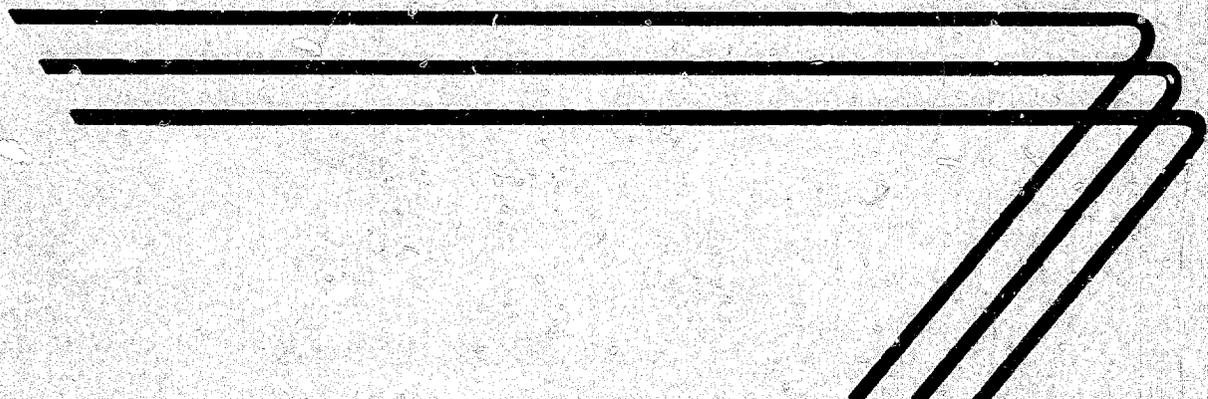


01a

PLANT REQUIREMENTS FOR MANUFACTURE OF MEN'S SOCKS

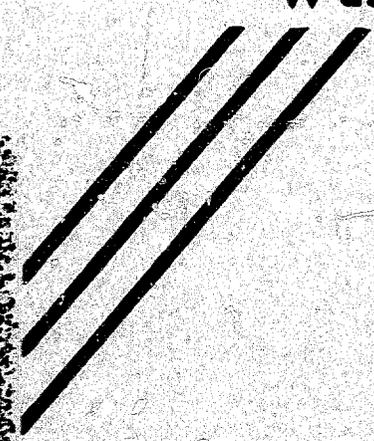


TECHNICAL AIDS BRANCH

INTERNATIONAL COOPERATION

ADMINISTRATION

Washington, D. C.



REVISED
MAY 1959

FOREWORD

This manual is a revision of an earlier report of the same type issued in 1955. This revised version includes current costs of labor, machinery, equipment and supplies, as well as additional information relative to engineering, training, safety, markets, sales, financial and economic factors.

* * * * *

This manual is designed to provide a general picture of the factors which must be considered in establishing and operating a small-scale factory of this type. It should prove useful in creating interest in the subject, and serve to give enough understanding of the related considerations to help government officials, other leaders and businessmen to determine whether the potential deserves more-detailed attention.

However, it is important to note that in most cases plans for the actual development and installation of a plant will require expert engineering and financial advice in order to meet specific local situations. For further information and assistance, readers should contact their local Productivity Center, Industrial Institute, Servicio, or United States Operations Mission.

Mention of the name of any firm, product, or process in this manual is not to be considered a recommendation or endorsement by the International Cooperation Administration, but merely a citation that is typical in its field.

* * * * *

The original report was prepared by the Wolf Management Engineering Company, Chicago, Illinois.

Technical information, as well as review, was provided by R. Poliakoff, Industrial Consultatn, 126 Eleventh Avenue, New York 11, New York.

* * * * *

This manual has been revised and rewritten by
George H. Andrews Engineering Associates, Inc.
411 Southern Building, Washington 5, D. C.

PR+21

April 1959

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
General Assumptions	1
Production Capacity	2
Manufacturing Process for Mens' Socks	2
Manufacturing Unit	5
Machinery and Equipment	6
Furniture and Fixtures	6
Direct Materials	7
Annual Cost of Direct Materials	7
Supplies	7
Direct Labor	8
Indirect Labor	8
Diagrammatic Layout	9
Plant Layout	10
Plant Site	11
Building	11
Power	11
Water	11
Fuel	11
Depreciation	12
Manufacturing Overhead	12
Manufacturing Cost	12
Fixed Assets	13
Working Capital	13
Capital Requirements	13
Sales Revenue	14

	<u>Page</u>
Recapitulation of Costs, Sales and Profits	14
Budget Control	15
Budget Control Accounts	15
Purchase Requisition	16
Voucher Check	17
Engineers	18
Training	19
Safety	20
Summary	21
Materials and Supplies	21
Market Factors	21
Export Markets	22
Marketing Problems	22
Economic Factors	23
Personnel	23
Laws and Regulations	23
Financial Factors	24
Financial Requirements of the Project	24
Short Term Bank Credits	24
Financial Plan	24
Bibliography	25
Abbreviations	25
Knitting Machine	26
Looper	27
Rotary Hosiery Dyeing Machine	27
Extractor	28
Boarding Hosiery	28

P L A N T R E Q U I R E M E N T S
F O R M A N U F A C T U R E O F
M E N ' S S O C K S

INTRODUCTION

The purpose of this manual is to present basic information for establishing and operating a small plant for the manufacture of men's socks.

Except for a small percentage all socks are made by the knitting process. There are about 4,000 knitting industries in the United States. A few of the products made in these industries include outerwear, underwear and hosiery. However, this manual will be devoted exclusively to men's socks.

The term sock used in this manual denotes a short stocking as distinguished from a hose that is longer.

GENERAL ASSUMPTIONS

In order to make realistic estimates in this manual, certain assumptions are made. These are:

1. The costs of the building and general facilities are based on United States prices.
2. Material costs are based on sizes and specifications of materials used in the United States.
3. Labor costs are based on the average for the industry as recently published by the United States Bureau of Labor.
4. Adequate power and water are available at the plant site.
5. Adequate transportation facilities are available at the plant site.
6. The plant operates two eight-hour shifts a day, five days a week, and fifty weeks per year.
7. No special provision is made for the training of new personnel. It is assumed that learner's rates are paid in such cases.

