Buy in
Open
Market

In general, the Company buys in the open market. In some cases, future requirements are covered by term contracts, and for some special materials, future supply is assured through having these made and supplied to us by our own subsidiary companies, like the Tennessee-Eastman Corporation, or the Eastman Chemical Corporation, previously mentioned.

Carload Lots of Material

Carload
Lots of
Material

You may be interested in a list of some of the materials which are received at the Kodak Park plant in carload lots. Among these might be mentioned, alcohol (denatured) acids, aluminum foil, cotton, camphor, clay and cement, gelatine, glass, lime, lumber, pulp, rags, soda-ash, etc.

Lewis
Gun
Cameras

In a war emergency, the supply of necessary materials in adequate quantities is of course absolutely essential. Much of our product is a war-time necessity. For example, aerial photography is absolutely essential and during the late War we manufactured Lewis Gun cameras which were used for instruction in airplane gunnery. The gunner

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recording his hit through taking a picture of the vital section of his opponent's plane.

Protection of material supplies in such an emergency is secured through increasing the normal stocks carried ahead, and in addition to this, recourse may be had to many make-shifts in case of necessity. Probably this can better be explained by citing some of the make-shifts resorted to in the past.

Photographic Paper:

Paper stock, before the War, was purchased abroad. We carried a large stock, about one year's supply, and had been experimenting in a small way for a number of years in the manufacture of paper ourselves. At the outbreak of the War, but before this country was involved, we therefore started the construction of a large paper mill in which to manufacture paper for our requirements. In addition to this, we were able to find some domestic sources of supply with which to carry on until we were able to produce for ourselves.

Barium Chloride (Baryta Coating):

This material is used for the coating of paper. Previously, it had been imported from Europe. We were able to purchase Tennessee baryta and then installed refining equipment and learned to refine this product.

Pyrogalllic Acid:

This had been previously purchased from Europe. During the War, the supply was shut off, since they could not get it across the Atlantic. We were, however, able to get the nut galls from which it is made across the Pacific from China and then installed the necessary fermenting and refining equipment so that we now make this product ourselves.

Gelatine:

This was purchased abroad, but we found an American source of supply and then built our own plant, from which we are now able to get a better quality of gelatine than we were ever able to purchase.

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Photo-graphic Paper

Barium Chloride (Baryta Coating)

Pyrogallic Acid

Gelatine

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Glass:

Before the War, glass for both lenses and photographic plates was imported. During the war, as a result of the activities of the Government's Geo-Physical laboratories under Dr. Wright, great strides in the development of manufacturing methods for this product were made, and we were able to buy glass for both purposes from the Pittsburgh district. Optical glass is also now made in Rochester by the Bausch and Lomb Optical Company.

Tin Plate:

Large quantities of tin plate are used, both for tin cans and for tin lining of export cases. For this latter purpose we have developed the use of a laminated waterproof paper which serves every requirement, and for most purposes, tern plate can be substituted for tin plate, although it is not as good.

For some of our photographic chemicals, there are deviations which may be made in the formulae so that if one chemical element is unobtainable, by suitable changes, another chemical can be substituted in its place.

Each material presents a special problem in itself and results have shown that Necessity, like Experience, is a splendid teacher.

We maintain extensive laboratories, both for controlling and checking production methods and quality, for the development of industrial processes, and for the purpose of pure research. Their service in meeting these material problems was invaluable.

VI. SELECTION & TRAINING OF PERSONNEL AFFECTED BY DRAFT:

Our business, especially at Kodak Park, is not a common and usual one. While we have, at Kodak Park, over 60% of the occupations recognized by the Census Bureau, as well as many others peculiar to our industry, the bulk of our operators are specialists, trained and developed on our plant, for our particular operations and purposes. For a great many positions, a qualified operator must have had years of highly specialized training. The work

Glass

Tin Plate

VI. Selection & Training of Personnel

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may involve control of chemical operations, the coating of photographic emulsions on our various photographic products, or the inspection of such products before they are cut and packed for the trade. This applies particularly to our men, many of whom work on shift jobs similar to those in the paper or steel industry.

In the War emergency, we found we could replace men with women or girls on some operations which were not on a shift basis. For practically all of our jobs now we have definite job analyses and specifications which visualize in detail the job and specify the class and kind of an employee by whom it should be performed. Upon many of the operations, especially those upon which a large number of operators are employed, we have motion studies and Standard Written Practice Instructions which tell just how the job is performed. These correspond for industry to the Manual of Arms for the Army.

