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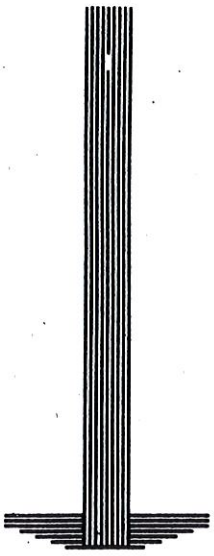
JOURNAL OF ENGINEERING DRAWING



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THE DIVISION OF ENGINEERING DRAWING AND DESCRIPTIVE GEOMETRY
S P E E

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PUBLISHED IN THE INTEREST OF TEACHERS OF ENGINEERING DRAWING
AND RELATED SUBJECTS

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CONTENTS

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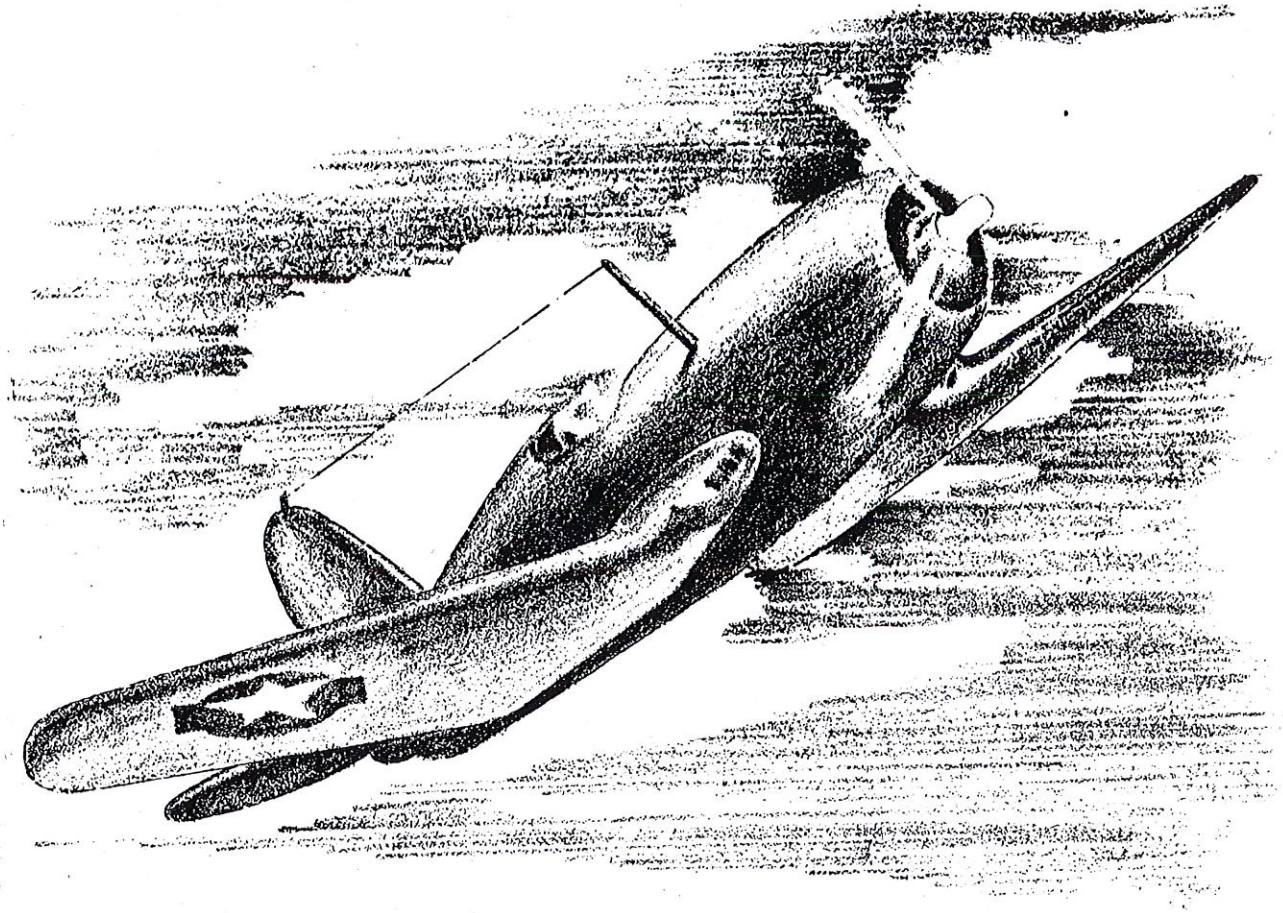


