

1948

# The use of motion pictures and filmstrips in teaching industrial arts in the seventh and eighth grades

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THE USE OF  
MOTION PICTURES AND FILMSTRIPS  
TEACHING INDUSTRIAL ARTS  
THE SEVENTH AND EIGHTH GRADES  
BY  
R. A. BOURDON

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SCHOOL OF EDUCATION

Service Paper

THE USE OF MOTION PICTURES  
AND FILMSTRIPS IN TEACHING INDUSTRIAL ARTS IN  
THE SEVENTH AND EIGHTH GRADES

Submitted by

Roland A. Bourdon

(B. Ed. Boston College, 1934)

In partial fulfillment of the  
requirements for the degree of

MASTER OF EDUCATION

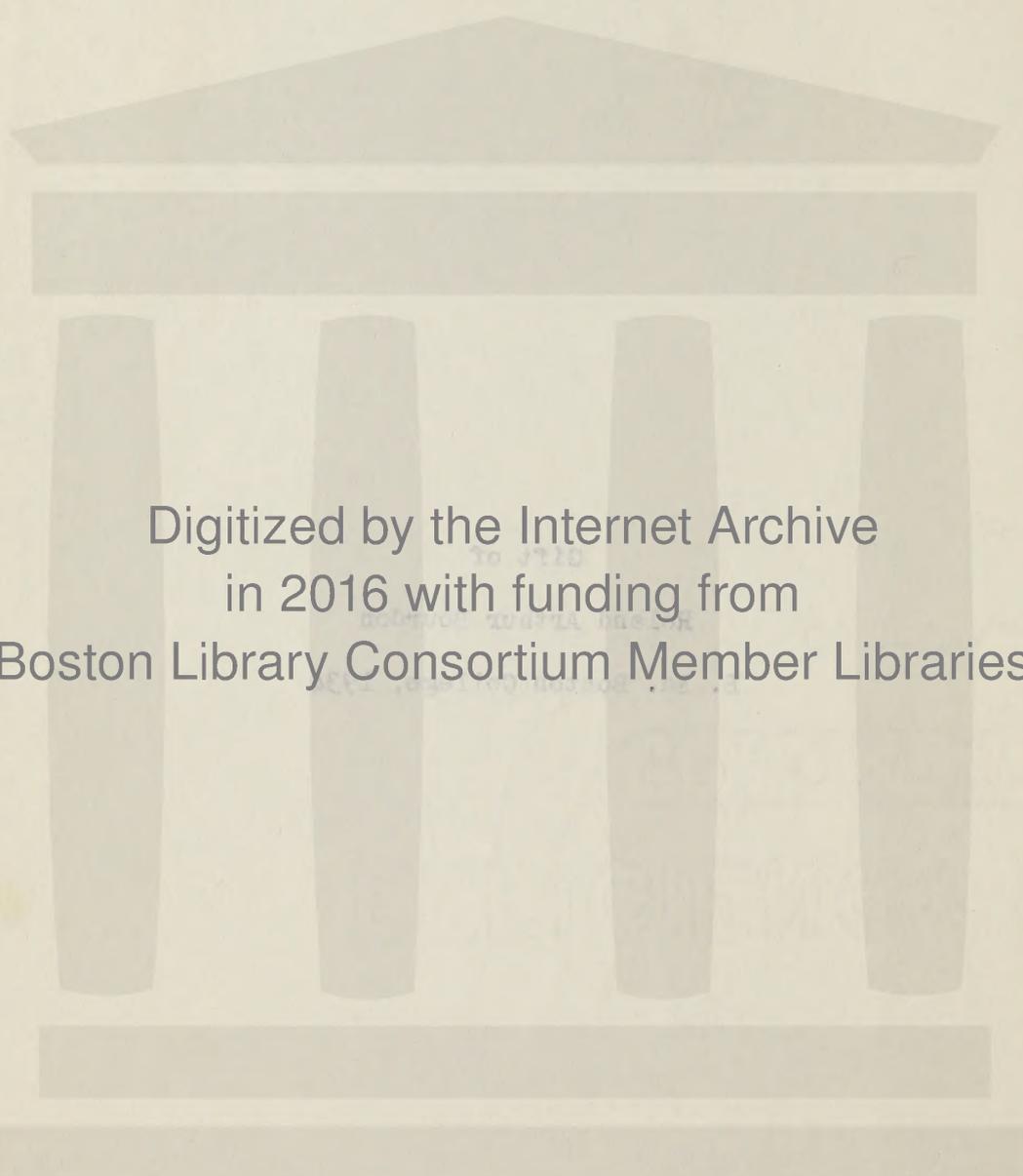
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Gift of

Roland Arthur Bourdon

B. Ed. Boston College, 1934



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#### ACKNOWLEDGMENTS

I am deeply grateful for major assistance in planning and in building the architecture of this service project to Professor Henry W. Syer. Through his unflagging attention to the general organization as well as to specific details, he has helped to create a plan more unified and effective than the author could have been able to do alone.

Approved by

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Motion Pictures and Visual Aids, Boston Uni-  
versity School of Public Relations



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## CHAPTER I.

### INTRODUCTION

"One picture is worth 10,000 words," says an ancient Chinese adage. Today teachers recognize that the most effective way of learning is to create a situation which brings into play the greatest number of senses. In this respect teaching today differs markedly from that of a few years ago. This is especially true since teachers now much more readily recognize the importance of a pupil's ability to develop new skills or activities.

Most pupils tend to learn more quickly through the sense of sight than through any of the other senses. The student who hears how a particular piece of machinery works, and who is also able to see how it operates, and then who is actually able to operate it, is participating actively in a situation favorable to the most economical learning. Visual aids, such as motion pictures and filmstrips enable the instructor to make excellent use of the important sense of sight. This principle can be applied to many and varying learning situations, especially in industrial arts.

Today the teacher has become an outstanding guide in child development. In carrying out his work he should plan circumstances that arouse mental activity on the part of his pupils.

Industrial arts has been defined by Frederick Gordon Bonsor as <sup>1</sup> "a study of the changes made by man in the forms of materials to increase their

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<sup>1</sup> Frederick Gordon Bonsor, and Lois C. Mossman, Industrial Arts for the Elementary School. New York: The Macmillan Company, 1923.

INTRODUCTION

"The picture is worth 10,000 words," a very old Chinese proverb says.

Today's technical requirements demand the most efficient way of learning in the sciences a situation which brings into play the most efficient use of senses. In the present teaching many different methods have been used in the past. The most important is especially the use of the senses. This is the reason for the importance of a quality of learning and skill in our activities.

Most pupils tend to learn more quickly through the sense of sight than through any of the other senses. The student who needs more particular kinds of machinery works, and who is also able to use and to operate, and then who is actually able to operate it, is participating actively in a situation favorable to his most economical learning. Visual aids, such as motion pictures and illustrations enable the instructor to make excellent use of the important sense of sight. This principle can be applied to any and every learning situation, especially in industrial arts.

Today the teacher has become an outstanding guide in this development. In carrying out his work he should plan circumstances that arouse mental activity on the part of his pupils. Industrial arts has been defined by Professor Gordon Bennett as "a study of the changes made by man in the course of materials to increase their

A Professor Gordon Bennett, and Lois C. Bennett, Industrial Arts, The McGraw-Hill Company, New York, 1937.

values, and of the problems of life related to these changes."

Industrial arts is a phase of general education that concerns itself with the materials, processes, and products of manufacture, and with the contributions of those engaged in industry.

Learning thus comes through the pupil's experiences with tools and materials and through his study of resultant conditions of life. It is a curriculum area rather than a subject or course, being comparable in this respect to the field of language.

Industrial arts, therefore, has general values that apply to all levels, and in a continuous program these values are progressively intensive and are cumulative in their effect as the pupil advances in maturity.

Through such a program the pupil:

1. Gains knowledge of the changes made in materials to meet the needs of society, of tools and industrial processes used to effect these changes, of the constant adaptation of materials, tools, and processes to meet changing needs and conditions, and of industrial workers and working conditions.

2. Grows in appreciation of the values of information regarding occupations as a background for a wise choice of a career, of the importance in modern life of tools, and industrial processes, of the artistry of the designer and the skill of the artisan, and of the dignity of productive labor.

3. Increases in ability to plan constructive projects, to select and use sources of industrial and related information, to handle tools and materials, to express with material things his individual interests, to use effectively his recreational time, to work and share as a member of a group, and to evaluate work and its products.

4. Develops attitudes of concern for safety practices, of consideration for workers in all fields, of regard for co-operation among the members of a group, and of respect for property. 1

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1 United Office of Education, Industrial Arts--Its Interpretation in American Schools. Washington, D. C.: Department of the Interior, Bulletin 1934, No. 34.



## STATEMENT OF THE PROBLEM

Like other subjects industrial arts has felt the new influence of visual aids in education. Among these aids are motion pictures, filmstrips, slides, pictures, models, charts, field trips, blackboard, bulletin board, cutaways and exhibits. Only filmstrips and motion pictures will be discussed. However, not too much has actually been done up to the present time to develop them. In the past, it has been often said that the teaching of a particular operation was mainly accomplished by an explanation with an occasional demonstration. Today a demonstration by a motion picture can be superior to the class demonstration because all the pupils in any group are able to see more clearly what is being done. The subject can be presented with improved chances of obtaining equal clarity and an identical viewpoint.

Moreover, visual aids, such as motion pictures, allow complete control of the time needed and can be stopped at any particular point in order to show details of important operations. Visual aids can also greatly help the slow learner since they can remain before the student and may be referred to until he has mastered the operation which is being demonstrated. Much time is saved by the use of visual aids as the pupil's attention is more apt to be fixed on the material being presented. This is particularly true in the showing of motion pictures or filmstrips because the room is in darkness and the pupil's attention can be focused only on the screen.



### SCOPE AND DELIMITATION

This paper is intended to be used as a guide for teachers in industrial arts who wish to improve teaching methods by the use of visual aids. A course of study in industrial arts accompanied by motion pictures and filmstrips for the seventh and eighth grades has been laid out and is indicated for each branch of shopwork. The areas of woodwork, metal, electricity, plastics and mechanical drawing has been included in order to make specific materials available to the teacher and indicates where he may obtain them. A bibliography of industrial arts books has also been included.

### SUMMARY

Today as never before educators the country over are realizing that sensory experiences are the foundations of good learning activity. Visual aids are being increasingly used in an attempt to overcome the weaknesses of a curriculum based on verbal teaching. Much progress has been made in the past twenty years in the use of visual aids and the movement has resulted in more economical ways of enriching the curriculum.

In this paper the writer has endeavored to correlate the results of twelve years of practical teaching at industrial arts with the use of visual aids as advocated by modern educational methods. For this purpose, he has studied fifteen books (noted below) and the past five years of the "Industrial Arts and Vocational Education Magazine" along with two years of the "Educational Screen" and other periodicals in a search for material pertaining to this work. Material has been secured from the Navy Department,



Bureau of Naval Personnel, Washington, D. C. and some of this material has been also used here. The author has prepared a course of study for a general shop in the seventh and eighth grades which has aided greatly in the preparation of the present material.

Sources. The sources referred to above comprise the following visual aids books, periodicals and U. S. Navy materials.

VISUAL AIDS BOOKS

Brunstetter, M. R. How to Use the Educational Sound Film. Chicago, University of Chicago Press, 1937.

Dale, Edgar. Methods in Teaching Audio-Visual. New York, The Dryden Press, Inc., 1946.

\_\_\_\_\_, Dunn, Fannie W., Hoban, Charles F., Jr., and Schneider, Etta. Motion Pictures in Education. New York, The H. W. Wilson Company, 1938.

\_\_\_\_\_, and Ramseyer, Lloyd L. Teaching with Motion Pictures, Handbook of Administration Practice. Washington, American Council on Education, 1937.

Dent, Ellsworth C. The Audio-Visual Handbook. Chicago, Society for Visual Education, 1946.

Dorris, Anna V. Visual Instruction in the Public Schools. Boston, Ginn and Company, 1928.

Hethershaw, L. Simple Directions for Making Visual Aids. Lawrence, Kansas, Department of Visual Instruction, National Education Association, 1912.

Hoban, Charles F., Jr. Focus on Learning. Washington, D. C., American Council on Education, 1942.

Hoban, Charles F., Hoban, Charles F., Jr. and Zisman, Samuel B. Visualizing the Curriculum. New York, The Dryden Press, Inc., 1937.



VISUAL AIDS BOOKS (continued)

Hollis, A. P. Motion Pictures for Instruction. Boston, Houghton Mifflin Company, 1924.

Koon, Cline M. School Use of Visual Aids. Washington, D. C., Government Printing Office, 1938.

Mannino, Philip. A B C's of Visual Aids and Projectionist's Manual. New York, Educational Film Library Association, Inc., 1947.

McKown, Harry C. and Roberts, Alvin B. Audio-Visual Aids to Instruction. New York, McGraw-Hill Book Company, 1941.

Seaton, Helen H. A Measure for Audio-Visual Programs in Schools. Washington, D. C., American Council on Education.

Wittich, Walter Arno and Fowlkes, John Guy. Audio-Visual Paths to Learning. New York, Harper and Brothers, 1946.

LIST OF PERIODICALS

Business Screen, 157 E. Erie Street, Chicago 11, Illinois. 8 Issues.

Educational Screen, 64 E. Lake Street, Chicago, Illinois. 10 Issues.

Film News, Educational Film Library Association, 45 Rockefeller Plaza, New York 20, N. Y. 12 Issues.

Film and Radio Guide, Educational and Recreational Guides, Inc., 172 Renner Avenue, Newark, N. J. 9 Issues.

Film World, 6060 Sunset Boulevard, Hollywood 38, California. 12 Issues.

Movie Makers, Amateur Cinema League, 420 Lexington Avenue, New York 17, N. Y. 12 Issues

See and Hear, E. M. Hale Company, Eau Claire, Wisconsin. 9 Issues.

The News Letter, Ohio State University, Bureau of Educational Research, Columbus, Ohio, 12 Issues.

Visual Review, Society for Visual Education, 100 S. Ohio Avenue, Chicago, Illinois. Annual.



NAVY DEPARTMENT MATERIALS

How to Use Training Aids. U. S. Navy Manual, Bureau of Naval Personnel Training, Training Aids Division, Washington, D. C. NAVPers 12500.