Psychological Tests

In the selection of employes, we use psychological tests to determine the natural aptitude of the applicants and from this the jobs for which they would be best suited. During the War, new employes were trained in a separate training school, using the motion studies and Standard Written Practice Instructions as the basis for instruction. Practical psychology was used in the school through motion pictures, still pictures and lectures to instruct the beginners and to encourage them to stick to the job until trained and competent to do good work and earn good wages. This training period was the critical time when turnover was high and often most discouraging.

This educational use of motion pictures is now being introduced into the public schools by our educational department and promises almost revolutionary results.

When the beginner was competent, he was then transferred to the production department where payment for work done was on a piece work, bonus, or other financial incentive basis of payment.

As a result of this combination of activities in handling the new employes, it was found possible to greatly reduce the loss and turnover of beginners and to materially

Psychological Tests

Separate Training School

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reduce the time for beginners to become competent and increase the output otherwise unobtainable and to cut down the loss of product attending the breaking in of green help.

Industrial Relations

At this point, it may be well to mention some of the activities of our Industrial Relations Department which make our Company a good firm to work for. The Company has had for years a suggestion system with awards to employes for good suggestions. There is a wage dividend plan by which the employe receives dividends on his wages, thus sharing in the Company's prosperity. There is provision for sickness and accident compensation, graduated in accordance with length of employment. Safety-first activities are carried on through departmental safety committees. The Company has built houses on a wholesale basis, saving 15 to 20% on the usual cost, and there is a Savings and Loan Association which assists in financing the purchase of homes.

VII. POWER PRODUCTION PROBLEM

At our Kodak Park plant we burn on an average of 500 tons of coal per day. At times, however, a consumption as high as 700 tons is reached in a day. We have a power house capacity of 14,500 H.P. and a refrigeration capacity of 4000 tons per 24 hours. During the summer we buy some current from the local gas and electric company, but in the winter we generate all of our own power, using the exhaust steam for heating.

Normally, we have from two to three months' supply of coal either in our stock piles, or in transit from the mines. This month, we have approximately 39,000 tons of coal in storage, but this is increased when the need is indicated, as upon the occasion of a threatened strike, etc.

In connection with our plant we have a complete water-works sufficient for a city of 150,000, including an inlet on Lake Ontario, six miles from our plant, a pumping station with a capacity of 12,000,000 gallons

Indus-
trial
Relations

2 to 3
Months'
Coal
Supply

Water
Works

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daily, our own pipe line, and a storage reservoir of 5,000,000 gallons' capacity on the plant.

Our local gas and electric company generate both by hydraulic and steam power and are interconnected with Niagara Falls, so we really have three independent sources of power.

During the War, a committee was appointed by the manager for the conservation of fuel. This committee appointed departmental committees, and as a result through their joint activities every unnecessary expenditure of power was eliminated. Lights were kept turned off, building temperatures were reduced, both by day and during the night, belts were thrown off on unnecessary line shafts, and processes requiring heat from steam were closely investigated and supervised. In this way, a material reduction in our coal consumption was effected.