8. The following items cannot be estimated realistically:

- a. Land value;
- b. Distribution and selling costs;
- c. In-freight and out-freight;
- d. Taxes.

While general estimates will be made of each of these items except taxes, for the purpose of completing cost estimates, adjustment should be made in accordance with actual local costs.

In fact, all cost estimates contained in this manual should be adjusted to conform to local conditions.

9. Columns are provided in the tables included in this manual to facilitate the conversion of cost figures to conform with local costs.

PRODUCTION CAPACITY

The capacity of this plant is 160 dozen pairs of socks per day or 40,000 dozen pairs of socks per year.

MANUFACTURING PROCESS FOR MEN'S SOCKS

The manufacturing process is relatively simple requiring only about six clearly defined operations. Practically all men's socks follows the same sequence of operations. The machinery and equipment described in this manual are the simplest that can be considered adequate for doing the job, on the basis of productivity data obtained from the machinery manufacturers and checked against actual results being obtained in representative mill. The figures shown can therefore be considered as being definitely attainable.

The descriptions of operations which follow apply particularly to a simple, inexpensive type of men's sock.

Knitting

In knitting by hand, each loop is made separately, loop following loop across the width of the fabric, but knitting machines make the whole row of loops across the width of the fabric at one time by having a separate needle for each loop. The up-and-down and out-and-in motions of the needles are controlled by cams which slide underneath and push particular needles into position.

Knitting machines are equipped with either spring beard needles or latch needles. Both types have a hook-eye at one end and a method of rapidly opening and closing the eye. The eye opens to hook a strand of yarn and closes so that it can pull the yarn through another, or "old", loop without catching on the old loop.

The latch needle has a half hook which is opened and closed by a small swinging latch attached to the stem of the needle.

There are a number of different knitting machines each designed to do a particular job. There are two basic types: flat and circular machines.

The flat knitting machine has needles arranged in a straight line and produces a flat fabric. One type is the full-fashioned knitting frame, which makes a flat strip automatically dropping or adding the right number of stitches so as to narrow or widen the strip at certain places to conform to the shape of the leg; these strips are then sewed together to form a stocking, known as full-fashioned hose.

The circular knitting machine has needles arranged in a circle, fixed to the rim of a rotating cylinder. The needles work their way from stitch to stitch as the cylinder revolves. The machines produce knitted fabric webbing in the form of a tube. Circular machines are used in the production of men's socks, with which this manual is concerned.

Probably 90 per cent of men's socks are knitted in a single operation on a one-cylinder automatic machine.

As one whole sock is knitted complete on a single automatic machine, only a few operators are required in the knitting room. It is customary in laying out the knitting room to install machines in groups of from 16 to 30 machines; 20 is considered about average for one knitter, and is the number used in this manual. One fixer devotes his time to the machines tended by two knitters.

The fixer changes needles, sinkers, and sizes, and makes minor adjustments. He is also primarily responsible for quality and lengths. There is also a top grade of fixer known as a Plant fixer." The latter is able to do all repairs and maintenance and is responsible for changing and developing patterns.

Average standard production is:

4 dozen pairs per machine per 8 hour day.
80 dozen pairs per machine battery of 20 machines
per 8 hour day.

The cuffs are knitted in long strips on ribbing machines, and the cuffs are later separated. The "transferring" of anklets

is a skilled operation in which each cuff is hung loop for loop inside a ring having as many points as there are stitches in the cuff. This ring is then fitted into the transfer-knit machine which completes knitting the sock.

Looping

In the manufacture of men's socks the action of the knitting machine stops on the top of the toe, and the sock is complete except for an opening which is closed by "looping." Bags holding approximately 20 dozen pairs of socks are taken directly from the knitting machines to the looping section.

One operator is required to run a single looping machine, which consists of a horizontal disc turning from right to left, with small points around the circumference. The operator hangs both edges of the toe opening, loop for loop, on the points of the looper. During the full revolution of the disc the sock first passes under a cutting device which trims the excess knitting just above the points. The toe is then closed by another loop, made by the yarn in the looper which brings together the loops of both sides of the opening.

Average production per operator is:

40 dozen pairs per 8 hour day.

Turning

After looping, the socks must be "turned." This operation consists of pulling the sock over a shaped board, inspecting for knitting defects, and turning the sock as it is pulled off the board. Defective socks which can be repaired are sent directly to the menders. Then all socks are sent to the grey-room storage, or directly to the dye house.

This does not include the mending job, which is usually considered as indirect labor. It would also be considered reasonable if about 6 per cent of the total production was found to be defective to some degree; half of these could probably be salvaged by mending, and the other half would be sold as "seconds."

Bleaching and Dyeing

It is the general practice to bleach and dye hosiery according to the individual customer's orders. The socks are placed in nets, then put into a chlorine solution in open or rotary vats and then rinsed. Then similarly they are placed in a dye solution, and well rinsed. After a final rinse, the socks are put through a centrifugal extractor, then are removed, and while still wet are taken to the boarding department.

Boarding

In this process, the socks are dried and shaped on steam heated forms. The work is done on tables having two parallel rows of 12 forms. The operator, working between the tables, uses the rows on both sides of him. The forms themselves are hollow, upright shapes of stainless steel or aluminum and are heated by steam. The forms may have removable toe caps, which permit the same form to be used for all the different sizes.

The operator is required to pull the sock over the shape, to fit it snugly, and to smooth the entire sock. By the time all 24 socks have been placed on the forms, the first socks are dried and can be removed.

Average production per operator is:

120 dozen pairs per 8 hour day.

Finishing

The remainder of the operations may be generalized by the term "finishing." These are ordinarily:

- a. "Transfer" - The trade mark, size, and yarn content is usually recorded on one sock of each pair using decalcomanias. The information is transferred from a roll of thin paper on which it is written by pulling the paper over the sock and applying a hot iron.
- b. "Put on Rider" - The rider is the glued label applied to the tops of a pair of socks, which keeps them paired together.
- c. "Fold and Box" - From the finishing department, the boxed hose go directly to the stock bins or shipping room.