Instructor Evaluations of the Effectiveness of Training Films. Bureau of Naval Personnel Training, Training Aids Division, Washington, D. C. March 1945.

Use of Training Film Aboard Ship as Reported by Fire Controlmen. Bureau of Naval Personnel Training, Training Aids Division, Washington, D. C. February 1945.

Use of Training Aids as Reported by Officers Aboard Ships. Bureau of Naval Personnel Training, Training Aids Division, Washington, D. C. April 1945.

Training Film and Film Strip Projection. War Department, Washington, D. C., Bulletin TM 11-401, March 22, 1943.

Training. U. S. Naval Bulletin, Bureau of Naval Personnel, Training Aids Division, Washington, D. C., NAVPers 14954, February 1947.

Training. U. S. Naval Bulletin, Bureau of Naval Personnel, Training Aids Division, Washington, D. C., NAVPers 14954, May 1947.

Training. U. S. Naval Bulletin, Bureau of Naval Personnel, Training Aids Division, Washington, D. C., NAVPers 14954, July 1947.

Training. U. S. Naval Bulletin, Bureau of Naval Personnel, Training Aids Division, Washington, D. C., NAVPers 14954, September 1947.

Training. U. S. Naval Bulletin, Bureau of Naval Personnel, Training Aids Division, Washington, D. C., NAVPers 14954, October 1947.

Considering the Curriculum. In considering the most recent developments in the field of visual aids, it was found that the army and navy utilized many of the latest and best techniques in their training programs during World War II. The United States Navy emphasizes a given curriculum is a comprehensive training plan. In effect, it outlines the goals,



objectives, and aims of an area of instruction. Obviously, any attempt to plan an integrated visual aids program for industrial arts without first considering the aims and objectives of the curriculum would result in a poorly co-ordinated program. In fact, such an attempt might well result in the development of concepts entirely different from those originally intended.

With that in mind, we then assume that the competent instructor in the industrial arts will select aids in terms of the objectives of the curriculum. Thus, consideration of these fundamental objectives is a primary requisite.

Training aids that do not appear to contribute to the established purpose of the instruction are not to be construed as aids and therefore should not be scheduled for presentation. 1

#### ADVANTAGES OF VISUAL AIDS

2

In his Audio-Visual Methods in Teaching, Edgar Dale points out the use of films in teaching skills.

1. Films may make it possible to learn more in less time. This is particularly true in industrial arts where complex machinery does not readily lend itself to oral or written description. An example of this might be the mechanism of a carburetor.

2. Films make it possible to standardize training. All persons learn how to do an operation in the same way. The advantage of this in industrial arts courses is obvious--for example as with the proper use of tools.

3. It is easy to get and hold the attention of a large class by using films. This is especially important in industrial arts classes

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1 "Training Aids in a Training Program. U. S. Naval Training Bulletin, NAVPers 14956, July 1947. Pp. 14-15.

2 Edgar Dale, Audio-Visual Methods in Teaching. New York City, The Dryden Press, 1946. P. 424.



where the objects involved are too small to be seen easily such as the automobile carburetor or the adjusting of a hand plane.

The motion picture permits the elimination of all extraneous noises and all views of the machine except the exact part in which the students are interested.

The selection of scenes, the words used, and their organization are the result of hours of painstaking care by outstanding authorities--far more time and care than the average instructor can spend organizing a single demonstration. Again the carburetor as an automotive product requiring specialized knowledge may be cited as an excellent example and, of course, others could be given, as the making of plywood or the Bessemer process of making of steel. The demonstrator in the film has been selected for his skill; he never grows cross or irritated at doing the same demonstration over and over, never forgets a single line or action, but always repeats the demonstration exactly as it was done the first time.

Animation can explain the action and the basic principles in the demonstration at the time those principles are needed, using a technique of explanation that is superior to all others.

It can be repeated for the slow student, for the student absent the day of the first showing, without requiring the full time of the instructor or of the class and without embarrassment to the individual or group using it. To anyone who has ever seen these factors illustrated in films such as Walt Disney's animated cartoon, "The Flow of Electricity", in the industrial

J. S. Crocker, "Film for Shop Training", School Shop, September 1915.



1

arts the advantages of such visual aid is obvious.

Film demonstration possesses an objectively unattainable by the usual instructor demonstration. Students can learn and know without having to admit that they didn't know. This is particularly important in the training of women or in the training of individuals who have had some experience.

The film demonstration provides a way of giving school shop students a degree of familiarity with production machines that they do not possess in the school shop, since such machines are too large or too expensive to be available. This has proved of considerable assistance to students going from the school into apprentice training in production shops.

#### SUGGESTIONS FOR FURTHER STUDY

Improved methods of using training films in the industrial arts should be striven for.

1. Study should be made of the extent to which films at present included in the curriculums of various types of schools are considered applicable and useful by the instructors. Much work needs to be done in co-ordinating the opinion of experienced teachers in the industrial arts field.

2. Instructors insistent opinion that motion pictures are somewhat better visual aids than filmstrips suggests investigation of the reasons for this opinion. An experimental study could be made to determine the differ-

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1 F. E. Brooker, "Films for Shop Training", School Shop. September 1945.



ence, if any, between training effectiveness of motion pictures and filmstrips. Essential to a study of this type would be matched filmstrips and motion pictures covering the same or comparable instructional areas followed by tests. The field of industrial arts offers many opportunities for this comparison.

Materials, processes, and products of architecture, and with the participation of those engaged in industry. The learning came through the pupils' experience with tools and materials and through his study of relevant conditions of life.

Industrial arts is a curriculum area treating a special phase of the social system and is comparable in this respect to the language arts. Industrial arts makes a study of the changes made by man in the form of materials. These changes enhance and increase the value of the materials, and everyday life becomes more dependent upon these changes.

The objectives of industrial arts are essentially the same. The objective of education is to develop the child so that he may be physically, emotionally, and intellectually. That the growth of the individual may be complete, all aspects of his nature must be cultivated and developed. Today a student must know more about his modern industrial environment and the changes it has on his economic, social, and cultural life. Elements of experience have from ever-changing modern industry are being used to collect materials in the school shop or laboratory for educational purposes. This industrial information is being collected, organized, evaluated, and presented in industrial arts, where a study is made of industry showing its social as well as the material aspects and the student's



## CHAPTER II--INDUSTRIAL ARTS

### PURPOSE

Industrial arts is a phase of general education that concerns itself with the materials, processes, and products of manufacture, and with the contribution of those engaged in industry. The learnings come through the pupils' experiences with tools and materials and through his study of resultant conditions of life.

Industrial arts is a curriculum area treating a special phase of the social system and is comparable in this respect to the language arts. Industrial arts makes a study of the changes made by man in the forms of materials. These changes enhance and increase the value of the materials, and everyday life problems are dependent upon these changes.

The objectives of industrial arts are essentially the same. The majority of educators stress the fact that the child must be developed physically, emotionally, and intellectually. That the growth of the individual may be complete, all aspects of his nature must be cultivated and developed. Today a student must know more about his modern industrial environment and the bearing it has on his economic, social, and cultural life. Elements of experiences taken from ever-changing modern industry are being used to excellent advantage in the school shop or laboratory for educational purposes. This industrial information is being collected, organized, evaluated, and presented in industrial arts, where a study is made of industry showing the social as well as the material aspects; and the student's



knowledge and appreciation of industrial life is developed.

#### OBJECTIVES

1. To develop in each boy an interest in people, their occupations and methods of production.
2. To provide the boy with the knowledge and understanding of common tools, skills and processes.
3. To give the boy the fundamentals of good design, workmanship and develop his ability to read and make working drawings, charts and graphs.
4. To develop an interest in the student to express himself by making useful articles.
5. To create in each pupil an attitude of co-operation and be willing to assist others in group undertakings.
6. To provide the boy with opportunities to make a wise selection of consumer products.
7. To create in the boy a responsibility for safety and health regulations.

The motion pictures in this paper help to contribute to the objectives of industrial arts in the following way:

1. To develop in each boy an interest in people, their occupations and methods of production. For example, the motion picture "Miracles of Plywood" portrays scenes of logging in the Pacific Northwest, details in manufacture of plywood. The principal uses of plywood are shown with carpenters applying it for inside finish of houses and also for outside con-



struction. A painter is also shown applying the stains and finishes to plywood for inside work.

2. To provide the boy with the knowledge and understanding of common tools, skills and processes. This is well-demonstrated in the motion picture film "Elementary Manual Training." A gift box is displayed with other articles of wood. The working plan indicates stock required. The instructor selects various tools and shows the plans to a boy who, then, proceeds to measure, saw, and plane the various pieces of wood needed. The boy applies stain and attaches the hinges. He traces a ship design onto a piece of wood, cuts it out with a coping saw and glues it to the top of the box.

3. To give the boy the fundamentals of good design and develop his ability to read and make working drawings, charts, and graphs. The film "Reading a Three-View Drawing" shows how to use a blueprint to visualize the object, how to interpret a blueprint, and how to make a tool block according to specifications.

4. To develop an interest in the student to express himself by making useful articles. This is well-demonstrated in the motion picture film "Elementary Manual Training". It portrays a gift box and other articles of wood. The instructor selects tools and shows plans to a boy who, then, proceeds to measure, saw, and plane the various pieces of wood needed. The boy applies stain and attaches the hinges. He traces a ship design onto a piece of wood, cuts it out with a coping saw and glues it onto the top of the box.



5. To create in each pupil an attitude of co-operation and be willing to assist others in group undertakings. The motion picture "The Woodworker" demonstrates well the willingness of the carpenters to assist each other in group undertakings. It depicts clearly the importance of working together and assisting others. This film portrays a group of carpenters constructing a house where co-operation is very essential to the successful completion of the house.

6. To provide the boy with opportunities to make a wise selection of consumer products. The motion picture "Furniture Craftsmen" gives the boy an insight on how custom-built furniture is made. The interrelation of hand and machine-tool operations and skills required for precision woodworking are demonstrated in this film. The boy feels the necessity of doing fine quality work in order to obtain best results. Another film should be shown in conjunction with this objective. The motion picture "Masterpieces in Mahogany" should be projected to show the student what good quality furniture looks like and the processes which are necessary to the making of this fine furniture.

7. To create in the boy a responsibility for safety and regulations. This is portrayed well in the filmstrip "Maintaining a Safe Shop". This filmstrip shows how safety and health regulations are obtained in the school shop.



COURSE OF STUDY IN INDUSTRIAL ARTS  
WITH MOTION PICTURES AND FILMSTRIPS

In the past teachers in industrial arts have had difficulty in securing the proper 16 mm motion picture films and filmstrips for the different working units in shop work. A course of study in industrial arts has been built. The author has searched and found films that he feels are suitable for the different working units. The sponsors and the distributors for these films are also listed. A description has been made for each 16 mm motion picture film and can be found by a code number and letter.

Seventh Grade Units

Mechanical Drawing. . . . .	8 weeks
Woodworking . . . . .	.16 weeks
Electricity . . . . .	8 weeks
Plastics. . . . .	8 weeks

Eighth Grade Units

Sheet Metal Work. . . . .	8 weeks
Wrought Iron. . . . .	8 weeks
Woodworking (Advanced). . . . .	.16 weeks
Home Mechanics. . . . .	8 weeks

The letter after the film number denotes the working area: w--Woodworking; d--Mechanical Drawing; e--Electricity; m--Metal Work; p--Plastics.

All filmstrips in this course of study are produced by Jam Handy Organization, Inc. and distributed by Gledhill Bros., Inc., 20 Chestnut Ave. Jamaica Plain 30, Mass.



## I. INTRODUCTION--MECHANICAL DRAWING

To teach the student how to make simple working drawings and interpret them has been the objective of authors in the preparation of study courses. It is presupposed that mechanical drawing will be the first industrial arts course offered to seventh and eighth grade students, since a knowledge of drawing is essential in his subsequent shop work.

The foundation of almost all commercial mechanical drawing is orthographic projection. This phase of drawing is not only the basis to the other branches, but includes additionally such topics as intersections, developments, isometric drawings and dimetric projections.

## II. TEACHING UNITS--MECHANICAL DRAWING

### A. Use and care of drafting tools

1. T-Square
2. Drawing board
3. Triangles
4. Scales
5. Pencils

### VISUAL AIDS

16 mm Film--13d--Introduction To Mechanical Drawing

Filmstrips--T-Squares, Triangles and Other Tools, Part I

T-Squares, Triangles and Other Tools, Part II



B. Mounting and Laying Out Paper

1. Proper position of paper on board
2. Margins
3. Title block

VISUAL AIDS

16 mm Film--11d--Drafting Tips

Filmstrips--Layout Work, Part I

Layout Work, Part II

C. Isometric Drawings

1. 30-degree Lines left and right
2. Ellipses

VISUAL AIDS

Filmstrip--Constructions--Isometric Drawings

D. Orthographic Projection

1. Relation of 3 views
2. Selection of correct views
3. Character of lines

VISUAL AIDS

16 mm Film--3d--Orthographic Projection

Filmstrip--Construction--Orthographic Projection

- 8. Mounting and Levelling Out Paper
- 1. Proper position of paper on board
- 2. Margins
- 3. Title block

VISUAL AIDS

- 1. Isometric Drawings
- 2. Isometric Drawings
- 3. Isometric Drawings

VISUAL AIDS

- 1. Isometric Drawings
- 2. Isometric Drawings
- 3. Isometric Drawings

VISUAL AIDS

- 1. Isometric Drawings
- 2. Isometric Drawings
- 3. Isometric Drawings

## E. Dimensioning

1. Placing dimensions
2. Size of dimensions
3. Extension and dimension lines
4. Construction of arrowheads

## VISUAL AIDS

16 mm Films--11d--Drafting Tips

Filmstrips--Measurements and Measuring, Part I

Measurements and Measuring, Part II

F.

## F. Outcomes

1. Pupils should be able to give names and explain how drafting equipment is used.
2. Pupils should be able to layout paper.
3. Pupils should be able to use proper lines.
4. They should be able to make simple isometric problems.
5. They should be able to plan orthographic projection.
6. They should be able to place and dimension drawings.