CONCLUSION

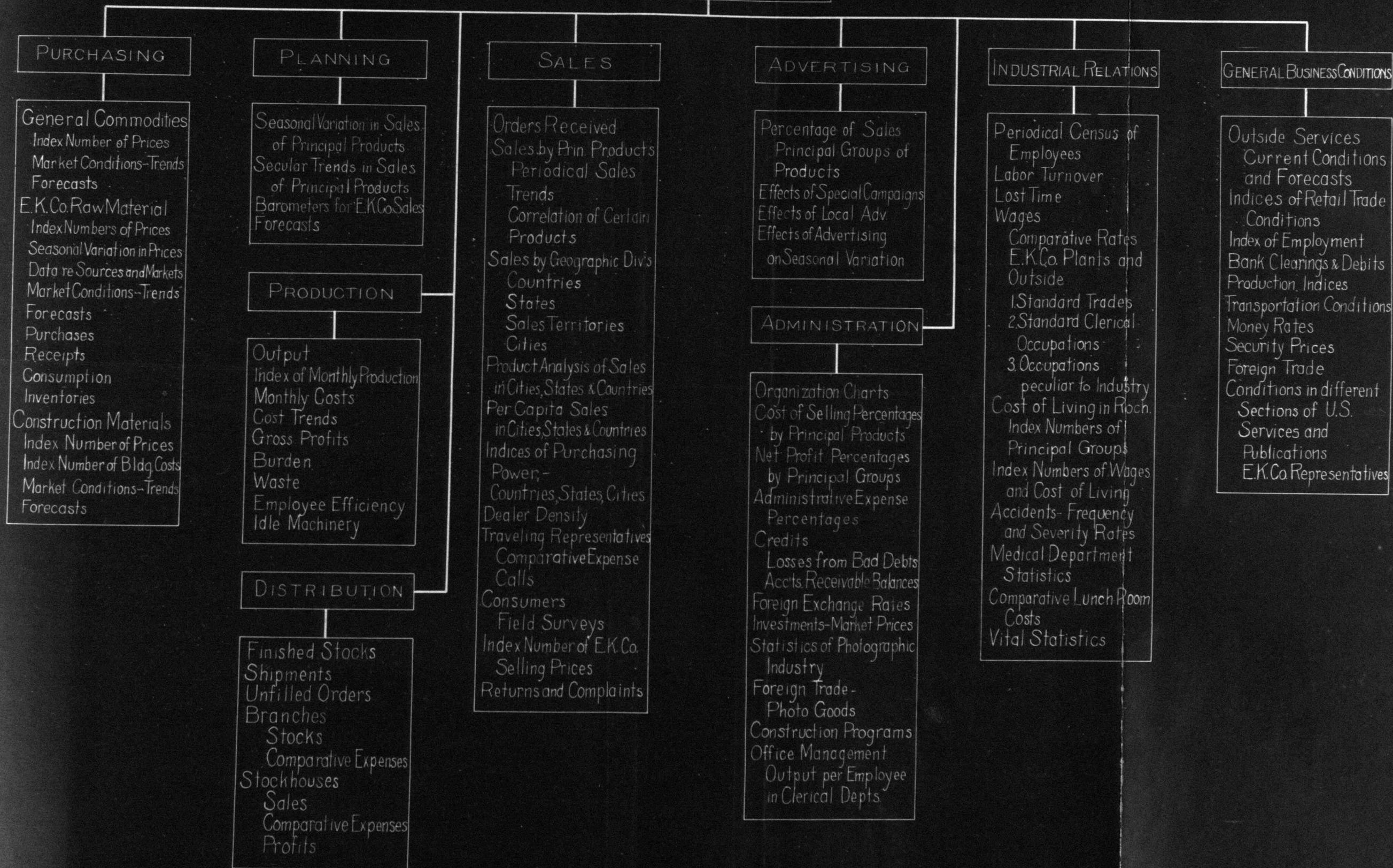
I am not sure that the information as given is of direct value to you in your work, but I do think it has given you a fairly comprehensive conception of the extent of our Company's activities, its products, and at least some of its problems.

I am an industrial engineer, not a statistician nor a chemist, but if there are any questions which I can answer, I shall be pleased to do so.

War
Emergency
Fuel Comm.