Average production per operator is:

120 dozen pairs per 8 hour day.

Under normal conditions an individual order received from a customer on Monday morning is usually shipped by Friday afternoon; in plants knitting on a blanket order only three days are required to complete the process from grey storage to shipping.

MANUFACTURING UNIT

The manufacturing unit for men's socks is one dozen pair.

MACHINERY AND EQUIPMENT

160 Dozen Pairs Men's Socks Per Eight Hour Day

<u>Description</u>	<u>Number Required</u>	<u>Estimated</u>		<u>Actual Cost</u>
		<u>Unit Cost</u>	<u>Total Cost</u>	
Knitting Machines	20	\$ 1,700	\$ 34,000	_____
Elastic Top Attachment	10	185	1,850	_____
Packing Charge	20	40	800	_____
Motor and Transmissions	1	1,500	1,500	_____
Loopers	2	200	400	_____
Motor	1	50	50	_____
Rotary Dye Vac - 25 lbs.	1	2,100	2,100	_____
Motor	1	300	300	_____
Extractor - 30 inch	1	1,700	1,700	_____
Motor	1	50	50	_____
Turning Board	1	50	50	_____
Boarding Table	1	200	200	_____
Boarding Toes	24	30	1,200	_____
Racks, tables, baskets, work bench, small tools, trucks and chairs.		1,200	1,200	_____
Piping and Wiring for Equipment		1,500	1,500	_____
Total			\$ 46,900	_____

FURNITURE AND FIXTURES

<u>Description</u>	<u>Number Required</u>	<u>Estimated</u>		<u>Actual Cost</u>
		<u>Unit Cost</u>	<u>Total Cost</u>	
Desks and Chairs	3	\$ 100	\$ 300	_____
Typewriter	1	150	150	_____
Adding Machine	1	150	150	_____
Filing Cabinets	2	100	200	_____
Total			\$ 800	_____

DIRECT MATERIALS

Men's Socks

<u>Description</u>	<u>Size Yarn</u>	<u>Pounds Yarn Per 100 Dozen Pairs</u>	<u>Estimated Price Per Pound</u>	<u>Estimated Yarn Cost Per 100 Dozen Pairs</u>	<u>Actual Cost</u>
Top	16	62	\$0.68	\$ 42.16	_____
Body	10	46	0.66	30.36	_____
Heel and Toe	16	23	0.68	15.64	_____
Cost of Dyes			0.20	<u>20.00</u>	_____
Total Per 100 Dozen Pairs				\$108.16	_____

ANNUAL COST OF DIRECT MATERIALS

Based on operating the plant two 8 hour shifts per day and producing 80,000 dozen pairs of socks per year would amount to --

$$\frac{\$108.16}{100} \times 80,000 \text{ or } \$ 86,528$$

SUPPLIES

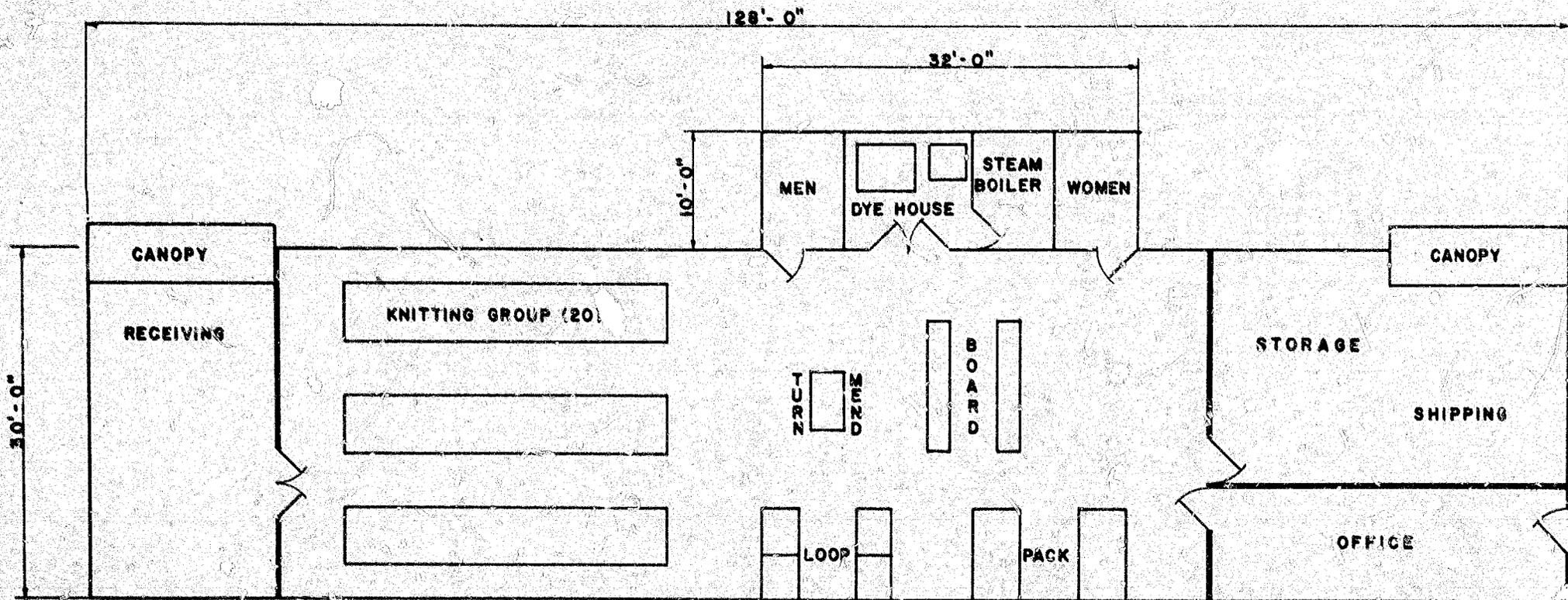
<u>Item</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>
Lubricants	100	_____
Needles	1,000	_____
Repair Parts	1,000	_____
Maintenance Materials	700	_____
Office Supplies	<u>200</u>	_____
Total	\$ 3,000	_____