## G. List of Suggested Problems

Brick  
Butt joints  
Oilstone holder  
Wedge  
V Block

Knife sharpener  
Mounting board  
Step block  
Core box  
Book rack

E. Dimensioning

- 1. Finding dimensions
- 2. Size of dimensions
- 3. Extension and dimension lines
- 4. Construction of arrowheads

VI. VISUAL AIDS

10. The First--11--Drafting Tips

11. Drafting--Measurements and Marking, Part I  
 12. Measurements and Marking, Part II

7. Outcomes

- 1. Pupils should be able to give names and explain how drafting equipment is used.
- 2. Pupils should be able to layout paper.
- 3. Pupils should be able to use proper lines.
- 4. They should be able to make simple isometric problems.
- 5. They should be able to give orthographic projection.
- 6. They should be able to place and dimension drawings.

8. List of Suggested Problems

Knife sharpener  
 Mounting board  
 Step block  
 Gore box  
 Book rack

Block  
 Nut joints  
 Clasp holder  
 Wedge  
 V Block

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McGee, Richard A. and Sturtevant, Walter W. General Mechanical Drawing. Milwaukee, Wisconsin, The Bruce Publishing Company, 1935.



## SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS

All Films Are 16 mm

No.	MECHANICAL DRAWING NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
1d	Introduction to Engin- The Draftsman-eering Drawing	11		X	X		5	v
2d	According to Plan--Film 1	10		X	X		5	mg
3d	Orthographic Projection--Film 2	20		X	X		5	mg
4d	Auxiliary Views--Single Auxiliaries Film 3	20		X	X		5	mg
5d	Auxiliary Views--Double Auxiliaries Film 4	15		X	X		5	mg
6d	Sections and Conventions--Film 5	15		X	X		5	mg
7d	The Drawings and the Shop--Film 6	15		X	X		5	mg
8d	Selection of Dimensions--Film 7	20		X	X		5	mg
9d	Behind The Shop Drawing	10		X	X		4	j
10d	Blueprint Reading	10		X	X		2	am
11d	Drafting Tips	28		X	X		2	p
12d	Reading a 3-View Drawing	10		X	X		2	w
13d	Introduction to Mechanical Drawing	20		X		X	2	co
14d	Visualizing an Object	9		X	X		2	w
	1. Hardwoods and Softwoods 2. Uses of Canvas Wood, Veneer and Plywood 3. Kinds of Wood							



## CHAPTER III

### I. INTRODUCTION--WOODWORKING

Woodworking has long been an important phase of our industrial life and was one of the first types of shopwork introduced into the schools.

Woodworking includes benchwork and advanced woodworking includes machine work. Benchwork forms the core of woodworking on this level. Through experience in practical situations the pupil should learn the basic principles of woodworking and their application. He should become acquainted with common bench tools and be able to select and use safely the proper tools for the job. Machine work involves the use of power machinery in the place of hand tools. It also includes a knowledge of wood fasteners and how to use them and the recognition and use of various clamps.

Training in the use of suitable finishes to preserve and enhance wood surfaces is a necessary part of any woodworking course. Some knowledge of the ingredients and manufacture of finishes could serve the pupil in the wise choice of finishing materials.

### II. TEACHING UNITS--WOODWORKING

#### A. Lumber Industry

1. Hardwoods and Softwoods
2. Uses of Common Wood, Veneer and Plywood
3. Kinds of Wood



## VISUAL AIDS

16 mm Films--1w--Trees and Homes

2w--Miracles of Plywood

5w--From Forest to Fireside

## B. Measurements

1. Different Kind of Rules

2. Reading Graduations

3. Measurement of Materials

## VISUAL AIDS

16 mm Films--17m--The Steel Rule

18m--The Slide Rule--179

19m--The Slide Rule--354

Filmstrip--Scales and Models

Measuring Instruments

## C. Planning in Woodwork

1. Understand Simple Drawings

2. Layout Patterns

3. Bill of Materials

## VISUAL AIDS

16 mm Films--2d--According to Plan

7d--The Drawings and the Shop

10d--Blueprint Reading



Filmstrip--Layout Work, Part I

Layout Work, Part II

D. Common Tools

1. Squares

- a. Try Square
- b. Framing Square
- c. Combination Square
- d. T-Bevel

VISUAL AIDS

16 mm Film--24m--Elementary Manual Training

26w--A B C of Hand Tools, Part I

27w--A B C of Hand Tools, Part II

Filmstrip--Use of Various Squares

2. Marking Gauge

VISUAL AIDS

Filmstrip--How to Use the Marking Gauge

3. Types of Saws

- a. Cross cut
- b. Rip
- c. Keyhole



- d. Turning
- e. Coping
- f. Backsaw
- g. Miter Box Saw

#### VISUAL AIDS

16 mm Film--25w--Hand Sawing

Filmstrip--Types of Saws and Picking Out the Right Saw for the Job

#### 4. Hand Planes

- a. Block
- b. Smoothing
- c. Jack
- d. Jointer

#### VISUAL AIDS

16 mm Film--9w--The Woodworker

Filmstrip--Types of Planes and Their Use

#### 5. Spokeshave and Drawknife

#### VISUAL AIDS

Filmstrip--How To Use The Spokeshave and Drawknife

#### 6. Cabinet Scraper and Scraper Blade

#### VISUAL AIDS

Filmstrip--Proper Use and Care of Cabinet Scraper and Scraper Blade



7. Files and Rasp

- a. Flat
- b. Half-round
- c. Rat Tail

VISUAL AIDS

Filmstrip--Types of Files and Their Use

Safe Use of Files and Wood Rasps

8. Chisels

- a. Butt
- b. Framing
- c. Gouge

VISUAL AIDS

Filmstrip--Types of Chisels and Their Use

9. Bits and Drills

- a. Auger
- b. Expansion
- c. Forstner
- d. Countersink
- e. Screwdriver Bit
- f. Carbon Drills
- g. Bit Brace, Push Drill, Hand Drill



## VISUAL AIDS

16 mm Films--26w--A B C of Hand Tools, Part I

27w--A B C of Hand Tools, Part II

24w--Elementary Manual Training

Filmstrips--Bits, Drills and Screwdriver Bit, Countersink, and How  
To Use Them

E. Fastenings

1. Nails
  - a. Common
  - b. Finish
  - c. Brads
  - d. Corrugated Fasteners
  - e. Tacks
2. Screws
  - a. Flat Head
  - b. Round Head
  - c. Oval Head
3. Glue
  - a. Flake or Animal
  - b. Liquid or Fish
  - c. Casein
4. Clamps
  - a. C Clamps
  - b. Bar Clamps
  - c. Hand Screws



## VISUAL AIDS

Filmstrips--Mixing and Using Casein Glue

Nails, Brads, Screws--How to Use Them

Proper Way in Using Clamps

## F. Finishing

## 1. Sandpaper

- a. Flint
- b. Garnet
- c. Waterproof Garnet

## 2. Stains

- a. Water
- b. Oil
- c. Spirit
- d. Commercial (Prepared)

## 3. Fillers

- a. Commercial
- b. Self-Prepared

## 4. Transparent Finishes

- a. Shellac
- b. Varnish
- c. Lacquer

## 5. Opaque Finishes

- a. Flat Paint
- b. Enamel
- c. Colored Lacquer



6. Solvents
  - a. Turpentine
  - b. Alcohol
  - c. Lacquer Thinner
7. Polishes
  - a. Lemon Oil
  - b. Wax
  - c. Rotten Stone
8. Brushes
  - a. Kinds
  - b. Use and Care

#### VISUAL AIDS

16 mm Films--44f--How to Finish Plywood

15w--Repainting a Frame Building

Filmstrips--Spray--Painting Equipment

Care and Cleaning of Spray

Painting Equipment and Brushes

How to Apply Fillers, Shellac and Varnish

G. Power Machinery--Woodworking

1. Wood Lathe
  - a. Use and Care
  - b. Spindle Turning
  - c. Face Plate Turning
  - d. Sharpening Tools
  - e. Safety



## VISUAL AIDS

16 mm Films--28w--Turning a Cylinder Between Centers

29w--Turning Taper Work

30w--Turning Work on a Face Plate

Filmstrips--Lathe: Parts--Spindle Turning

16 mm Films Lathe: Faceplate Turning--Other Operations

Safety for Sale--"Making Them Careful"

## 2. Jig Saw

a. Use and Care

b. Fret Work

Filmstrips c. Safety

## VISUAL AIDS

Filmstrips--Jig Saw Operations and Care

Safety for Sale--"Making Them Careful"

Safe Practices for Jig Sawing

## 3. Drill Press

a. Use and Care

b. Safety

## VISUAL AIDS

Filmstrips--Drill Press Operations and Safety Factors in Using a

Drill Press



#### 4. Jointer

- a. Use and Care
- b. Safety
- c. Changing Knives

#### VISUAL AIDS

16 mm Films--33w--Jointing Edges and End Grain

34w--Beveling--Stop Chamfering and Tapering Square Stock

35w--Face Planing Uneven Edges, Jointing on Edge for  
Gluing

36w--Installing Knives

Filmstrips--Jointer Operations Pointed Out

Safe Practices for Using a Jointer

#### 5. Variety Saw (Circular)

- a. Use and Care
- b. Changing Saw
- c. Safety

#### VISUAL AIDS

16 mm Film--37w--Ripping and Cross Cutting

38w--Beveling, Rabbeting, Mitering and Dadoing

39w--Cutting Tenons and Segments

Filmstrips--Circular Saw: Parts, Installing A Blade

Circular Saw: Setting Up, Operating

Factory Safety--Safety Methods in the Factory

Safe Practices for Using a Circular



6. Band Saw
  - a. Use and Care
  - b. Changing the Blade
  - c. Safety

#### VISUAL AIDS

16 mm Film--41w--Changing Band

42w--Sawing a Reverse Curve

Filmstrips--Band Saw and Its Use

Factory Safety

Safe Practices for Band Sawing

7. Tool Grinder
  - a. Use and Care
  - b. Sharpening of Tools
  - c. Safety

#### VISUAL AIDS

Filmstrips--The Tool Grinder

Safety in the Shop

Safe Practices for Using a Tool Grinder

#### H. Outcomes in Woodworking

1. Be able to select lumber best suited for his job and be able to identify different characteristics of lumber.
2. Be able to read a drawing.
3. Make a bill of material.
4. Plan a procedure in doing a job.



5. Able to use a ruler, square and marking gauge.
6. Dress curved edge stock with file or rasp.
7. Recognize types of saws, and be able to choose the proper saw.
8. Square up block to given dimensions.
9. Use chisel and gouge properly.
10. Choose the correct holding tool for bits and drills.
11. Apply nails, screws and glue properly.
12. Indicate and compare the use of the drawknife and spokeshave.
13. Identify the block, smoothing, jack and jointer planes.
14. Indicate the use of each plane.

#### Outcomes in Finishing

1. Familiar with common opaque and transparent finishes.
2. Choose and apply opaque finishes.
3. Choose and apply transparent finishes.
4. Choose and care for brushes.
5. Choose proper solvents for finishing materials.
6. Choose and apply fillers.
7. Able to rub a finish.
8. Able to prepare a surface for finishing.

#### Outcomes in Power Machinery

1. Identify the parts of the lathe and make adjustments.
2. Able to mount work in lathe and select proper speeds.
3. Able to use a shearing cut and scraping cut in turning.
4. Able to do outside and inside turning.



5. Able to adjust cutting throat on schroll saw and adjust blade.
6. Able to choose proper cutting speeds on schroll saw.
7. Identify parts of schroll saw.
8. Able to choose proper drill and make adjustments on drill press.
9. Use the vise properly in drilling.
10. Identify the parts and make adjustments on the band saw.
11. Able to adjust cutting throat.
12. Able to change the blade and adjust properly.
13. Able to identify parts and make adjustments on the jointer.
14. Able to change and adjust blades on jointer.
15. Able to use proper cuts.
16. Know and identify parts of circular saw.
17. Able to change saw.
18. Able to adjust saw for different cuts.
19. Able to adjust push fence for angular cutting.
20. Able to adjust tool rest on grinder.
21. Able to sharpen plane iron and chisel.
22. Recognize need of protective equipment when grinding.

#### I. List of Suggested Projects

Door Stop  
 Tie Rack  
 Letter Holder  
 Book Ends  
 Book Rack  
 Shoe Shine Box  
 Towel Rack  
 Trellis  
 Toys  
 Repair Jobs

Bird House  
 Ironing Board  
 Tabouret  
 Lamp  
 Checker Board  
 Serving Tray  
 Wall Shelves  
 Corner Shelves  
 End Table  
 Coffee Table



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\_\_\_\_\_. Machine Woodworking. Milwaukee, Wisconsin, The Bruce Publishing Company, 1937.

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Waring, Ralph G. Woodfinishing and Painting Made Easy. Milwaukee, Wisconsin, The Bruce Publishing Company, 1940.



SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16 mm

NO.	WOOD WORKING NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
1w	Trees and Homes	40	X		X		1	a
2w	Miracles of Plywood	40	X		X		2	df
3w	Doorway to Happiness	30		X	X		2	df
4w	Fabricating the Western Pines	35		X	X		2	w
5w	From Forest to Fireside	35		X	X		2	w
6w	How to Build a House in 78 Minutes	35	X		X		2	ho
7w	Masterpieces in Mahogany	30		X		X	2	ma
8w	Prefabrication with Plywood	32	X			X	2	df
9w	The Woodworker	11		X	X		5	v
10w	Furniture Making	15		X		X	2	e
11w	Furniture Craftsmen	11		X	X		1	e
12w	Lumbering in the Pacific Northwest	15		X		X	1	w
13w	The Builders	20		X	X		1	t
14w	Treasures of the Forest	15		X	X		3	e
15w	Repainting a Frame Building	18		X	X		3	u
16w	Making of American Homes	30	X		X		3	e
17w	Trees and Men	44		X	X		1	a
18w	Romances of Mahogany	45		X		X	2	ma
19w	Essentials of Wood Turning	16			X		2	bel
20w	Forest Treasures	25			X		2	ve
21w	Redwood Saga	14				X	2	ha
22w	Logging Along	12		X	X		2	tr



SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16 mm

NO.	WOOD WORKING NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
23w	Trees for Tomorrow			X	X		2	af
24w	Elementary Manual Training	10		X	X		2	v
25w	Hand Sawing	20		X	X		2	v
26w	A B C of Hand Tools Part 1	18	X		X		2	gm
27w	A B C of Hand Tools Part 2	15	X		X		2	gm
44f	How to Finish Plywood	22		X	X		2	u
	WOOD LATHE							
28w	Turning a Cylinder Between Centers	17		X	X		2	u
29w	Turning Taper Work	12		X	X		2	u
30w	Turning Work on a Face Plate	15		X	X		2	u
31w	Turning Work in a Chuck	15		X	X		2	u
32w	Face Turning a Collar	16		X	X		2	u
	JOINTER							
33w	Jointing Edges and End Grain	17		X	X		2	u
34w	Beveling, Stop Chamfering and Tapering Square Stock	20		X	X		2	u
35w	Face Planing Uneven Edges Jointing on Edge for Gluing	13		X	X		2	u
36w	Installing Knives	21		X	X		2	u
	VARIETY SAW							
37w	Ripping and Cross Cutting	19		X	X		2	u
38w	Beveling, Rabbeting, Mitering and Dadoing	19		X	X		2	u
39w	Cutting Tenons and Segments	15		X	X		2	u



SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16 mm

NO.	WOOD WORKING NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
40w	Cutting Core Molding and a Core Box	19		X	X		2	u
	BAND SAW							
41w	Sawing with Jig--Changing Band	20		X	X		2	u
42w	Sawing a Reverse Curve	18		X	X		2	u
	SANDER							
43w	Sanding Flat and Irregular Surfaces	19		X	X		2	u
	<p style="text-align: center;">II. TRAINING UNITS--ELECTRICITY</p> <p>A. Sources</p> <ol style="list-style-type: none"> <li>1. Batteries</li> <li>2. Dry Cells</li> <li>3. Generators</li> </ol> <p style="text-align: center;">VISUAL AIDS</p> <p>16 mm Films--1a--Flow of Electricity</p> <p>54--Principles of Electricity</p> <p>6a--Story of a Storage Battery</p> <p>9a--World's Largest Electrical Shop</p>							



## CHAPTER IV

### I. INTRODUCTION--ELECTRICITY

A general course in electricity should be simple and direct, not technical and not limited to one or two small phases of the subject. It should be broad enough to help young people do better those things electrically they will always be trying to do and to meet their needs, regardless of future calling, for a practical working knowledge of common everyday electricity. The course will present and explain the fundamental basic principles of electricity and magnetism, the operation, care and upkeep of the common consuming devices, the ordinary rules of safety, and, to a certain extent, the economic and social tie-up of this subject with other life situations.

### II. TEACHING UNITS--ELECTRICITY

#### A. Sources

1. Batteries
2. Dry Cells
3. Generators

#### VISUAL AIDS

16 mm Films--1e--Flow of Electricity

5e--Principles of Electricity

6e--Story of a Storage Battery

9e--World's Largest Electrical Shop



Filmstrips--The Electric Cell

The Storage Battery

The Generator

B. Simple Hookups

1. 1 Button and 1 Buzzer
2. 2 Buttons and 2 Buzzers
3. 1 Button and 2 Buzzers
4. 2 Buttons and 1 Buzzer

VISUAL AIDS

16 mm Film--5e--Principles of Electricity

Filmstrip--Simple Combinations in Hookup of Buttons and Buzzers

C. Conductors and Insulators

1. Kinds of Conductors
  - a. Copper
  - b. Aluminum
  - c. Lead
  - d. Zinc
  - e. Steel
  - f. Silver
  - g. Tungsten

VISUAL AIDS

16 mm Films--1e--Flow of Electricity

17e--Joining Solid Conductors

20e--Porcelain Protected Surface



Filmstrip--Electric Conductors

2. Kinds of Insulators

- a. Asbestos
- b. Bakelite
- c. Cotton
- d. Fibre
- e. Porcelain
- f. Mica
- g. Rubber

VISUAL AIDS

16 mm Films--20e--Porcelain Protected Surface

23e--Cable Surface Wiring

25e--Wiring Old Buildings with Armored Cable

Filmstrip--Where to Use Insulators

3. Wire Sizes

VISUAL AIDS

16 mm Films-19e--Wire Sizes and Voltage Drop

26e--Electrical Circuit Faults

Filmstrip--Current Electricity

D. Fuses

- 1. Plug Fuse
- 2. Cartridge Fuse
- 3. Renewable Cartridge Fuse and Link

VISUAL AIDS

Filmstrip--Types of Fuses



### E. Electromagnets

1. Have pupil construct electro-magnet for use with dry cell or transformer.

#### VISUAL AIDS

16 mm Films--4e--Magnets

36e--Rotating Magnetic Fields

Filmstrips--Magnetism

Electromagnetism

### F. Splices

1. Western Union Splice
2. Rat-Tail Splice
3. Tap Splice

#### VISUAL AIDS

16 mm Films--17e--Joining Solid Conductors

18e--Soldering Lugs and Splicing Stranded Conductors

Filmstrip--Splices and How Constructed

### G. Meters

1. Types of Meters
2. Reading a Meter

#### VISUAL AIDS

Filmstrip--Electric Meters

### H. Safety Rules

1. Rules for Prevention of Fire
2. Rules for Prevention of Shock

E. Electro-magnets

- 1. Have built constant electro-magnet for use with dry cell or transformer.

VISUAL AIDS

10 mm Film--4x--Magnets

3x--Noting Magnetic Fields

Magnetic--Magnets

Electromagnets

F. Solids

1. Western Union Solids

2. Bat-Fall Solids

3. Top Solids

VISUAL AIDS

10 mm Film--1 1/2--Joining Solid Conductors

1 1/2--Joining Jugs and Soling Stranded Conductors

1 1/2--Joining and How Connected

G. Meters

1. Types of Meters

2. Reading a Meter

VISUAL AIDS

1 1/2--Electric Meters

H. Safety Rules

1. Rules for Prevention of Fire

2. Rules for Prevention of Shock

## VISUAL AIDS

## Filmstrip--Safety Factors

## I. Outcomes in Electricity

1. Understand sources of electricity.
2. Able to hookup elementary bell circuits.
3. Able to name good and bad conductors.
4. Able to distinguish different types of fuses.
5. Understand the importance of magnets and electro-magnets.
6. Able to make common splices.
7. Able to read the electric meter.
8. Be familiar with safety rules.

## J. List of Suggested Projects

Heater or Extension Cord

Miscellaneous Bell Hookups

Lift Magnet

Toy Motor

## K. References

Beauchamp, Wilbur L. and Mayfield, John C. Basic Electricity. New York, Scott-Foresman Company, 1943.

Collings, Merle D. Projects in Electricity. Bloomington, Illinois, McKnight and McKnight, 1941.

Jones, Elmer W. Essentials of Applied Electricity. Milwaukee, Wisconsin, The Bruce Publishing Company, 1935.

Tustison, F. E. Job Sheets for Practical Electrical Shop. Milwaukee, Wisconsin, The Bruce Publishing Company.

VISUAL AIDS

Minimum--Safety Factors

I. Outcomes in Electricity

- 1. Understand sources of electricity.
- 2. Able to hook up elementary bell circuits.
- 3. Able to name good and bad conductors.
- 4. Able to distinguish different types of fuses.
- 5. Understand the importance of magnets and electro-magnets.
- 6. Able to make common splices.
- 7. Able to read the electric meter.
- 8. Be familiar with safety rules.

J. List of Suggested Projects

Tester or Extension Cord

Miscellaneous Bell Hookups

Light Meters

Toy Motor

K. References

Beauchamp, Wilbur L. and Mayfield, John G. Basic Electricity. New York, Scott-Foresman Company, 1943.

Collings, Marie D. Projects in Electricity. Bloomington, Illinois, McNight and McNight, 1941.

Jones, Elmer W. Essentials of Applied Electricity. Milwaukee, Wisconsin, The Bruce Publishing Company, 1935.

Tustison, E. E. Job Sheets for Practical Electrical Shop. Milwaukee, Wisconsin, The Bruce Publishing Company.

SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16 mm

NO.	ELECTRICITY NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
1e	Flow of Electricity	10		X	X		1	t
2e	What is Electricity	22		X	X		1	t
3e	The Electrician	11		X	X		2	v
4e	Magnets	13		X	X		1	t
5e	Principles of Electricity	20	X		X		2	ge
6e	Story of a Storage Battery	30		X		X	5	bu
7e	Story of FM	17	X		X		2	ge
8e	When You Can Measure	37		X	X		2	ge
9e	World's Largest Electrical Workshop	32		X	X		2	ge
10e	West Lynn	31	X		X		2	ge
11e	Adventures in Research	20		X	X		1	t
12e	Electronics at Work	20		X	X		2	ge
13e	Excursions in Science No. 1	9		X	X		2	ge
14e	" " " No. 2	10		X	X		2	ge
15e	" " " No. 3	11		X	X		2	ge
16e	" " " No. 4	9		X	X		2	ge
17e	Joining Solid Conductors	22		X	X		2	u
18e	Soldering Lugs and Splicing Stranded Con- ductors	18		X	X		2	u
19e	Wire Sizes and Voltage Drop	13		X	X		2	u
20e	Porcelain Protected Surface	19		X	X		2	u
21e	Three-Wire Service Entrance	24		X	X		2	u

SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All films are 16 mm

No.	Name of Film	Electricity	Color	Approx. Running Time	White & Black	Sound	Tables	Illustrations	Comments
1a	Flow of Electricity			20	X	X			
2a	What is Electricity			20	X	X			
3a	The Electrician			11	X	X			
4a	Magnets			12	X	X			
5a	Principles of Electricity			20	X	X			
6a	Story of a Storage Battery			30	X	X	X		
7a	Story of an X-ray		X	17	X	X			
8a	Uses You Can Measure			37	X	X			
9a	Waxlin's Organic Electrical Workshop			32	X	X			
10a	West Lynn		X	31	X	X			
11a	Advances in Research			20	X	X			
12a	Electronics at Work			20	X	X			
13a	Experiments in Science No. 1			9	X	X			
14a	" " " " No. 2			10	X	X			
15a	" " " " No. 3			11	X	X			
16a	" " " " No. 4			9	X	X			
17a	Joining Solid Conductors			22	X	X			
18a	Coilbinding Lugs and Splitting Stranded Conductors			18	X	X			
19a	Wire Sizes and Voltage Drop			13	X	X			
20a	Porcelain Protected Surfaces			19	X	X			
21a	Three-Wire Service Entrance			21	X	X			

SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS

All Films Are 16 mm

NO.	ELECTRICITY NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
22e	Installing Surface Metal Raceway	22		X	X		2	u
23e	Cable Surface Wiring	17		X	X		2	u
24e	Preparing Old Buildings for Wiring	21		X	X		2	u
25e	Wiring Old Buildings with Armored Cable	22		X	X		2	u
26e	Electrical Circuit Faults	19		X	X		2	u
27e	Installing Conduit	25		X	X		2	u
28e	Power Bending Conduit	17		X	X		2	u
29e	D. C. Motor, Part I--Overhaul	20		X	X		2	u
30e	D. C. Motor, Part II--Rewinding	37		X	X		2	u
31e	Split-Phase Motor--Rewinding	28		X	X		2	u
32e	3-Phase Motor--Part II--Rewinding	17		X	X		2	u
33e	Repulsion-Induction Motor General Overhaul	25		X	X		2	u
34e	Split-Phase Motor Principles	17		X	X		2	u
35e	Repulsion Motor Principles	18		X	X		2	u
36e	Rotating Magnetic Fields	13		X	X		2	u



## CHAPTER V

### I. INTRODUCTION--PLASTICS

Plastics are constantly assuming greater significance in the lives of all people. The plastic industry is growing rapidly and is taking a most important position in the modern industrial picture. Many industrial products which are used about the home and community are made entirely or in part with plastic. With the ever-increasing use of plastic materials, pupils should obtain some non-technical information concerning the origin, care, and a few of the many fundamental uses of the more common plastic materials.

There are many small inexpensive projects that pupils can make with special emphasis being placed on the careful use of plans and patterns, hand manipulation, correct use of tools and the fabrication of the projects.

### II. TEACHING UNITS--PLASTICS

#### A. History and Kinds of Plastics

##### 1. History of Plastics

###### a. Celluloid and Bakelite

2. Discuss how industry works plastic material by the principle methods of moulding, compression, injection, extrusion.

#### VISUAL AIDS

16 mm Film--lp--Origin and Synthesis of Plastic Materials

12p--This Plastic Age

2p--Methods of Processing Plastic Materials



## B. Tools, Equipment and Supplies

1. Selecting Proper Tools
2. Jigs and Attachments
3. Supplies

### VISUAL AIDS

16 mm Films--26w--A B C of Hand Tools, Part I.

27w--A B C of Hand Tools, Part II.

## C. Layout of Stock

1. Take care in planning the layout to conserve material.
2. Demonstrate use of the tri-square and scratch awl to layout lines.

### VISUAL AIDS

16 mm Film--9d--Behind the Shop Drawing

Filmstrips--Layout Tools and Measuring Instruments

Layout Work, Part I

Layout Work, Part II

## D. Cutting Stock

1. Use of jewelers saw
2. Clamping stock in V block
3. Using clamp for large and small pieces
4. Use of common mill file for smoothing ends of square and round stock



## VISUAL AIDS

16 mm Film--25w--Hand Sawing

Filmstrips--Use of Files and Rasps

Safe Use of Coping Saw

## E. Bending and Shaping

1. Stress care in bending plexiglass and lucite.
2. Inlaying and overlaying.
3. Surface decorations.
4. Turning on lathe.

## VISUAL AIDS

16 mm Film--37m--Finish Forming by Hand

Filmstrips--Shaping and Forming

Spindle Turning

Faceplate Turning

## F. Drilling

1. Use of auger bit for boring plastics with special attention of pilot hole.
2. Using of countersink for heads of screws.
3. Use of wood block for backing of stock when drilling.

## VISUAL AIDS

16 mm Film--38m--Drilling with Portable Drill Motors

Filmstrip--Drills and Drilling



### G. Polishing

1. Use of buffing wheel
2. Caution of overheating
3. Use of sanding before buffing

#### VISUAL AIDS

Filmstrips--The Disk Sander

The Belt Sander

Sanding by Hand

### H. Fastenings

1. Caution pupils that polished edges will not cement well
2. Use of proper cement
3. Need of well-fitted joint
4. Use of screws
5. Use of paper when using clamps in cementing
6. Need of removing excess cement
7. Explain length of time needed for cement to set

#### VISUAL AIDS

Filmstrip--Proper Use of Clamps for Gluing

### I. Outcomes in Plastics

1. Common knowledge of common plastic materials.
2. Orderly way in preparing designs.
3. Use common tools correctly.
4. Cut and finish materials.