EASTMAN KODAK COMPANY

STATISTICAL DEPARTMENT

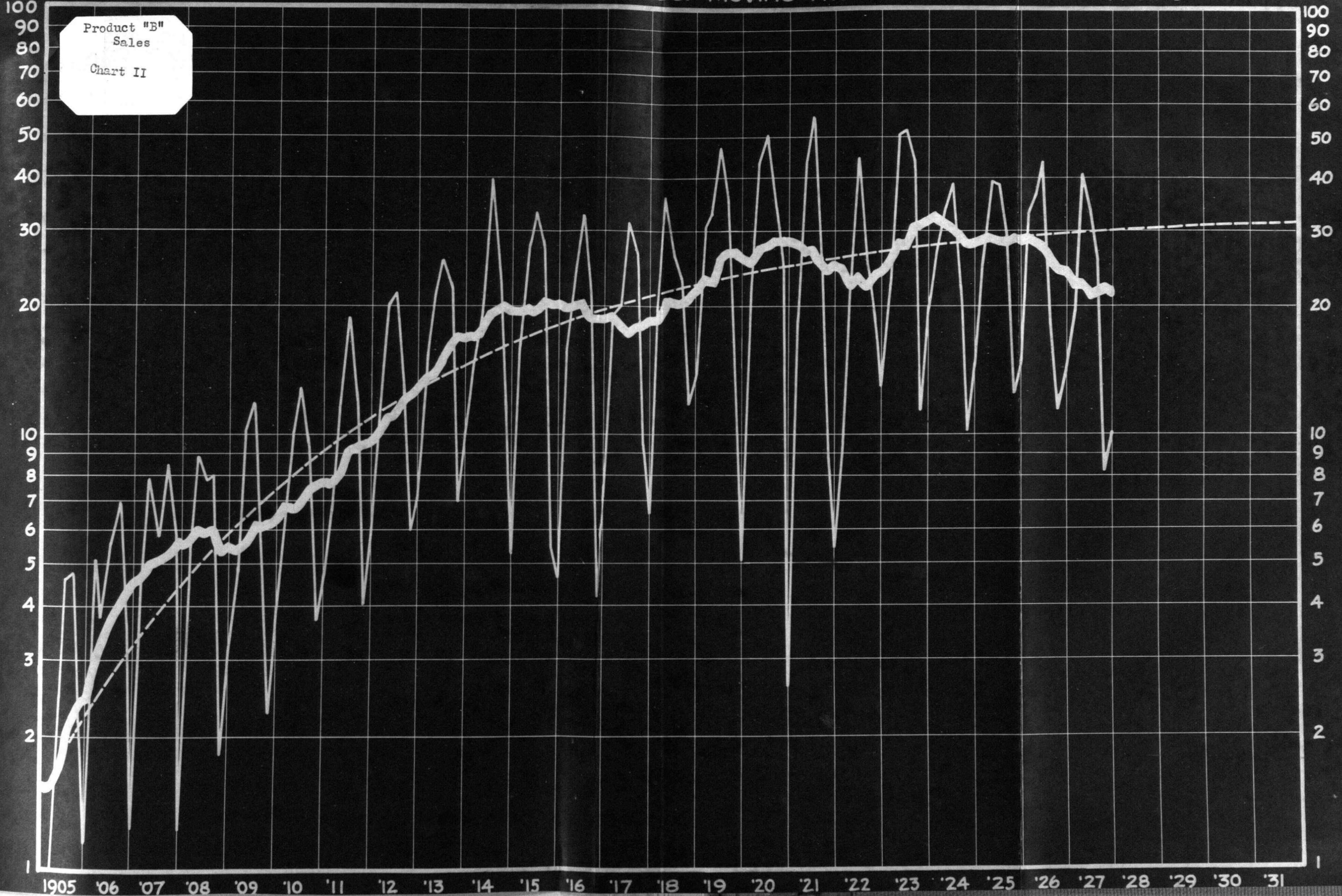


— MONTHLY SALES

— 12 MOS. MOVING AVERAGE

---- TREND

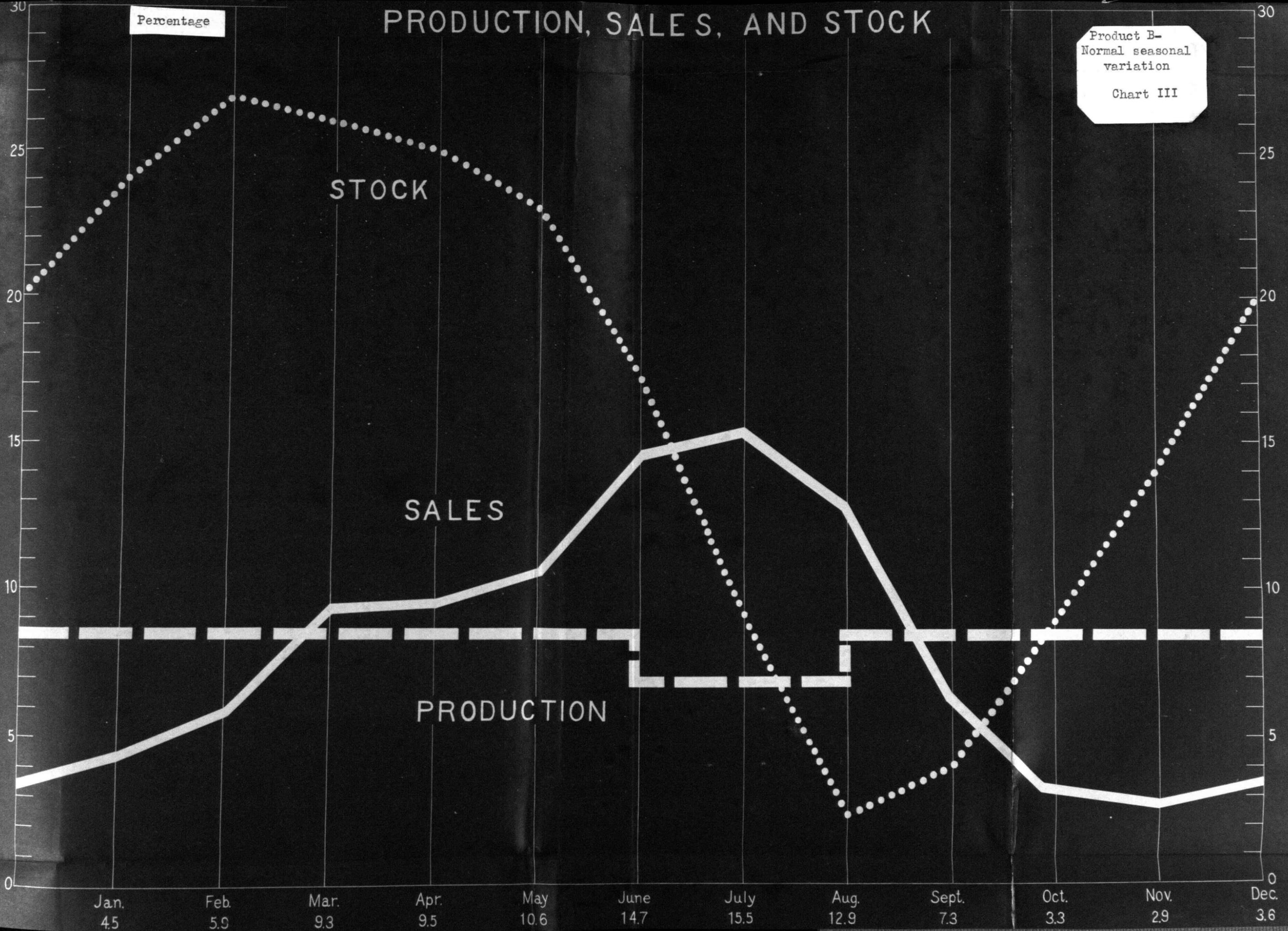
Product "B"
Sales
Chart II



PRODUCTION, SALES, AND STOCK