DIRECT LABOR

<u>Occupation</u>	<u>Personnel Required</u>	<u>Hourly Rate</u>	<u>Estimated Annual Cost</u>	<u>Actual Annual Cost</u>
Knitters	4	\$ 1.60	\$12,800	_____
Looper Operators	8	1.60	25,600	_____
Turners	2	1.50	6,000	_____
Bleacher and Dyer	1	1.80	3,600	_____
Boarders	3	1.60	9,600	_____
Finishers	<u>4</u>	1.60	<u>12,800</u>	_____
Total	12		\$70,400	_____

INDIRECT LABOR

<u>Occupation</u>	<u>Personnel Required</u>	<u>Hourly Rate</u>	<u>Estimated Annual Cost</u>	<u>Actual Annual Cost</u>
Manager	1		\$ 8,000	_____
Bookkeeper	1		5,000	_____
Secretary-Clerk	1		3,600	_____
Fixers	2	\$ 2.00	8,000	_____
Mending and Utilities	1	1.50	3,000	_____
Receiving and Shipping	1	1.60	3,200	_____
Janitor and Utilities	<u>1</u>	1.50	<u>3,000</u>	_____
Total	8		\$33,800	_____



- 6 -

DIAGRAMMATIC LAYOUT
of
SEAMLESS HOSIERY MILL

SCALE 1/2"



PLANT LAYOUT

Preliminary to laying out a plant, it is necessary to study local conditions with respect to the climate, type of transportation facilities, advisability of renting or building, and many other factors. However, there are a number of general principles concerning a small plant layout which would be applicable in most locations, and these are illustrated in the layout opposite this page. Also, this layout serves to establish the amount of space needed to approximate the cost of this operation.

It is axiomatic that the number of batteries, or groups, of knitting machines installed will determine the size of the plant itself and the production on which overhead costs will be determined. For the present purposes, it is considered that a battery of 20 knitting machines, placed in two parallel rows of 10, should be adopted, as it will afford a fair day's workload for one knitter.

It should also be noted that it is customary to operate knitting machines on a two-shift basis; some mills work around the clock. The present plan assumes a two-shift operation in all departments, and costs have been figured accordingly.

It also seems logical to sketch a layout which assumes the smallest size plant that will be economical to operate and which can be readily doubled or tripled in size. For men's socks, this can easily be accomplished. The layout sketched therefore shows the arrangement of a plant capable of producing 160 dozen pairs of men's socks of simple construction per 16 hour day.

The layout, being rectangular, is suited to a continuous flow of the work -

Yarn and supplies are received at one end.

The knitted socks move to the dye house, awaiting customers' specific orders.

Boarding and packing follow, and the finished socks are either held in storage or shipped and sent out.

PLANT SITE

To provide for eventual expansion about 10,000 square feet of level, well drained land is required. The site should be as advantageously located as possible with respect to transportation facilities, power, water, fuel, sources of labor and markets. The cost of the site is estimated at \$1,000.

BUILDING

To provide for some expansion a one-story building 30 feet by 128 feet or 3,840 square feet will be required. The building may be constructed with any suitable local material. The cost of the building including a suitable boiler, adequate plumbing and wiring is estimated at \$3.50 per square foot or \$13,440. In the procurement of the boiler the availability of local fuel should be considered.

POWER

The cost of power for all purposes is estimated at \$1,200 for two eight-hour shifts per day.

WATER

The cost of water is estimated at \$300 for two eight-hour shifts per day.

FUEL

The cost of fuel is estimated at \$600 for two eight-hour shifts per day.

DEPRECIATION

<u>Item</u>	<u>Estimated Cost</u>	<u>Years Life</u>	<u>Estimated Per Year</u>	<u>Actual Per Year</u>
Building	\$13,440	20	\$ 672	_____
Machinery and Equipment	46,900	10	4,690	_____
Furniture and Fixtures	800	10	80	_____
Total			\$ 5,442	_____

MANUFACTURING OVERHEAD

<u>Item</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>
Depreciation	\$ 5,442	_____
Indirect Labor	33,800	_____
Supplies	3,000	_____
Power	1,200	_____
Water	300	_____
Fuel	600	_____
Total	\$ 44,342	_____

MANUFACTURING COST

<u>Item</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>
Direct Materials	\$ 86,528	_____
Direct Labor	70,400	_____
Manufacturing Overhead	44,324	_____
Total	\$ 201,252	_____

FIXED ASSETS

<u>Item</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>
Land	\$ 1,000	_____
Building	13,440	_____
Machinery and Equipment	46,900	_____
Furniture and Fixtures	<u>800</u>	_____
Total	\$ 62,140	_____

WORKING CAPITAL

<u>Item</u>		<u>Estimated Cost</u>	<u>Actual Cost</u>
Direct Materials	- 30 days	\$ 7,200	_____
Direct Labor	- 30 days	5,900	_____
Manufacturing Overhead	- 30 days	3,700	_____
Reserve for Sales Collections	- 30 days	<u>26,600</u>	_____
Total		\$ 43,400	_____

CAPITAL REQUIREMENTS

<u>Item</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>
Fixed Assets	\$ 62,140	_____
Working Capital	<u>43,400</u>	_____
Total	\$ 105,540	_____

SALES REVENUE

The current selling price for socks of the type and quality produced in this plant, including allowances for the sale of seconds, will average about \$4.00 per dozen pair.

Based on this sales price per dozen pair the annual sales revenue would be 80,000 x \$4.00 or \$320,000.

RECAPITULATION OF COSTS, SALES AND PROFITS

<u>Item</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>
Direct Materials	\$ 86,528	_____
Direct Labor	70,400	_____
Manufacturing Overhead	<u>44,342</u>	_____
Total Manufacturing Cost	\$ 201,270	_____
Interest on Loans	\$ 3,000	_____
Insurance	500	_____
Legal	1,200	_____
Auditing	2,400	_____
Unforeseen Expense	<u>10,630</u>	_____
Total Administrative Cost	17,730	_____
Sales Commissions, Travel, Freight Out, Bad Debts, Discounts and Allowances	30,000	_____
Profit before Taxes	<u>71,000</u>	_____
Total Annual Gross Sales	\$ 320,000	_____

BUDGET CONTROL

A requisition form designed to provide accurate records of procurement and indicate the purpose of procurement with the least amount of time and effort is shown on the following page.