"CEASE NOT TO LEARN
UNTIL THOU CEASE TO LIVE;
THINK THAT DAY LOST
WHEREIN THOU DRAW'ST NO LETTER
NOR GAIN'ST NO LESSON,
THAT NEW GRACE MAY GIVE
TO MAKE THYSELF
LEARNEDER, WISER, BETTER."

FROM QUADRAINS OF PIBRAC, TRANSLATED BY JOSHUA SYLVESTER

The Editor's Page

The Lamme Award to

Thomas Ewing French

Professor of Drawing
Ohio State University

The Society
for the
Promotion of Engineering
Education

....."for his genius in teaching the graphical language of engineering; for his fertility in producing successful textbooks of engineering drawing based on sound principles of teaching and upon a broad knowledge of the requirements of practical construction; for the breadth of his personal culture and his perennial interest in succeeding generations of students inspiring them beyond the technical boundaries of his own field; for his guidance of the athletic problems of his university which rendered great service to the other Universities of the Middle West - the Lamme Medal for achievement in Engineering Education is awarded."

Thomas Ewing French, co-founder of the Division of Engineering Drawing, of the T-square page, and of the Journal of Engineering Drawing, was first president of the Division, shaping and guiding its policy through the formative years of this, the first division of the S.P.E.E.

Internationally recognized as an author and contributor to the literature of Engineering Drawing, his colleagues in the Division know him best as a wise and friendly counsellor of young teachers, a craftsman of creative and broad artistry, a teacher of deep and sympathetic understanding, and a companion in whose company pleasant and enriching hours are shared.

The very name Engineering Drawing is his creation, and to the art of teaching and developing the graphic language his contributions stand as unique and significant, a challenge for generations.

F. G. Higbee

USES AND METHODS OF PRODUCTION ILLUSTRATION *

by
CLIFFORD H. SPRINGER
Professor of Drawing - University of Illinois

The term "Production Illustration" has been applied to a form of drawing that is a combination of art and engineering drawing. It is actually the application of pictorial drawing to engineering and production problems. Pictorial drawing is one of the oldest methods of expressing ideas and has been used for many purposes since the beginning of history. Artists, artisans, and engineers have used pictures to portray nature, man, and his relations to other men, things that man has built, and things that he intends to build. However as the demand for things to be built became more complicated, it became increasingly more difficult to portray them by means of a picture. For that reason orthographic projection was developed.

With the introduction of orthographic projection and its manifold advantages for depicting objects in great detail, the picture ceased to be used to any great extent for describing objects that were to be made. Because the pictorial drawing could not be used to show everything that could be shown on the orthographic, engineers failed to realize its value as an aid in interpreting the orthographic, or perhaps they thought that it would not be worth the time necessary for its construction.

However, with the rush of war work and the necessity of training thousands of new men on the production lines, it soon became apparent that some method of speeding up the