Percentage

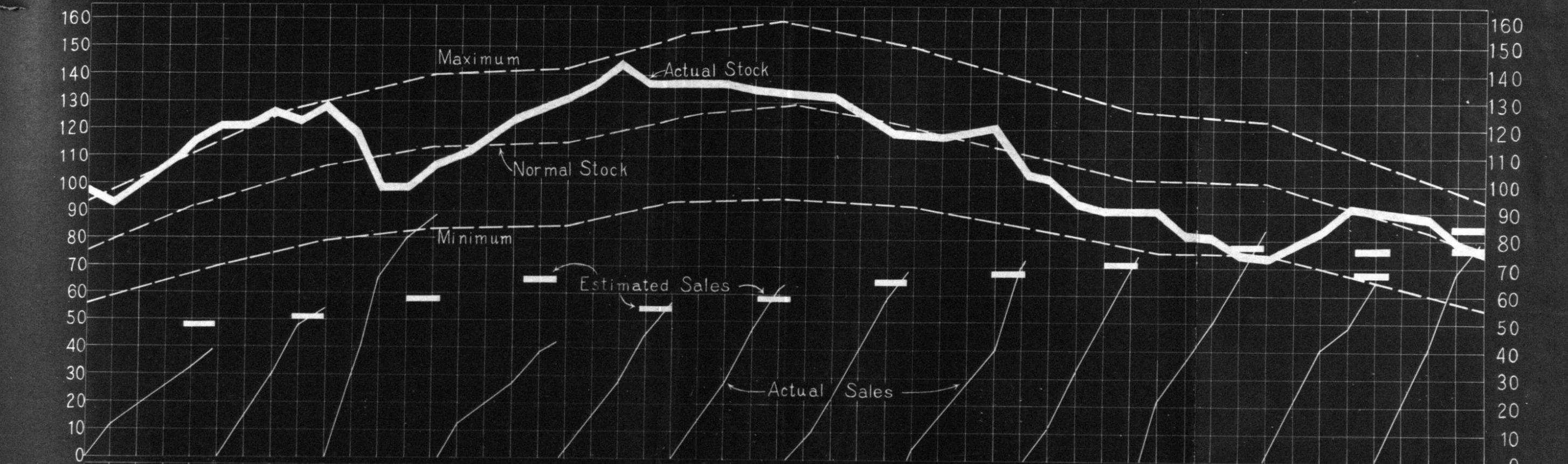
Product B-
Normal seasonal
variation
Chart III



PRODUCTION, SALES, AND STOCK

Sales and Stock
Thousands

Sales and Stock
Thousands



Product-"E"
Production,
Sales, and
Stock
chart IV