This form has an account number for each type of the various expenditures which the manager will review in detail, monthly or oftener, in order to control his expenses. Some items, such as power and water, are usually under contract and are easily checked by reference to monthly bills. For simplification, items (marked with an asterisk below) are omitted from the purchase requisition. Variations in the labor costs are easily reviewed by examination of the payroll vouchers. The simplified type of control thus provided makes certain that the manager can control expenditures promptly.

Following the requisition form, a sample voucher check is shown. Voucher checks should be used for the payment of all expenditures and the appropriate book account number placed on each voucher.

At the end of each month the manager will receive a statement of all expenditures broken down by budget accounts. If the expenditures exceed the budgeted monthly allowances of any of the accounts, the bookkeeper will furnish the manager with a break-down of all expenditures relative to the budgeted accounts exceeded. All these supporting data can be secured by reference to the purchase requisitions and the check vouchers. This reference will enable the manager to determine what caused the over-expenditure and take corrective action.

If at any time during each month it becomes apparent that expenditures will exceed any of the budget accounts, the bookkeeper will bring this to the attention of the manager for his information and action.

BUDGET CONTROL ACCOUNTS

Account Number	Monthly Expense	Monthly Budget	Annual Budget	Actual
10 Administrative	\$ _____	\$ 591	\$ 7,100	\$ _____
20 Sales	_____	2,000	30,000	_____
30 Direct Materials	_____	7,210	86,528	_____
40 Supplies	_____	250	3,000	_____
51 Power*	_____	100	1,200	_____
52 Water*	_____	25	300	_____
53 Fuel	_____	50	600	_____
60 Unforeseen Expense (Reserve Account)	_____	886	10,630	_____
71 Direct Labor*	_____	5,866	70,400	_____
72 Indirect Labor*	_____	2,816	33,800	_____
80 Depreciation (Reserve Account)	_____	---	5,442	_____

Note: Administrative includes interest on loans,
insurance, legal and auditing.

R. W. MITCHELL MANUFACTURING COMPANY

1422 BOSWORTH STREET. S. E.

65-22
514

ANYWHERE, U. S. A. _____ 19____ No. **10000**

PAY _____ DOLLARS \$ _____

TO THE ORDER OF

R. W. MITCHELL MANUFACTURING COMPANY

TO **FIRST NATIONAL BANK**
ANYWHERE, U. S. A.

BY **SAMPLE CHECK**

VICE PRESIDENT

- 17 -

ACCOUNT NUMBER

Sample voucher check to be used for the payment of
all expenditures in connection with Budget Control.

R. W. MITCHELL MANUFACTURING COMPANY

ENGINEERS

The services of professional engineers are desirable in the design of this plant, even though the proposed plant is small.

A correct design is one which provides the greatest economy in the investment of funds and establishes the basis of operation that will be most profitable in the beginning and will also be capable of expansion without expensive alteration.

The addresses of professional engineers who specialize in industrial design, some of whom may be willing to undertake such work on low cost projects overseas, can be secured by reference to the published cards in various engineering magazines. They may also be reached through their national organizations, one of which is the

National Society of Professional Engineers
2029 K Street, Northwest,
Washington 6, D. C.

Manufacturers of industrial equipment employ engineers familiar with the design and installation of their specialized products. These manufacturers are usually willing to give prospective customers the benefit of technical advice by those engineers in determining the suitability of their equipment in any proposed project.

The equipment manufacturers also know, and can recommend, professional engineers in private practice, who are willing and able to provide appropriate consulting services.

TRAINING

Manufacturing an inferior quality of product during the training period could create sales resistance that might be difficult to cope with later. To avoid such possibilities, the quality of the product should be maintained at all times, including the training period.

In some areas skilled operators may be available locally. In other areas all the operators may have to be trained.

If skilled operators are not available, adequate training would be assured by using one or more of the following methods:

- A. If the plant is designed and installed by a competent engineering firm, the contract should be negotiated, if possible, on a turn-key basis. On this basis the contractor agrees to operate the plant and produce the quality and quantity of the product stated in the contract for an agreed period of time. Such a contract would assure adequate personnel training, since full quantity and quality could not be produced with an untrained organization.
- B. The engineering firm that designs and installs the plant can usually make training arrangements to have key personnel placed, for training purposes, in a foreign industry that produces the same type of product. This would provide training for the key personnel while the plant is being installed.
- C. If neither of the above methods is possible, then qualified and experienced individuals should be employed for the key positions, either permanently or temporarily, to perform the key operations and assist in training the organization, even if they must be secured outside the country.
- D. The manager should have years of successful experience in this type of business and be fully qualified in all phases of management, including the training of employees.

SAFETY

There is always danger of accident and injury in any industrial plant. Because of this, the manager should take specific action to bring to the attention of each employee the importance of safety precautions and intelligent first aid.

Practically all machines have safety appliances, and the manager should see that these are in good working condition and that the operators are making full use of them.

In addition to constant watchfulness to make sure that all practicable safety precautions are taken, first aid supplies should be readily available. One complete first aid kit should be maintained near the manager's office, and others at appropriate places throughout the plant. Some of the employees should be trained to provide first aid service.

The use of accident posters in the plant have proved to be of value in reducing accidents. It is recommended that such posters be used, and that some direct special action be taken by the manager, at least once each month, to bring to the attention of all personnel the importance of safety precautions.

A fire brigade should be established and each member trained as to his responsibility in case of fire. Fire drills should be conducted periodically.

It is recommended that the employees be encouraged to offer suggestions or recommendations relative to prevention of accidents, removal of fire hazards and maintaining general interest in all safety factors.

SUMMARY

A small plant, built and operated according to the assumptions made in this manual would be a profitable undertaking.