5. Have a knowledge of the four methods of fabrication materials; injection, compression, extrusion, and lamination.

J. List of Suggested Projects

Shade pulls  
Rings  
Paper knives  
Letter holder  
Picture frame  
Costume jewelry  
Neckerchief slides

Napkin ring  
Drawer pulls  
Candle-holder  
Belt slides  
Necktie rack  
Checkers  
Powder box

K. References

Dubois, John H. Plastics, Chicago, Illinois, American Technical Society, 1939.

Leeming, Joseph. Fun With Plastics. Philadelphia, Pennsylvania, J. B. Lippincott Company, 1944.

Lockrey, A. J. Plastics in the School and Home Workshop. New York, D. Van Nostrand Company, Inc., 1940.

Simonds, Herbert R. Industrial Plastics. New York, Pittman Publishing Corporation, 1941.



SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16mm

NO.	PLASTICS NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
1p	Origin and Synthesis of Plastic Materials	16		X	X		3	u
2p	Methods of Processing Plastic Materials	21		X	X		3	u
3p	Preparing the Charge and Loading the Mold	11		X	X		3	u
4p	Molding a Simple Part	10		X	X		3	u
5p	Molding a Part with Inserts	10		X	X		3	u
6p	Semiautomatic and Hand Molding of Intricate Parts	16		X	X		3	u
7p	Setting up That Press and Molding a Part	16		X	X		3	u
8p	Cleaning and Servicing the Press	12		X	X		3	u
9p	Finishing Molded Parts	14		X	X		3	u
10p	Machinery Laminated Plastics	19		X	X		3	u
11p	Magic of Modern Plastics	40	X		X		1	b
12p	This Plastic Age	30	X		X		1	b
13p	Fourth Kingdom	30		X	X		2	y
14p	Lucite Carving	16		X		X	2	g



## CHAPTER VI

### I. INTRODUCTION--SHEET METAL WORK

Metalwork develops valuable skills and an appreciation for accuracy and precision. Through films, assigned readings and direct work with metals, boys gain information needed by wise consumers of metallic products. Projects in metalwork are relatively brief and simple so that pupils have ample time to use many different kinds of metals and alloys. Principles of design are used in planning projects.

### II. TEACHING UNITS--SHEET METAL WORK

#### A. Kinds of Metals

1. Black Iron
2. Galvanized Sheets
3. Tin Plate
4. Copper
5. Brass
6. Aluminum

Discuss Gauges, Standard Sizes and Finishes.

#### VISUAL AIDS

16 mm Films--1m--The Drama of Steel

2m--Unfinished Rainbows

20m--Tin From Bolivia

Filmstrip--Kinds of Metals and Their Use



## B. Use and Care of Tools

1. Straight, Schroll, Aviation Snips
2. Scriber
3. Hollow Punch, Center Punch
4. Rivet Set
5. Groover
6. Handy Seaver
7. Hack Saw
8. Setting, Riveting and Ball Pein Hammer
9. Tinner's Mallet
10. Hand Drill and Drills
11. Soldering Copper
12. Dividers
13. Cold Chisel
14. Files
15. Combination Square
16. Plumber's Scraper

### VISUAL AIDS

16 mm Films--29m--Fundamentals of Filing

30m--Sawing Template Metal

35m--Blanking Sheet Metal with Hand Snips

Filmstrips--Hand Tools (A Review of Metalworking Tools)

Scraping

Rivets and Riveting

Use and Care of Hand Files

Hand and Power Hack Saws

1. The end of the world

2. The end of the world

3. The end of the world

4. The end of the world

5. The end of the world

6. The end of the world

7. The end of the world

8. The end of the world

9. The end of the world

10. The end of the world

11. The end of the world

12. The end of the world

13. The end of the world

14. The end of the world

15. The end of the world

16. The end of the world

17. The end of the world

18. The end of the world

The end of the world

19. The end of the world

20. The end of the world

21. The end of the world

22. The end of the world

23. The end of the world

24. The end of the world

25. The end of the world

26. The end of the world

### C. Planning

#### 1. Making Patterns and Drawings

#### VISUAL AIDS

16 mm Films--7d--The Drawings and The Shop

9d--Behind The Shop Drawing

Filmstrips--Layout Tools and Measuring Instruments

Layout Work, Part I

Layout Work, Part II

### D. Cutting Sheet Metal

#### 1. Jeweler's Saw

a. Inside and Outside Cutting

#### 2. Straight Cutting

#### 3. Circular Cutting

#### 4. Chiseling

#### VISUAL AIDS

16 mm Films--35m--Blanking Sheet Metal With Hand Snips

30m--Sawing Template Metal

Filmstrip--Hand Tools for Cutting of Sheet Metal and How To Use Them

### E. Shaping and Forming

#### 1. Vise

#### 2. Grooves

#### 3. Moulds

#### 4. Folding

#### 5. Forming

C. Planning

1. Making Patterns and Drawings

VISUAL AIDS

10-11--The Drawings and The Shop

12--Behind The Shop Drawing

13--Layout Tools and Measuring Instruments

Layout Work, Part I

Layout Work, Part II

D. Cutting Sheet Metal

1. Jeweler's Saw

a. Inside and Outside Cutting

2. Straight Cutting

3. Circular Cutting

4. Notching

VISUAL AIDS

14-15--Blanking Sheet Metal With Hand Snips

16--Blanking Template Metal

17--Hand Tools for Cutting of Sheet Metal and How to Use Them

E. Bending and Forming

1. Vise

2. Grooves

3. Molds

4. Folding

5. Forming

## VISUAL AIDS

16 mm Films--36m--Forming On A Hand-Operated Brake

37m--Finish Forming By Hand

Filmstrip--Shaping and Forming of Sheet Metal

## F. Soldering

1. Soldering Copper, Electric Soldering Copper

2. Fluxes

a. Paste and Liquid

3. Solder

a. Bar

b. String Solder (Acid Core)

c. String Solder (Resin Core)

4. Gas Furnace

5. Safety

## VISUAL AIDS

16 mm Films--32m--Tinning and Solder Wiping

33m--Hand Soldering

Filmstrip--Soldering by Hand

Safe Practices for Using a Gas Furnace

## G. Drilling and Riveting

1. Drilling of Holes

2. Riveting

a. Iron Rivets

b. Tinners Rivets

## VISUAL AIDS

16 mm Film--38m--Drilling With Portable Drill Motors

Filmstrips--Drills and Drilling

Rivets and Riveting

VISUAL AIDS

16 mm Film--Forming On A Hand-Operated Brake  
375--Hand Forming By Hand  
Strip--Splicing and Forming of Sheet Metal

7. Soldering

1. Soldering Copper, Electric Soldering Copper

2. Fluxes

a. Paste and Liquid

3. Solder

a. Bar

b. String Solder (Acid Core)

c. String Solder (Resin Core)

4. Gas Furnace

5. Safety

VISUAL AIDS

16 mm Film--Tinning and Solder Wiping

375--Hand Soldering

Strip--Soldering by Hand

Safe Practices for Using a Gas Furnace

8. Drilling and Riveting

1. Drilling of Holes

2. Riveting

a. Iron Rivets

b. Tinners Rivets

VISUAL AIDS

16 mm Film--Drilling With Portable Drill Motors

Strip--Drills and Drilling

Rivets and Riveting

H. Safety

1. Tools Used Properly
2. Material Held Correctly

VISUAL AIDS

Filmstrips--Play Safe and Work Safely

Treatment for Bleeding

III. TEACHING UNITS--WROUGHT IRON

A. Planning

1. Designing and Sketching
2. Selection of Materials

a. Band Iron

b. Angle Iron

c. Channel Iron

d. Round Stock

VISUAL AIDS

16 mm Film--13m--Decorative Metal Work

23m--Metalcraft

Filmstrips--Layout Work, Part I

Layout Work, Part II

B. Cutting Stock

1. Hack Saw
2. Nicking and Breaking
3. Filing

H. Safety

1. Tools Used Properly
2. Material Held Correctly

VISUAL AIDS

Plastigrams--Play Safe and Work Safely

Treatment for Bleeding

III. TEACHING UNITS--PROJECT IRON

A. Planning

1. Designing and Sketching
2. Selection of Materials

a. Band Iron

b. Angle Iron

c. Channel Iron

d. Round Stock

VISUAL AIDS

16 mm Film--Iron--Decorative Metal Work

Iron--Materials

Plastigrams--Layout Work, Part I

Layout Work, Part II

B. Cutting Stock

1. Hook Saw

2. Marking and Pressing

3. Filing

## VISUAL AIDS

16 mm Films--29m--Fundamentals of Filing

30m--Sawing Template Metal

Filmstrips--Hand and Power Hack Saws

Fundamentals of Filing

## C. Drilling

1. Drills and Counter Sinks

2. Drill Vice

3. Hand Drill

4. Drill Press

## VISUAL AIDS

16 mm Film--38m--Drilling With Portable Drill Motors

Filmstrips--Drills and Drilling, Countersinking

Drill Presses, Part I

Drill Presses, Part II

## D. Files and Filing

1. Single Cut

2. Double Cut

3. Flat

4. Half Round

5. Triangular

6. Flat Filing

7. Draw Filing

8. Cleaning Files



## VISUAL AIDS

16 mm Film--29m--Fundamentals of Filing

Filmstrip--Use and Care of Hand Files

## E. Grinding

1. Punches, Cold Chisels, Screw Drivers

## VISUAL AIDS

Filmstrip--Grinding Machines

Grinding and Sharpening

## F. Shaping and Forming

1. Bending Jig

2. Vise

## VISUAL AIDS

16 mm Film--23m--Metalcraft

13m--Decorative Metal Work

37m--Finish Forming by Hand

## G. Finishing

1. Hammered

2. Painting

- a. Primer

- b. Enamel

- c. Lacquer

## VISUAL AIDS

Filmstrip--Metal Finishing

VISUAL AIDS

10 mm Film--Semi-Transparent of Film

Strip--Use and Care of Hand Film

E. Grinding

1. Pouches, Cold Chisels, Screw Drivers

VISUAL AIDS

Strip--Grinding Machines

Grinding and Sharpening

F. Shaping and Forming

1. Bending Jig

2. Vise

VISUAL AIDS

10 mm Film--Semi-Transparent

1/2--Decorative Metal Work

3/4--Finishing Forming by Hand

G. Finishing

1. Hammered

2. Polishing

a. Primer

b. Enamel

c. Lacquer

VISUAL AIDS

Strip--Metal Finishing

## H. Safety

1. Goggles
2. Garment Sleeves, Neckties Tucked In

### VISUAL AIDS

#### Filmstrips--Factory Safety

Safety Methods in the Factory

Maintaining a Safe Shop

## I. Outcomes in Sheet Metal and Wrought Iron

1. Know modern methods of manufacture and uses of steel.
2. Be able to cut metals with hacksaw, chisel, tinsnips.
3. Be able to use scribes, dividers, steel rule, square and center punch.
4. Be able to layout a simple pattern.
5. Be able to bend, shape, form, twist, and pein metal.
6. Be able to tin the soldering copper and use solder and flux.
7. Fasten metals with rivets and bolts.
8. Be able to file and use emery cloth correctly.
9. Be familiar with safe practices in shop.
10. Be able to bend, shape and form wrought iron.

## J. List of Suggested Projects

### Sheet Metal

Garden Trowel  
 Cookie Cutter  
 Book Ends  
 Utility Box  
 Whisk Broom Holder  
 Candle Holder  
 Dust Pan

### Wrought Iron

Crescent Electric Lamp  
 Hurricane Lamp  
 Pinup Lamp  
 Flower Pot Holder  
 Candle Holder  
 Smoking Stand  
 Floor Lamp

E. Safety

1. Goggles

2. Garment Sleeves, Neckties Tucked In

VISUAL AIDS

Illustrations--Theory Safety

Safety Methods in the Factory

Maintaining a Safe Shop

I. Outcomes in Sheet Metal and Wrought Iron

1. Know modern methods of manufacture and uses of sheet.

2. Be able to cut metals with hacksaw, chisel, tin snips.

3. Be able to use scribers, dividers, steel rule, square and

center punch.

4. Be able to layout a simple pattern.

5. Be able to bend, shape, form, twist, and join metal.

6. Be able to tin the soldering copper and use solder and flux.

7. Fasten metals with rivets and bolts.

8. Be able to file and use emery cloth correctly.

9. Be familiar with safe practices in shop.

10. Be able to bend, shape and form wrought iron.

1. List of Suggested Projects

Sheet Metal

Garden Trowel

Cookie Cutter

Book Ends

Utility Box

Whisk Spoon Holder

Garden Holder

Door Pan

Wrought Iron

Crescent Electric Lamp

Flour Sifter

Ring Lamp

Flower Pot Holder

Garden Holder

Smoking Stand

Wool Lamp

K. References

Broemel, Louis. Sheet Metal Workers' Manual. Chicago, Illinois, Frederick J. Drake and Company, 1942.

Tustison, Francis E. and Kranzusch, Roy F. Metalwork Essentials. Milwaukee, Wisconsin, The Bruce Publishing Company, 1936.

Johnson, William H. and Newkirk, Louis V. Metal Crafts. New York, The Macmillan Company, 1942.

Becker, William J. Metalwork Made Easy. Milwaukee, Wisconsin, The Bruce Publishing Company, 1942.

Ogilvie, John. Sheet Metal Pattern Drafting Made Easy. New York City, Sheet Metal Publication Company.



SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16 mm

NO.	METAL WORK	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
	NAME OF FILM							
1m	The Drama of Steel	34		X	X		2	e
2m	Unfinished Rainbows	36	X		X		1	t
3m	Steel	20		X	X		1	t
4m	Story of Nickel	30		X	X		5	bu
5m	Nickel Mining	16		X	X		5	bu
6m	Nickel Highlights	34		X	X		5	bu
7m	Aluminum--Mine to Metal	18		X	X		5	bu
8m	Aluminum--Fabricating Processes	19		X	X		5	bu
9m	Copper Refining	15		X		X	5	bu
10m	Fabrication of Copper (3 reels)	45		X		X	5	bu
11m	The Making and Shaping of Steel (Raw Materials)	15		X		X	5	bu
12m	The Making and Shaping of Steel (Flat Rolled Products)	15		X		X	5	bu
13m	Decorative Metal Work	10		X	X		2	t
14m	The Micrometer	15		X	X		2	u
15m	Verniers	19		X	X		2	u
16m	The Bevel Protractor	15		X	X		2	u
17m	The Steel Rule	14		X	X		2	u
18m	The Slide Rule--179	24		X	X		2	u
19m	The Slide Rule--354	21		X	X		2	u
20m	Tin from Bolivia	11		X	X		5	bu
21m	Silver	15		X		X	2	e



SELECTED MOTION PICTURES FOR INDUSTRIAL ARTS  
All Films Are 16 mm

NO.	METAL WORK NAME OF FILM	Time in Mins.	Color	Black & White	Sound	Silent	Distrib- utors	Sponsors
22m	Lead	15		X		X	2	e
23m	Metalcraft	11		X	X		2	e
24m	Cutting Threads with Taps and Dies	19		X	X		2	u
25m	Scraping Flat Surfaces	14		X	X		2	u
26m	Fitting and Scraping Small Bearings	20		X	X		2	u
27m	Reaming with Straight Hand Reamers	20		X	X		2	u
28m	Reaming with Taper Hand Reamers	15		X	X		2	u
29m	Fundamentals of Filing	12		X	X		2	u
30m	Sawing Template Metal	17		X	X		2	u
31m	Filing Template Metal	15		X	X		2	u
32m	Tinning and Solder Wiping	26		X	X		2	u
33m	Hand Soldering	20		X	X		2	u
34m	Blanking Sheet Metal on the Squaring Shear	15		X	X		2	u
35m	Blanking Sheet Metal with Hand Snips	18		X	X		2	u
36m	Forming on a Hand-operated Brake	17		X	X		2	u
37m	Finish Forming by Hand	16		X	X		2	u
38m	Drilling with Portable Drill Motors	17		X	X		2	u
	1. Use of clamps 2. Gluing (Hot and cold glue) 3. Cleaning joints							



## CHAPTER VII

### I. INTRODUCTION--HOME MECHANICS

Certain learning units are grouped to form special courses in home mechanics. By these it is meant an attempt is made to provide a variety of practical experiences which are not limited to any one of the common shop fields. Units are selected that will afford pupils the opportunity to learn activities and jobs that are immediately useful and interesting to them as well as having a real value in their adult lives.

If well-prepared instructions are available to pupils, covering fundamental processes, and if each pupil plans the procedure for each job undertaken, the most serious learning and teaching difficulties will have been removed. Instructors should select jobs based upon actual home needs. The aims of home mechanics instruction must be kept constantly in mind, if such a course is to be effective and worthy.

### II. TEACHING UNITS--HOME MECHANICS

- A. Sharpening a kitchen knife
  - 1. Use of grinder
  - 2. Use of whetstone
- B. Regluing Furniture
  - 1. Use of clamps
  - 2. Gluing (Hot and cold glue)
  - 3. Cleaning joints



### C. Plaster Patching

1. Preparing cracks
  - a. Undercutting
  - b. Sponging
2. Mixing plaster
  - a. Proper proportions

### D. Repairing Screens

1. Removing molding
2. Removing tacks and old screen
3. Cutting and tacking screen
4. Patching

### E. Replacing Window Pane

1. Remove old putty and glass
2. Spreading linseed oil on rabbet
3. Installing pane, points and putty

### F. Install and Repair Shades

1. Mending a tear on shade
2. Repairing wood strip in shade
3. Cutting the roller
4. Adjusting the spring

### G. Rewiring an Electric Lamp

1. Checking socket
2. Underwriter's knot for plug and socket
3. Check for good connections



- H. Making an Extension for Electric Lamp
  - 1. Use of rubber-covered wire
  - 2. Use of guard over the bulb
- I. Repairing of Attachment Cord for Toaster and Iron
  - 1. Use of asbestos wire
  - 2. Check switch and plug
- J. Assemble Pipe Fittings
  - 1. Cutting of pipe
    - a. Hack saw
    - b. Pipe cutter
  - 2. Threading pipe
    - a. Adjusting die
    - b. Use of die
  - 3. Assembling joint, using white lead
- K. Reading an Electric Meter
  - 1. Compute Amount of Electricity
- L. Outcomes in Home Mechanics
  - 1. Sharpen kitchen utensils.
  - 2. Make furniture repairs.
  - 3. Be familiar with different kinds of glue.
  - 4. Make minor repairs in plaster.
  - 5. Be familiar with correct procedure in tacking screen.
  - 6. Make temporary repairs to screens.
  - 7. Be able to adjust spring and repair shade.



8. Be able to tie underwriter's knot.

9. Be able to compute an electric light bill.

10. Able to cut, thread and assemble pipe.

M. List of Suggested Projects

Screen

Sloyd knife

Cut a piece of pipe

Thread it and

Assemble it

Wire a lamp

Tea Tile

Reglue a chair

Sharpen a knife

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## DESCRIPTION OF FILMS FOR INDUSTRIAL ARTS

## WOOD WORKING

## 1w--Trees and Homes--

This is a technicolor presentation of logging and lumber manufacture in the Pacific northwest, demonstrating conservation practices insuring a lumber supply for future generations.

## 2w--Miracles of Plywood--

A technicolor presentation of logging and lumbering of Douglas Firs in the Pacific northwest. The manufacturing of plywood and modern use of plywood are presented.

## 3w--Doorway to Happiness--

This picture contains views of the logging of the large Douglas fir trees, factory scenes showing the manufacture of fir doors in mass production; details of new door specialties, and views of homes with correct new entrances.

## 4w--Fabricating the Western Pines--

As the title implies, the picture is a portrayal of the fabrication and assembly of sash, doors, frames and screens as made from the Western pines, and the proper installation of such essential units for use in house construction. The continuity carries the theme in logical sequence, while a ghost voice renders a clear explanation of the subject matter as the picture is projected.

## 5w--From Forest to Fireside--

The origin, conversion and use of the products of Ponderosa Pine are shown in this film, including the falling of the timber, a trip through a sawmill, dry kilns, seasoning yards and planing mills. Conversion of the lumber into boxes, window frames, and specialty products is also seen. The work being done by the research laboratory of the Western Pine Association is shown, followed by exterior and interior views depicting the ways in which Ponderosa Pine products are used in building and equipping homes.

## 6w--How to Build a House in 78 Minutes--

A shortened and non-technical version of the film "A City Comes to Alexander's Corners", this film shows the highlights of the Homasote system of prefabricated houses. In full color on one large reel.

## 7w--Masterpieces in Mahogany--

The story of the reproduction of a fine sixteenth-century mahogany table is told in this film. The story begins with the design and scaled



## WOOD WORKING (continued)

shop drawing; the rough mahogany lumber and veneers are then followed step by step through the dry kiln, past the saws through the various machines that shape, turn, carve, and sand each part of this piece of furniture.

## 8w--Prefabrication With Plywood--

Prefabrication is a timely subject. This film shows the important steps in the factory building of houses, schools and farms structures. All the basic systems are shown with many actual factory scenes. Each step in the erection of a building is shown in detail, and the big job done in providing war-time housing by the prefabricating companies is seen.

## 9w--The Woodworker--

The film shows carpenters erecting scaffold, setting forms for concrete foundations and walls. The construction of a house involves the employment of rough and finish carpenters. Men are shown constructing a house from foundation through to the flooring and finishing. Mill working operations are portrayed, such as sash and door, stair building, and cabinet assembly. Another field is the small cabinet shop employing many skilled men.

## 10w--Furniture Making--

Contrasts important period styles of the past with styles of today: master craftsmen at work, modern methods in machine production.

## 11w--Furniture Craftsmen--

Portrays methods in hand-made furniture. The assembling of a fine quality mahogany chair.

## 12w--Lumbering in the Pacific Northwest--

This film portrays the laying of a railroad, dragging logs to it by steel cables, sawing the logs into lumber, drying in tunnel kilns, planing and subsequent sorting and shipping are shown.

## 13w--The Builders--

Construction of skyscraper--work of draftsmen, wreckers, excavators, steel workers--laying concrete floors, bricklaying, marble work--plumbers at job--terra cotta--tile setters, plasterers, roofers, painters--installation of elevators.

## 14w--Treasures of the Forest--

Shows the cutting and transportation by sleighs, trucks, electric railways and waterways of logs to the pulp and saw mills; cutting logs into lumber and pulpwood; the manufacture of wood pulp, paper and

WOOD WORKING (continued)

shop drawing; the rough mahogany lumber and veneers are then followed step by step through the dry kiln, past the saw through the various machines that shape, trim, size, and sand each part of this piece of furniture.

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13w--The Builders--

Construction of skyscraper--work of draftsmen, welders, excavators, steel workers--laying concrete floors, bricklaying, marble work--glaziers at job--tinsmiths--the electricians, plumbers, roofers, painters--installation of elevators.

14w--Treasures of the Forest--

Shows the cutting and transportation by airplane, trucks, electric railways and waterways of logs to the pulp and saw mills; cutting logs into lumber and pulpwood; the manufacture of wood pulp, paper and

## WOOD WORKING (continued)

viscose and the conversion of viscose into rayon fibres.

## 15w--Repainting a Frame Building--

How to determine repairs needed on building before painting; estimate amount; how to prepare building; how to set up staging; how to prepare factory or home-prepared paint; how to prime-coat the building; how to store paint and equipment; and how to care for brushes.

## 16w--Making of American Homes--

Shows how the kitchen and the bathroom may be rebuilt and modernized into rooms of beauty and utility.

## 17w--Trees and Men--

Modern logging and Sawmill--operations in the Northwest, emphasizing timber as a crop and showing methods used to conserve this resource and promote continuous production.

## 18w--Romances of Mahogany--

Depicts the search for mahogany trees in the tropical jungles, felling them, transportation to streams and down the rivers at flood time. The making of mahogany lumber and veneers.

## 19w--Essentials of Wood Turning--

Teacher-made film on operation of a simple wood lathe by scraping method and showing the usefulness of knowledge of woodworking machinery.

## 20w--Forest Treasures--

Cutting and sawing logs of mahogany, walnut, oak and other kinds of trees used in veneer making. Complete operations from log to finished piece of furniture.

## 21w--Redwood Saga--

Shows the cutting, loading, transportation, mill sawing, and finishing operations of the redwood lumber industry of northern California.

## 22w--Logging Along--

Life and work in a lumber camp in northwestern United States. A rather complete picture of lumbering as it was before the advent of portable sawmills and gasoline tractors.

## 23w--Trees for Tomorrow--

This film tells the story of the contribution our forests make to the war effort and the methods used by forest management in the conservation of this vital resource for the future. Modern uses of wood--plywood aircraft, prefabricated houses, cellophane plastics and even clothing are shown, as well as modern methods of forest management and conservation.



## WOOD WORKING (continued)

## 24w--Elementary Manual Training--

Making of a gift box from wood; technique of using woodworking tools. The working plan indicates lumber or stock required. Instructor teaches boy various processes of hand tools. Boy applies stain and finish.

## 25w--Hand Sawing--

Fundamentals of handling hand saws; choosing right saw for the job.

## 26w--A B C of Hand Tools, Part 1--

Produced by Walt Disney for General Motors and starring Primitive Pete, it teaches many things about the use and care of hand tools--hammer, screw driver, pliers and wrench.

## 27w--A B C of Hand Tools, Part 2--

Starring Primitive Pete and showing the proper use of the file, saw, chisel, plane and punch.

## WOOD LATHE

## 28w--Turning a Cylinder Between Centers--

Shows how to choose and center stock for a job; how to mount stock in the wood lathe for turning between centers; how to select the proper speed; how to select and use cutting tools; how to use the parting tool to establish diameter and length; how to use the skew chisel; how to sand turning work; and the safety factors involved.

## 29w--Turning Taper Work--

Shows how to center cylindrical wood stock for spindle turning; how to make clearance cuts and why they are made; how to establish the diameter of a taper; how to turn a single taper; how to establish diameters for turning two tapers from a single piece of material; and how to turn the tapers.

## 30w--Turning Work on a Face Plate--

Shows the various types of faceplates; how to choose the proper faceplate; how to attach the stock to the faceplate; how to true up the work; how to scribe the work for inside turning; how to use the round-nose chisel and diamond point chisel; and how to smooth the bottom of the recess.

## 31w--Turning Work in a Chuck--

Shows how to mount work on a faceplate; how to turn one face of the work; how to make a chuck for the opposite face; how to fit the finished face to the chuck; and how to turn the second face.



## WOOD WORKING (continued)

## 32w--Face Turning a Collar--

Shows how to prepare a faceplate chuck; how to attach work to faceplate chuck; how to turn a fillet and how to taper turn a recess.

## JOINTER

## 33w--Jointing Edges and End Grain--

Shows how to set the fence and infeed table to proper height; how to feed with the grain; how to joint end grain so as to prevent tearing; and how to observe all necessary safety precautions.

## 34w--Beveling, Stop Chamfering and Tapering Square Stock--

Shows how to set fence for bevel cutting; how to adjust the proper amount of cut; how to cut chamfer; how to set the infeed and outfeed tables for stop chamfer; how to set stop blocks; how to cut tapers; and how to observe all proper safety precautions.

## 35w--Face Planing Uneven Edges--Jointing on Edge for Gluing--

Shows how to surface wide stock on one side; how to use a pusher; how to make and use a feather board; and how to use a backing block for facing thin stock.

## 36w--Installing Knives--

Shows how to determine when knives are dull; how to remove dull knives; how to install sharp knives on the cutter head and adjust them for proper cutting; how to straighten crooked stock; and how to join edges for gluing.

## VARIETY SAW

## 37w--Ripping and Cross Cutting--

Shows how each working part of the variety saw functions; how to check saw blades; how to set the fence; how to protect oneself on the job; how to change saw blades; how to use a cutoff gage; and how to use a hinged block in crosscutting.

## 38w--Beveling, Rabbeting, Mitering and Dadoing--

Shows how to cut a bevel with tilted fence; how to cut a bevel with tilted blade; how to set a miter gage; how to use a stopblock in mitering; how to set the fence and blade for cutting rabbets; and how to install and use a dado head.

## 39w--Cutting Tenons and Segments--

Shows how to lay out and cut a tenon; how to set up the equipment to make shoulder cuts; how to set up the equipment to make first and second



## WOOD WORKING (continued)

check cuts; how to prepare a jig to trim and miter segments; and how to guide the jig, using a sliding miter gage.

## 40w--Cutting Cove Molding and a Core Box--

Shows how to select stock for cove molding; how to mark the stock; how to cut and rip cove molding; how to set up equipment and make progressive adjustment in oblique cutting; how to select the proper blade for oblique cutting; and how to cut a deep hollow.