There are some determinations, however, that should be made before a decision is reached to build and operate such a plant. Among the necessary determinations to be made are those with respect to the following items:

MATERIALS AND SUPPLIES

1. Are all materials and supplies available locally?
2. Is the local material market competitive?
3. Are satisfactory delivery of local materials assured at reasonable prices?
4. What materials and supplies must be imported?
5. Are they available in world markets at competitive prices?
6. Would prompt delivery of imported materials and supplies be assured so that large inventories would not be required?

MARKET FACTORS

1. Is there already a demand for the product?
 - A. Who are the principal consumers?
 - B. Who are possible new consumers?
2. How is demand for the product now satisfied?
 - A. By local production? If so, what is the volume of annual production?
 - B. What percentage of consumption is filled by local production?
 - C. By imports? If so, what is the volume of annual imports?
 - D. What percentage of consumption is met by imports?
 - E. From what areas are imports derived?
3. What is the estimated annual increase in local consumption over the next five years?
 - A. How were such estimates made?
 - B. By reference to official figures on population growth, family budgets, imports, etc.?
 - C. By consultation with trade or industry, ministries, associations, bankers, commercial houses, wholesalers, retailers, industrial consumers, etc.?

SUMMARY (Continued)

4. If the product is already being manufactured, can the existing and estimated future local market absorb production of the new plant without price-cutting or other dislocations?
5. Would the estimated sales price and quality of the new product make it competitive with an imported equivalent?
 - A. After adjusting cost to local conditions, is the estimated sales price of the product so high that tariff protection is necessary to protect it from imports?

EXPORT MARKETS

1. Could the product compete in export markets on the basis of price, quality and dependability of supply?
2. Can export markets for the product be developed?
3. If so, in what areas and in what annual volume?
4. What procedures would be necessary to develop export markets?
5. What would it cost?

MARKETING PROBLEMS

1. In calculating costs of the product, has adequate allowance been made for the expense of a sales department, advertising and promotion that might be required?
2. Do consumer prejudices against locally manufactured products exist?
 - A. If so, why?
 - B. Would they apply to the new product?
 - C. If so, how could they be overcome and what would it cost to do so?
3. Do marketing and distribution facilities for the product exist?
 - A. If not, can they be set up?
 - B. What would it cost to do so?
4. Will the product be sold to:
 - A. Wholesalers?
 - B. Retailers?
 - C. Direct to consumer?
 - D. Other industries?
 - E. Government?

SUMMARY (Continued)

ECONOMIC FACTORS

1. How much foreign exchange (and in what currency) is required to import machinery, equipment and supplies:
 - A. How much foreign exchange (and in what currency) is required for annual interest payments and amortization of any loans contracted to import machinery and equipment, or for payment of royalties and technical services?
 - B. How much foreign exchange (and in what currency) is required for annual import of raw materials and supplies?
 - C. What are estimated annual foreign exchange earnings and in what currencies?
 - D. Has careful consideration been given to the possibility of depreciation in the foreign exchange value of the local currency?
 - E. Has careful consideration been given to the possibility of import controls, or restrictions on availabilities of foreign exchange necessary to operate the business?
 - F. What benefits would the new business bring to the economy in the use of local raw materials: in employment and in technology?
 - G. Do dependable facilities exist for transportation, power, fuel, water and sewage?
 - (1) If not, can existing deficiencies be eliminated satisfactorily?
 - (2) What would be the cost to do so?

PERSONNEL

1. Is there an adequate labor supply near the plant location?
 - A. If not, how can the problem be solved?
2. Can the problem of training competent management and supervisory personnel be solved?
 - A. Also, the training of skilled labor?
 - B. Is technical advice available in the locality?
 - C. If not, where can it be obtained and what will it cost?

LAWS AND REGULATIONS

1. Do existing labor laws, government regulations, laws and taxes favor establishment of new business?
 - A. If not, can existing obstacles be removed?
 - B. If so, how and when?

SUMMARY (Continued)

FINANCIAL FACTORS

1. Technical advice on selection of machinery and equipment.
 - A. In selecting the machinery and equipment for the new plant, have reputable and competent engineers and technicians been consulted?
 - B. Have they been asked for advice on the most suitable types of machinery and equipment for the process and locality?
 - C. Have they carefully compared costs of various suppliers?
 - D. Credit terms offered purchasers?

FINANCIAL REQUIREMENTS OF THE PROJECT

1. In estimating the cost of the project, has careful consideration been given to:
 - A. The effect on costs of delays in construction schedules?
 - B. In delivery and installation of machinery and equipment?
 - C. In import of essential raw materials and supplies?
2. In calculating cash flow and working capital requirements, has careful consideration been given to:
 - A. Maintaining adequate inventories of raw materials?
 - B. Supplies and spare parts?
 - C. Seasonal fluctuations in the business?
 - D. The time required to liquidate credit sales to customers and bad debts?
 - E. The period necessary to get the plant into production?
 - F. Cash required to amortize its principle loans?
3. If the economy is in a period of inflation, has full allowance been made for the influence of rising prices and wages on the cost of the project and on working capital requirements?

SHORT TERM BANK CREDITS

1. Has it been possible to make arrangements with local banks to finance short-time working capital requirements of the business?

FINANCIAL PLAN

1. Has a definite plan to finance the project been worked out?
 - A. Is sufficient capital available locally?
 - B. If not, what is the plan to obtain the required capital?

BIBLIOGRAPHY

Textbook

American Cotton Goods

Textile Book Publishing Co.
303 Fifth Avenue
New York 10, New York

Periodicals

Textile World

McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

Daily News Record

Fairchild's Publishers Inc.
7 East 13th Street
New York 3, New York

ABBREVIATIONS

'	Foot or feet
"	Inch or inches
%	Per cent
lbs.	Pounds
No.	Number

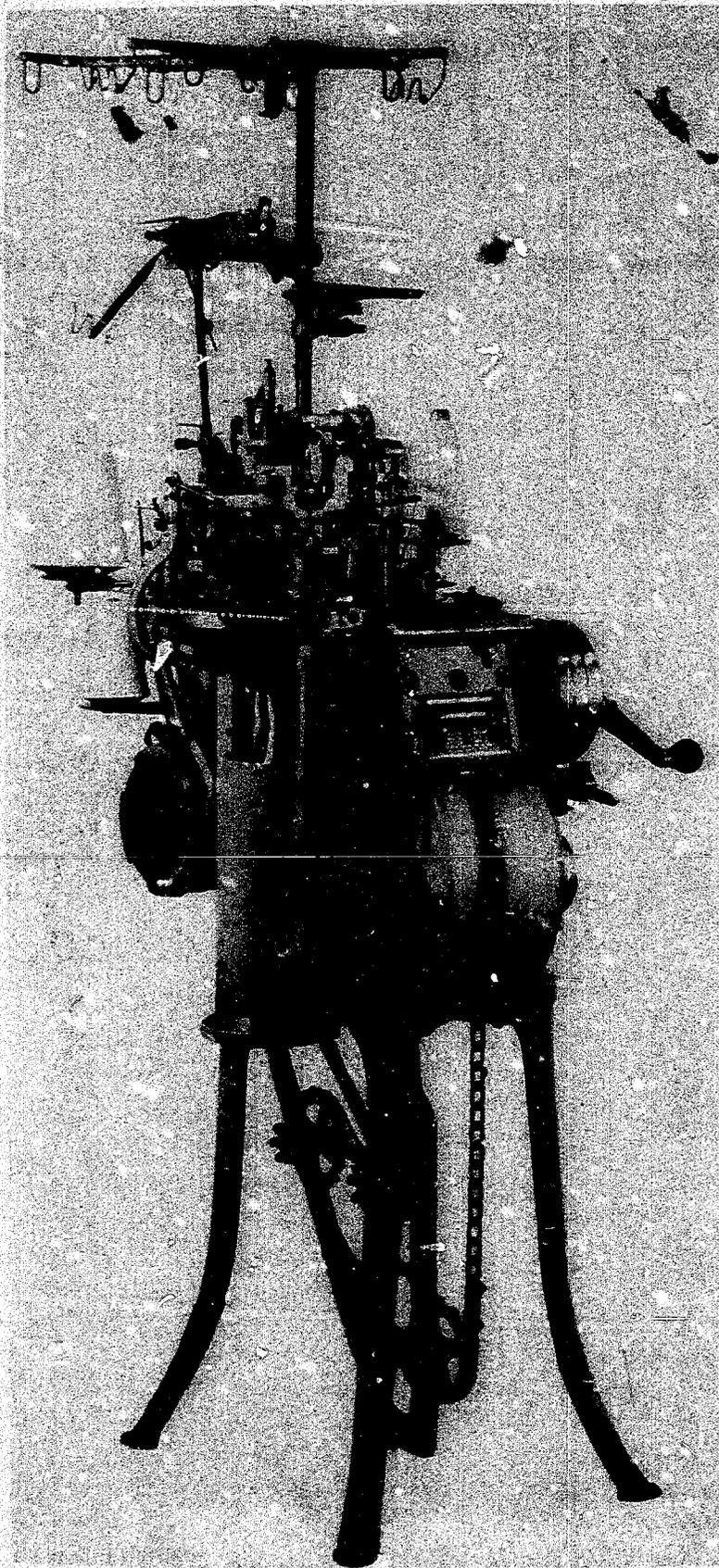


Figure 1
Knitting Machine



Figure 2
Looper

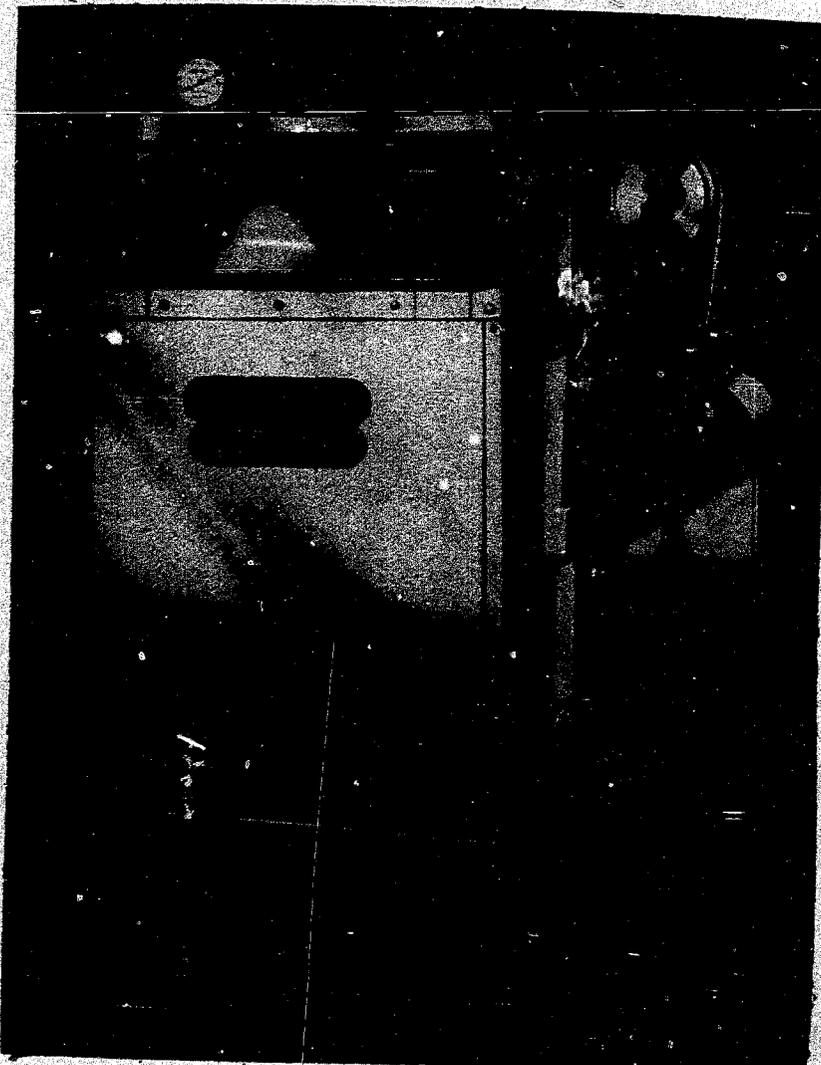


Figure 3
Rotary Hosiery
Dyeing Machine

Figure 4
Extractor

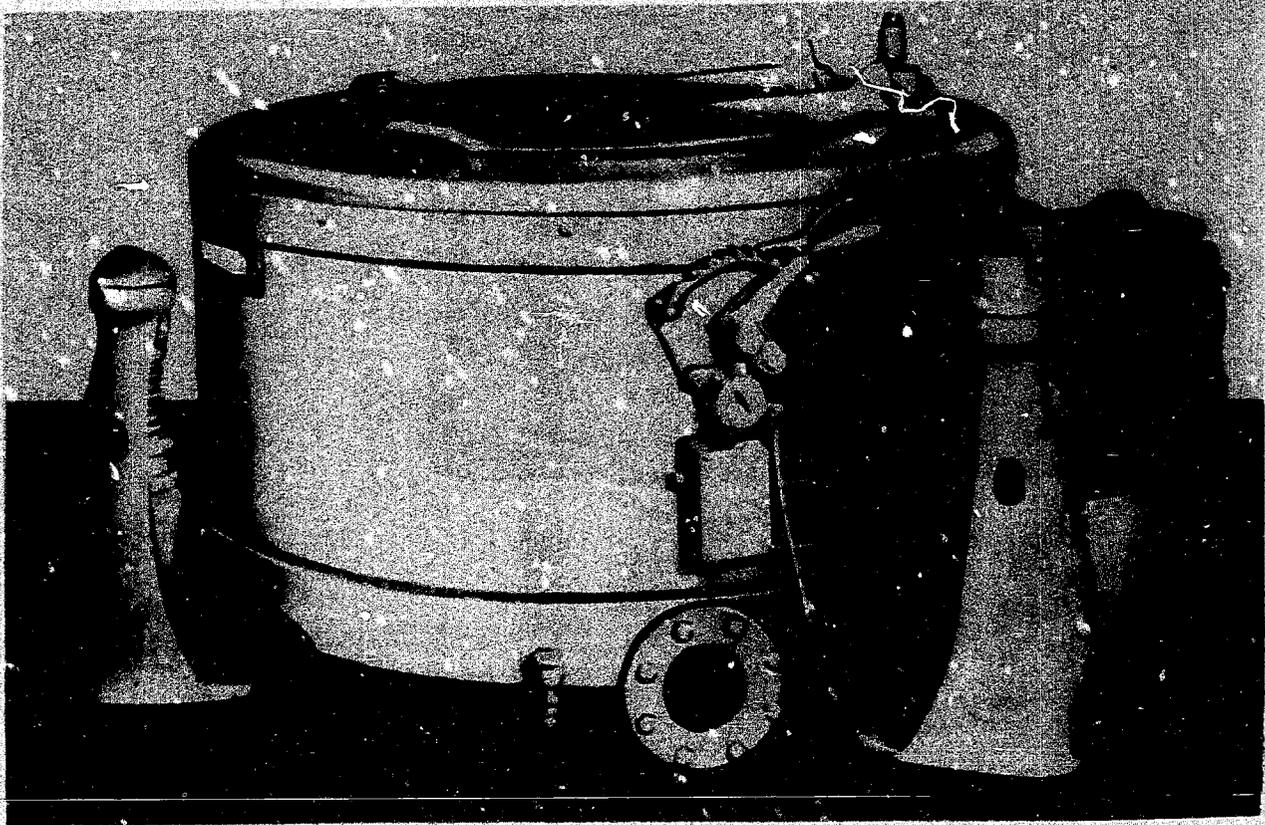


Figure 5
Boarding Hosiery



INTERNATIONAL COOPERATION ADMINISTRATION
SERVICES OF THE
INDUSTRIAL TECHNICAL COOPERATION PROGRAM
TYPE III - TECHNICAL AIDS FOR OVERSEAS

● **INDUSTRIAL REPORTS SERVICE**

Provides basic information regarding:

1. Data and reference materials relating to private capital mobilization and its application in economic development.
2. Requirements for establishing and operating small factories in basic industries.
3. Man-hour requirements, operational characteristics, and equipment utilization in representative U. S. factories in selected industries.
4. Man-hour and materials savings through standardization, simplification, and specialization studies.
5. Supervisory and other specialized training procedures and techniques.
6. U. S. experience in specialized fields.

● **TECHNICAL DIGEST SERVICE**

Provides digests and abstracts, full length articles, and bibliographical references on U. S. developments in products, processes, and work techniques derived from U. S. technical, scientific, and trade periodicals, and other pertinent sources.