## BAND SAW

## 41w--Sawing with Jig--Changing Band--

Shows how to select the proper band saw blades for the job; how to change blades; how to fold blades for storage; how to adjust saw guiders; how to mark stock and cut to the mark; how to prepare a jig; and how to cut discs, using a jig.

## 42w--Sawing a Reverse Curve--

Shows how to select and lay out stock to avoid waste; how to reverse curves to contour lines; how to use the table tilting gage; how to saw a beveled reverse curve; how to prepare a template for a newel post; and how to saw a newel post having reverse curves.

## SANDER

## 43w--Sanding Flat and Irregular Surfaces--

Shows how the belt sander operates; how to prepare a sanding belt; how to sand flat stock on a belt sander; how to sand curved molding on a belt sander; how to use and replace sandpaper on a disk sander; and how to use and replace sandpaper on a spindle sander.

## 44f--How to Finish Plywood--

This is a picture designed to give practical answers to the questions people ask about painting plywood. Finishes for both interiors and exteriors are described, including light stain, plastic, stipple, enamel, wallpaper and canvassing. A number of joint treatments are shown.



## METAL WORK

## 1m--The Drama of Steel--

Traces the history of steel-making from the crude charcoal furnaces of the ancients to the modern spectacular blast and open-hearth furnaces of today.

## 2m--Unfinished Rainbows--

The aluminum industry is traced from Napoleon III's time to the present. Early experiments by Hall to find a cheaper way of processing aluminum and his efforts to find a market are shown.

## 3m--Steel--

This picture illustrates the making of steel from the raw materials to the rolled product.

## 4m--Story of Nickel--

The film is a clear and interesting presentation of the mining and preparation of nickel and its alloys. The film includes the rolling of ingots into rods and sheets.

## 5m--Nickel Mining--

This film shows the mining of nickel ore in the world's largest nickel mine.

## 6m--Nickel Highlights--

Activities and operations essential to production of nickel and its alloys: mining, smelting, refining, rolling of the metal.

## 7m--Alluminum--Mine to Metal--

Illustrates use of aluminum in transportation, in the home, in building, and in industry. Shows source of bauxite from which aluminum is extracted, in rock, clay banks, and soils, and, by means of an animated map, pictures countries in which the mineral is found.

## 8m--Aluminum--Fabricating Processes--

Portrays working and shaping of aluminum into various forms. Shows a rolling mill and pouring of sheet ingot, rolling into slab and flat sheets in a continuous mill. Working of aluminum by stamping, blanking, drawing, spinning, hammering, forming, machining, riveting and torch, arc, spot, seam and butt welding.

## 9m--Copper Refining--

Shows conversion into chemically pure copper of anode slabs made in smelter. Operations include sampling of anodes, placing them in electrolytic tanks, with starting - sheet cathodes of pure copper between them. Melting cathode sheets, and casting into bars which are inspected



## METAL WORK (continued)

and shipped to the fabrication plant to be made into wire and other copper products.

### 10m--Fabrication of Copper--

Reel 1 shows heating of bars in continuous furnace; bars entering roughing mill; electric-welding rods end to end to maintain continuous operation; stranding wires into cables, making fine wire, covering with enamel, cotton, paper insulations and braiding of wire.

Reel 2 shows braided cotton being impregnated with petroleum asphalt and coated with stearine pitch, tinning copper wire, testing wire, cutting into strips, winding coils; explains in detail the making of paper-insulated cable.

Reel 3 describes making and operation of oil-filled cable for transmission at high voltages. Shows use of copper in making pipe, tubing and copper-base alloys. Depicts fabrication where 5,000,000 lbs. pressure is applied to hot-forge, pierce and extrude billets, and, by means of animated drawings, explains action that takes place in extrusion press.

### 11m--The Making and Shaping of Steel; Raw Materials--

This film shows open-pit iron mining with steam shovel, crushing ore, and loading into cars. Pictures underground mining--mine shaft, drilling face, blasting and transporting it to docks to lake steamers. Raw materials (iron ore, limestone and coke) are assembled at blast furnace where smelting operation reduces them to molten iron and slag.

### 12m--The Making and Shaping of Steel; Flat Rolled Products--

Pictures flat ingot being moved from soaking pit to slabbing mill for manufacture of steel plate, rolling, reheating, rerolling, leveling, cooling, cutting to length and testing for hardness. Operation in strip mills, "pickling" in dilute acid, cold rolling, annealing, bulge test. Closing scenes depict galvanizing by coating with zinc.

### 13m--Decorative Metal Work--

This film shows how to make an etched bracelet. It is filmed simply and clearly.

### 14m--The Micrometer--

Presents in considerable detail an explanation of the basic principles on which the micrometer works, correct care, use, and maintenance of a micrometer; and the various forms of the micrometer developed to measure outside lengths, inside lengths and depths.



## METAL WORK (continued)

## 15m--Verniers--

Offers a detailed study, largely in animation of the principles of the vernier scale and its application to precision measurement. The reading of the vernier scale and the precautions necessary in the care of tools having a vernier scale are stressed. The film closes with scenes and commentary emphasizing the care that is required to maintain the accuracy of all tools using vernier scales.

## 16m--The Bevel Protractor--

Shows the principles of the vernier bevel protractor; how to set and read the bevel protractor; how to use the protractor to lay out angular work and to check angles on finished work; and how to care for the protractor.

## 17m--The Steel Rule--

Shows how to read steel rules and explains the fractional graduations. Shows how to use the flexible hook and rule-type depth gages and combination squares; and how to lay out holes with a combination square. Shows how to use inside and outside calipers to transfer dimensions to and from steel rules.

## 18m--The Slide Rule--179--

Explains in detail the "C" and "D" scales of the slide rule, the parts and markings of the rule, and shows how to use these scales for multiplication, division, and combinations of these two operations.

## 19m--The Slide Rule--354--

Shows how to use the "B" and "C" scales of the slide rule to calculate proportions and percentages; how to calculate squares and square roots; and how to determine placing of decimals after the square root is extracted.

## 20m--Tin from Bolivia--

The mining and concentrating of tin and its smelting in the United States is shown in this picture. Primitive methods of producing tin by surface mining in the beds and banks of dry streams, transportation by llamas to water sources, screening, gravity concentration, crushing, sluicing, drying and llama transportation over mountain trails are shown. In contrast to these primitive methods, modern methods of tin mining, which employ large quantities of electric and water-power, Diesel engines, the creation of modern cities, homes, stores, hospitals and schools in Bolivia are then pictured. Closing scenes show the tin bullion being shipped to factories throughout the United States.



## METAL WORK (continued)

## 21m--Silver--

Important uses, preparations of sterling silver, producing flatware and hollow ware; silver plating for mirrors; photographic emulsions; film units, sterling silver, silverplate and mirrors, silver in photography.

## 22m--Lead--

Way in which ore is mined and smelted; multiple uses of metal in industry; process of making white lead.

## 23m--Metalcraft--

Master craftsman making pewter bowl, bronze bowl, candlestick mold, and jewel box.

## 24m--Cutting Threads with Taps and Dies--

Shows the methods, operations, and procedures for cutting small threads with hand taps and dies. Explains the correct use of the taper tap; the plug tap; and the bottoming tap in cutting internal threads in a blind hole. Shows how to use a hand die to cut threads on a stud to fit in the tapped holes.

## 25m--Scraping Flat Surfaces--

Show the operations and procedures used in hand scraping flat surfaces to a surface plate. Shows five common forms of hand scrapers and the operations and care of the flat scraper in detail. Emphasizes methods used in scraping around holes and near edges of flat surfaces.

## 26m--Fitting and Scraping Small Bearings--

Shows the scraping of split and solid bearings; the laying out and chipping of oil grooves; and the fitting of the shaft to the bearings. Shows forms of hand scrapers used for scraping curved surfaces and explains why bearings must be relieved to aid lubrication.

## 27m--Reaming with Straight Hand Reamers--

Shows how to drill and machine-ream two holes in line and how to finish the hole to size, using a straight fluted reamer. Shows the reamer, names its parts, describes cutting angles, and explains its cutting action. Shows how to use a helical-fluted reamer in reaming a hole in a gear blank having a keyway.

## 28m--Reaming with Taper Hand Reamers--

Demonstrates the hand reaming of a taper pinhole through a shaft and collar. Shows the taper reaming of a dowel pinhole in a split bearing to maintain alignment between the bearing cap and the bearing base, and the action of a reamer in removing metal.



## METAL WORK (continued)

## 29m--Fundamentals of Filing--

Shows the various kind of files and indicates the general type of work that each is used for. Shows the use of single cut files; draw filing with a single cut fine file; and the difference between the single cut and double cut files.

## 30m--Sawing Template Metal--

Shows how to use a job selector chart for width, pitch, set of teeth, and speed; how to identify raker and straight teeth; how to mount a saw blade on a band saw; how to select and adjust blade guides; how to saw to a layout line; how to "chew out" metal from a notch; and how to remove burrs.

## 31m--Filing Template Metal--

Shows how to clamp template metal on a bench and in a vise; how to select the correct file for each job; how to grip the file for different jobs; how to file a square edge and remove burrs; how the wrist is rotated for filing inside curves; how to file inside rectangles and remove fillets from corners.

## 32m--Tinning and Solder Wiping--

Shows how to clean copper tubing for tinning; how flux is applied to copper; how to tin copper tubing by hand and by dipping; how solder wiping is done; and how copper reacts to heat when being tinned and solder wiped.

## 33m--Hand Soldering--

Explains the theory of soldering and shows how to prepare soldering irons and torches; how to clean and prepare the work; how to fasten the joints; how to solder wire and lug joints; and how to seal seams.

## 34m--Blanking Sheet Metal on the Squaring Shear--

Shows how to lay out tapered blanks on an aluminum sheet; how to set and adjust front and back gages and side stops; how to use holddowns and treadle; how to check blanks and further adjust machine; and how to trim blanks.

## 35m--Blanking Sheet Metal with Hand Snips--

Shows how to care for and adjust the sheet metal snips; how to select snips for the job to be done; how to cut along a straight line; how to cut an outside circle and a notch; how to cut an inside line; and how to remove burrs left by cutting.



## METAL WORK (continued)

### 36m--Forming on a Hand-operated Brake--

Shows how to lay out work for bending in a hand-operated brake; how to set up the brake for bend angle and bend radius; how to operate the brake; and how to check test pieces and finished work.

### 37m--Finish Forming by Hand--

Shows the tools and methods used for holding small aluminum bulk-heads during forming; the grip of the mallet handle and the free movement of wrist and hand during forming (in slow motion); the successive stages of forming with a flat fibre strip (around the bend of the flange, along the flat of the flange, and the final smoothing); the successive stages of shrinking large wrinkles with a forming tool; marking excess metal with a surface gage and checking finished work with a contour template.

### 38m--Drilling with Portable Drill Motors--

Shows how to use a portable electric drill motor; how to select a drill and check it for size; how to insert a drill in a chuck; how to check a drill for true running; how to avoid damage to parts while drilling; and how to install and use a special attachment for drilling.

42--  
How the locations of ancient Greece has been developed into modern electric magnets used by industry today.

### 43--Principles of Electricity--

This film breaks down the structure of matter into atoms, and by the use of conventional symbols, shows the action of electrons within an atom. The principles involved in the flow of current are explained and a volt, ampere and ohm are defined. Magnetism and magnetic fields as applied to motors are also covered in this film by animation.

### 44--Story of a Storage Battery--

The processes used in the manufacturing of a modern storage battery are shown, including the making of grids, insulators, testing, sealing, filling and packing the batteries.

### 45--Story of F M--

The mysteries of frequency modulation radio (F M for short) are explained. "Excellent scientific explanations of its advantages. Doesn't mention problems of switching to F M."

### 46--When You Can Measure--

This film explains the uses of many intricate electrical measuring instruments, and the development of modern types.



## ELECTRICITY

### 1e--Flow of Electricity--

Describes in a simple and straightforward manner, the flow of electricity by means of a simple demonstration in a home situation. Animation is used to demonstrate the flow of electricity through the circuit.

### 2e--What Is Electricity--

In this film the basic facts of electricity are clearly pictured and explained in a way that makes them easy to understand. Lively animation effectively shows fundamental information concerning the generation and distribution of electricity.

### 3e--The Electrician--

This film portrays in an excellent manner many of the jobs which the electrician is called upon to do. It starts with a display of the many types of electrical equipment used in everyday life. From the wiring of a home, it then traces the electric supply lines back through various transformers to the power plant. Views of this equipment in operation are shown and its servicing explained.

### 4e--Magnets--

How the lodestone of ancient Greece has been developed into enormous electric magnets used by industry today.

### 5e--Principles of Electricity--

This film breaks down the structure of matter into atoms, and by the use of conventional symbols, shows the action of electrons within an atom. The principles involved in the flow of current are explained and a volt, ampere and ohm are defined. Magnetism and magnetic fields as applied to motors are also covered in this film by animation.

### 6e--Story of a Storage Battery--

The processes used in the manufacturing of a modern storage battery are shown, including the making of grids, insulators, testing, sealing, filling and packing the batteries.

### 7e--Story of F M--

The mysteries of frequency modulation radio (F M for short) are explained. "Excellent scientific explanations of its advantages. Doesn't mention problems of switching to F M."

### 8e--When You Can Measure--

This film explains the uses of many intricate electrical measuring instruments, and the development of modern types.



## ELECTRICITY (continued)

## 9e--World's Largest Electrical Shop--

Internationally known Drs. Langmuir, Whitney and Coolidge are shown in their laboratories. Equipment ranging from giant turbines to small domestic devices are shown in process of construction.

## 10e--West Lynn--

The story of the watt-hour meter is told in this film. A trip along the production lines, to the laboratories and through a foundry where the powerful little alnico magnets are made, makes an instructive travelogue.

## 11e--Adventures in Research--

This picture shows a radar demonstration in which the strength of radio energy is shown. It demonstrates the vacuum tube, the X-ray tube, the pinhole detector tube, the stroboscope, the ignition tube, cathode-ray tube and the photo-electric cell. Each experiment is followed by a portrayal of the electronic device's use in communication, transportation, health or entertainment.

## 12e--Electronics at Work--

In simple diagrams this film explains the principle of the electronic tube, how it works, and makes clear its six basic functions. Electronic devices are shown at work in radio, X-ray equipment, diathermy and bactericidal lamps. They are shown at work in industry doing hundreds of important tasks.