● **TECHNICAL INQUIRY SERVICE**

Provides answers to individual questions relating to products, processes, machinery and equipment, production operations, work techniques, management practices and concepts, factory engineering, and basic requirements for industrial production.

● **TRAINING MATERIALS SERVICE**

Provides basic materials for use by specialized technicians in the conduct of management, supervisory and specialized training courses in host countries.

● **TECHNICAL LITERATURE SERVICE**

Provides recommendations and guidance regarding current useful world-wide publications relating to industry and productivity improvement; distributes carefully selected and representative new publications of particular value for program use; and facilitates mission literature procurement.

● **U. S. BOOK EXCHANGE SERVICE**

Provides, on Mission approval, technical and scientific books and periodicals on exchange basis to overseas libraries.

● **VISUALS AND NEW MEDIA**

Provides technical advice and guidance to missions on new industrial visuals. Provides for cooperative program adaptation and use a variety of visual materials, including loan exhibits, silk-screen display panels, graphic brochures, slide and sound kits, and related materials.

● **TECHNICAL FILM SERVICE**

Provides guidance for and facilitates procurement of U. S. technical and training films for program use; provides representative U. S. technical industrial films and filmstrips on loan basis for short-term program requirements; and facilitates adaptation of films into foreign language versions for program use overseas.