## 13e--Excursions in Science, No. 1--

This film gives an excellent illustration of elementary principles of magnetism. Shows the affinity that different oils have for water and shows how the photo-cell is based upon the principle of the simple radiometer. A small model is shown being driven by three photo-cells.

## 14e--Excursions in Science, No. 2--

This film illustrates the impractical though very interesting magnetic gears. It also shows a practical application of the use of the photo-electric cell in photo-sorter. Details of the construction of electric light bulbs are shown.

## 15e--Excursions in Science, No. 4--

This film demonstrates the "electric eye" or phototube. Shows how the phototube controls drinking fountains, registers, "camera finishes" at race tracks, operates doors. Explains how the phototube makes sound movies possible.

## 16e--Excursions in Science, No. 6--

Shows scientific experiments in the making of forced glass springs. The making of sodium electric lamps and their use as indirect lighting



## ELECTRICITY (continued)

for public highways.

## 17e--Joining Solid Conductors--

Shows how to remove insulation from a wire and how to clean the conductor; how to make a Western Union splice, pigtail, plain tap, Britannia, loop tap and fixture joints; how to care for and use a blowtorch; how to flux and solder joints and how to insulate joints with rubber and friction tape.

## 18e--Soldering Lugs and Splicing Stranded Conductors--

Shows how to solder a lug using electric soldering tongs; how to solder lug with blowtorch; how to solder a lug using solder pot and ladle; how to splice stranded conductors using a split solder sleeve; and how to make a served cable splice.

## 19e--Wire Sizes and Voltage Drop--

Explains the factors influencing the ability of conductors to carry electron flow, the measurement of wire sizes, wire area in circular mils, voltage drop, and Ohm's Law.

## 20e--Porcelain Protected Surface--

Shows how to make an electrical entrance to a building; the need for providing fuse protection in circuit; how to install wiring and porcelain fittings; how to support and insulate wires to meet requirements of the National Electrical Code; and how to prepare and connect wires for service.

## 21e--Three-wire Service Entrance--

Shows how to mount and connect an outdoor meter connection box; how to mount and connect a service control box; how to ground a three-wire service entrance installation; and how to install concentric service entrance cable.

## 22e--Installing Surface Metal Raceway--

Shows how to plan the job; how to use molding raceway fittings; how to install a molding raceway run to ceiling outlet; how to install a run from ceiling outlet to wall switch; how to install run from ceiling outlet to wall fan; and how to install run to floor outlet.

## 23e--Cable Surface Wiring--

Shows how to make an electrical entrance to a building; the need for providing fuse protection in circuit; how to install non-metallic sheathed cable; how to handle and install porcelain fittings; how to support and connect cable to meet requirements of the National Electrical Code; and how to prepare and connect wires for service.



## ELECTRICITY (continued)

## 24e--Preparing Old Building for Wiring--

Shows how to plan the wiring paths visualizing the obstructions, and how to prepare the paths for the wiring run.

## 25e--Wiring Old Building with Armored Cable--

Reviews the steps in preparing a building for wiring; shows how to install a ceiling outlet with a plaster ring; how to install outlet boxes; how to cut and strip armor from cable; how to attach cable to outlet boxes; how to run armored cable; how to repair opening in walls, and how to join conductors at ceiling outlet.

## 26e--Electrical Circuit Faults--

Shows how to test for and locate common circuit faults; and how to test for and locate ground resistance deterioration, and interference in circuits.

## 27e--Installing Conduit--

Shows how to plan the job; how to bend electrical metallic tubing; how to install the metallic tubing runs; how to bend rigid conduit; how to install rigid conduit runs; and how to use flexible conduit.

## 28e--Power Bending Conduit--

Shows how to assemble and operate a floor bender; how to assemble and operate a portable bender; how to make a 45 degree bend in 3 inch conduit; how to make an offset in 1 1/2 inch conduit; and how to make an offset in conduit already installed.

## 29e--D. C. Motor, Part I, Overhaul--

Shows how to test for electrical and mechanical faults; how to dismantle D. C. motor and to record data; how to turn the commutator; how to clean and recondition parts; how to repair and replace field coils; how to assemble the motor; and how to adjust and make final tests on motor before returning to service.

## 30e--D. C. Motor, Part II--

Shows how to dismantle and clean an armature core; how to determine commutator pitch; how to reinsulate the core; how to insert coils; how to band an armature; how to shape coil ends; how to lay in and solder leads; how to balance the armature; how to impregnate the armature; and how to turn a commutator.

## 31e--Split-phase Motor, Rewinding--

Shows how to test a split-phase motor for electrical and mechanical faults; how to record data necessary for accurate rewinding; how to dismantle a split-phase motor and strip the stator; how to rewind the



## ELECTRICITY (continued)

stator by hand or by using a winding gun; how to form and install skein windings; how to insulate, lace, dip, and bake the stator; and how to assemble, lubricate, and test the motor.

## 32e--Three-phase Motor, Part II, Rewinding--

Shows how to insert mush coils; how to insert separators or "willies"; how to fold trim and wedge slot insulation around windings; how to insert phase insulation; and how to make a delta connection.

## 33e--Repulsion-Induction Motor General Overhaul--

Shows how to check a repulsion-induction motor for electrical and mechanical faults; how to dismantle a repulsion-induction motor; how to clean and plug the commutator; how to turn the commutator; how to remove a damaged sleeve bearing; how to ream to size and install a new sleeve bearing; how to remove a damaged coil; and how to wind and insulate a new coil; and how to assemble and lubricate a repulsion-induction motor.

## 34e--Split-phase Motor Principles--

Explains the construction of stator and rotor; comparison of winding in two-phase stator with split-phase stator; effects of winding resistances and inductive reactances; and use of capacitor to produce phase displacement.

## 35e--Repulsion Motor Principles--

Explains construction of repulsion motor; rotor circuits and effect of brush position; short-circuiting and brush-lifting mechanism; and applications of repulsion motors.

## 36e--Rotating Magnetic Fields--

Explains a rotating magnetic field pattern; traces the three-phase winding in a demonstration stator; shows the factors that cause rotation of the magnetic field, and the construction of polyphase motors.



## MECHANICAL DRAWING

## 1d--The Draftsman--

The film shows various steps necessary in the preparation of plans for a building. It presents the kinds of drafting used, from freehand sketches to detailed finished drawings; each phase of the development being handled by men trained for particular types of detail work.

## 2d--According to Plan--Introduction to Engineering--Film 1--

The aim of this film is to help the beginning student get started on the right track in his thinking about Engineering Drawing. The film's approach is suggestive; the end result is attitude shaping rather than vocational guidance. Thus, the student is encouraged to approach the course with a receptively open mind, and to develop the feeling that Engineering Drawing is interesting and important.

## 3d--Orthographic Projection--Film 2--

The film begins by showing that objects, as well as planes and lines, look different from different points of view. These differences are then applied to the projection of front, top, and right side views of an object. When swung around on a single plane, these three projected views together are shown to represent fully the three-dimensional object. Their relationship to each other is demonstrated. The film concludes with a brief summary review of the main principles of orthographic projection.

## 4d--Auxiliary Views--Single Auxiliaries--Film 3--

This film begins with a brief review of the principles of orthographic projection. Auxiliary projection is explained and defined, using the same three-dimensional effects as in Film 2. Auxiliary elevations, right or left auxiliary views, and front or rear auxiliary views are explained and defined. It concludes with a brief summary of these principles.

## 5d--Auxiliary Views--Double Auxiliaries--Film 4--

This film starts with a brief summary of orthographic projection and auxiliary planes. The film shows why a single auxiliary view does not give an accurate picture of an oblique face. The theory of the double auxiliary or oblique view is then described in detail. This is followed by a demonstration of the steps involved in drawing an object with an oblique face. The film concludes with a quick restatement of the theory of oblique view.

## 6d--Sections and Conventions--Film 5--

The film begins by stating that in some cases the important interior details of an object may show as a confused mass of dotted lines on the



## MECHANICAL DRAWING (continued)

regular exterior views. The meaning of special sign language used in sectioning is explained, such as cross hatching, broken lines, reference letters, and directional arrows. Various types of sectional views are explained. In conclusion, the film summarizes the important facts about sectioning.

### 7d--The Drawings and the Shop--Film 6--

The purpose of this film is to point up and describe the relationship between the making of a drawing and various production operations in shop and factory. The flow of work, as called for in the various drawings of typical metal products, is traced through the pattern shop, the foundry, the forge shop, the machine shop and the assembly shop. Operations in each of these departments are demonstrated. In conclusion, the film shows a completely assembled machine, and points out that many different operations have gone into its manufacture, each of which had to be directed by information given on a drawing or several drawings.

### 8d--Selection of Dimensions--Film 7--

This film introduces principles which govern the choice of dimensions. These principles are shown to be based on two factors: (1) the functional characteristics of the object, which includes consideration of the accuracy demanded, and the relation of the portion to other elements of the unit or machine, and (2) the manufacturing methods used in making the object. The film shows how these factors are interpreted and applied to a specific object, as a guide for their general application.

### 9d--Behind the Shop Drawing--

This film shows the importance of shop drawings--perspective drawing showing step by step animated lines, arrows and transparent paper--dimension figures, lines, scale drawings--blueprints.

### 10d--Blueprint Reading--

This is a heading for two films. The name of the first film is Principal Dimensions, Reference Surfaces, and Tolerances. It shows how to compare casting dimensions with blueprint specifications; how a cross section view is derived from a full view; how to use a blueprint as an aid in selecting reference surfaces from which to take other dimensions.

The second film is Reading a Drawing of a Valve Bonnet. It shows how to interpret conventional symbols and tolerance specifications and the conventional views and cross-sectional views. It also shows how to use the blueprint as a guide in planning machine operation.



## MECHANICAL DRAWING (continued)

### 11d--Drafting Tips--

Part I--Instruction is given in the use and care of drafting equipment, with proper emphases on the three essentials--cleanliness, accuracy, and orderliness.

Part II--Contains instruction on proper sheet layout and the use of an alphabet of lines; depicts the best procedure in developing a drawing from beginning to end.

### 12d--Reading a Three-view Drawing--

Shows how to use a blueprint to visualize the object; how to interpret a blueprint; and how to make a tool block according to specifications.

### 13d--Introduction to Mechanical Drawing--

Mechanical drawing is here presented clearly and practically for the beginner. The necessary materials are lined up and the correct methods of procedure demonstrated. Drawings are actually made of articles requiring one, two and three views.

### 14d--Visualizing an Object--

Shows how a blueprint is developed; how dimensions are shown by views; and how various kinds of lines are shown on a blueprint.



## PLASTICS

## 1p--Origin and Synthesis of Plastic Materials--

Shows the organic origin of plastics and the resemblance of synthetic compounds to natural substances; synthesis of plastics from natural substances; differences between thermosetting and thermoplastic materials; compounding plastics to provide desired properties in products; forms in which plastics are produced; and typical plastics products.

## 2p--Methods of Processing Plastic Materials--

Shows the fundamentals of the compression, transfer, extrusion, and injection molding methods; the finishing of molded parts; fundamentals of lamination; and machining laminated and other plastics products.

## 3p--Preparing the Charge and Loading the Mold--

Shows how to set up the press; how to weigh the charge; how to pre-heat the charge; how to clean and lubricate the mold; and how to load the mold.

## 4p--Molding a Simple Part--

Shows how to close the mold; how to breathe the mold; how and when to open the mold; how to prevent pieces from warping; and how to co-ordinate steps of molding cycle.

## 5p--Molding a Part with Inserts--

Shows how the transfer molding differs from compression molding; how to determine whether a part should be molded by the transfer method; how to mold a part by the transfer method; and how to co-ordinate the steps of the molding cycles.

## 6p--Semi-automatic and Hand Molding of Intricate Parts--

Shows how to mold a part with undercuts; how to position the wedges and to close the mold; how to mold a part with complicated shape; how to assemble a hand mold; and how to disassemble a hand mold.

## 7p--Setting Up That Press and Molding a Part--

Shows what happens in the plunger cylinder; heating cylinder, and mold during injection molding; how to set up an injection molding press for a specified job; how to avoid dampness and contamination of molding material; and how to maintain the operating cycle and prevent damage to the mold and the press.

## 8p--Cleaning and Servicing the Press--

Shows how to disassemble the heating cylinder; how to clean the cylinder, hopper, and feeder mechanism; how to give the entire press a routine cleaning; and how to prepare scrap material for re-use.



## PLASTICS (continued)

## 9p--Finishing Molded Parts--

Shows how to finish a typical molded part; how to trim the gate with a band saw; how to sand it with a drum-sander; how to retap the metal inserts; how to remove flash from contours by hand sanding and filing; how to file and scrape cavities; how to finish buff and polish the surfaces; and how to finish and polish by tumbling.

## 10p--Machinery Laminated Plastics--

Shows how to machine typical laminated part; how to cut the tube stock to length on a circular saw; how to turn the outside diameters on a lathe; how to machine inside diameters by boring with a lathe; and how to finish the machining of the part on a milling machine.

## 11p--Magic of Modern Plastics--

The film tells the story of plastics from the invention of cellulose nitrate in 1869, to the modern applications. The manufacture of typical plastics such as cellulose nitrate and the vinyl acetal resin is shown through all stages with a commentary that makes the procedure understandable to a lay audience.

## 12p--This Plastic Age--

After the audience has been introduced to the subject through familiar applications of plastics, the camera shows how the plastics are manufactured. A trip through a plastics manufacturing plant shows the molder at work, the making of a mold, and the finished product as it is taken from the presses. The film illustrates all of the basic facts of how plastics differ in production from other materials. Another sequence shows plastics for use in war. The final sequence consists of a series of interviews with several persons in relation to his activities and to the future.

## 13p--Fourth Kingdom--

Development of Bakelite materials and rapid expansion of uses since 1909--use of plastics, molding materials, laminated products, cast transparent materials, resins for paints and varnishes, bonds for abrasive wheels, calendaring materials for waterproofing fabrics, materials for artificial denture restorations, and other applications--conversion of raw materials into finished articles.

## 14p--Lucite Carving--

This is the first instructional film to be made showing an art technique developed by the "machine age". The medium used is a transparent synthetic plastic and the tools used in carving are all electrically driven. The new possibilities suggested by this film are tremendously interesting to artists and students alike.



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