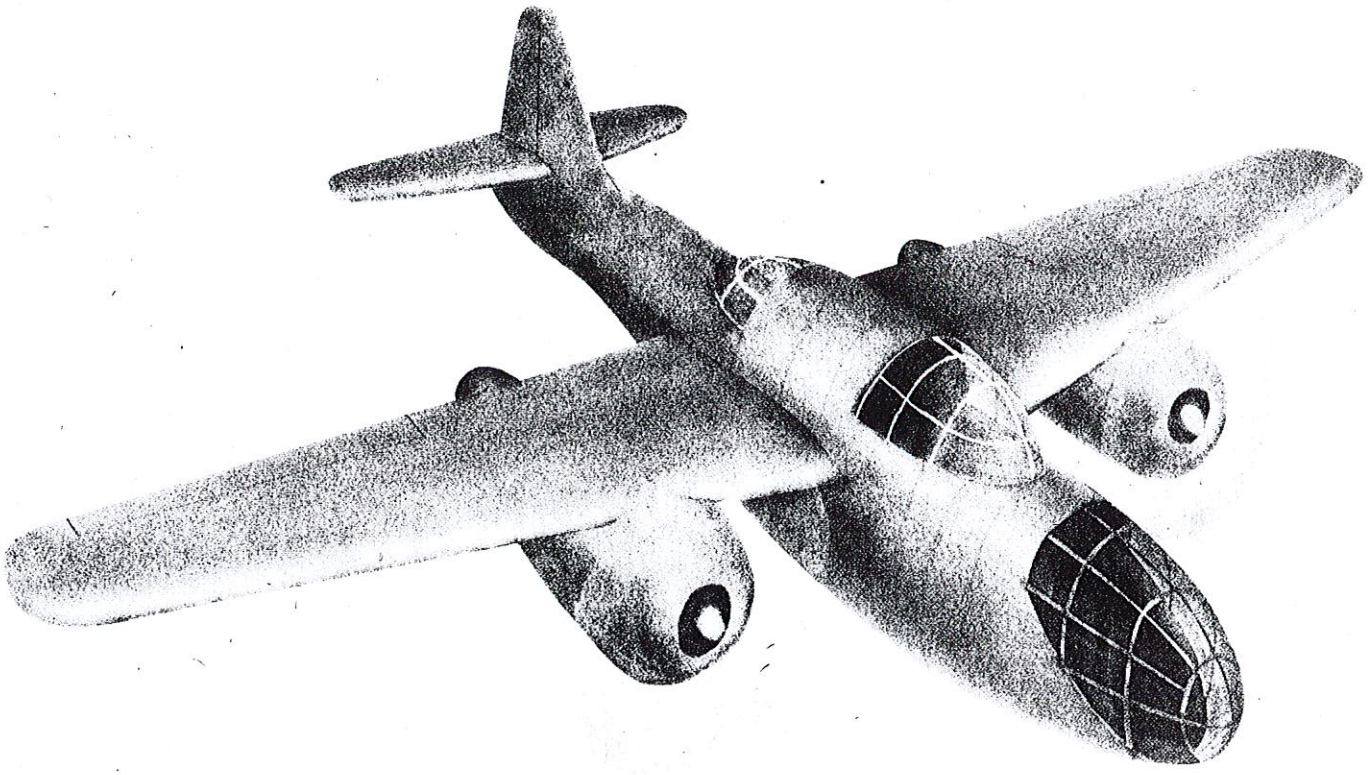


Fig. 1. Perspective of Airplane

* A paper presented before the Drawing Division at the annual Convention of the S.P.E.E., Chicago, Ill., June 19, 1943.

learning process must be found. The airplane plants seem to have been the first to bring into prominence the pictorial method of illustrating production methods. However, the idea is not new and has been used for many years in various industries. Still we must give the airplane industry credit for developing the method to its present state and for developing many new uses for pictorial drawing.

Let us then follow the design and construction of an airplane in a general way and see where the pictorial drawing is used. An expert on production illustration sits in on the conferences of the engineers and designers when the specifications are discussed and the important features of the design of the plane, such as type, size, cost, and the like, are decided. He takes notes on everything that is decided and translates them into a pictorial sketch giving a general view of the proposed plane. This leads to further conferences and forms a basis for conversations with the builder, whether that be the army, navy or a private firm. The pictorial drawing is easily read by anyone and is much more satisfactory than orthographic projections. Any changes are noted by the illustrator and incorporated into his drawing which is finally approved for production. Figure 1 might be such a drawing.

This brings the engineers to the point of deciding just how the machine can be made to the best advantage in the plant space available. The airplane must be manufactured in parts of as large a size as can be handled conveniently, which leads to the production breakdown illustration showing the plane broken up into parts as they are to be built and assembled. See Figure 2. From this, the layout of the machines in the plant and the arrangement of the assembly line can be arranged.

After the production breakdown illustration is completed, the engineers take over and design the various parts and each part is then further broken down showing just how the structural members go together. See Figure 3.

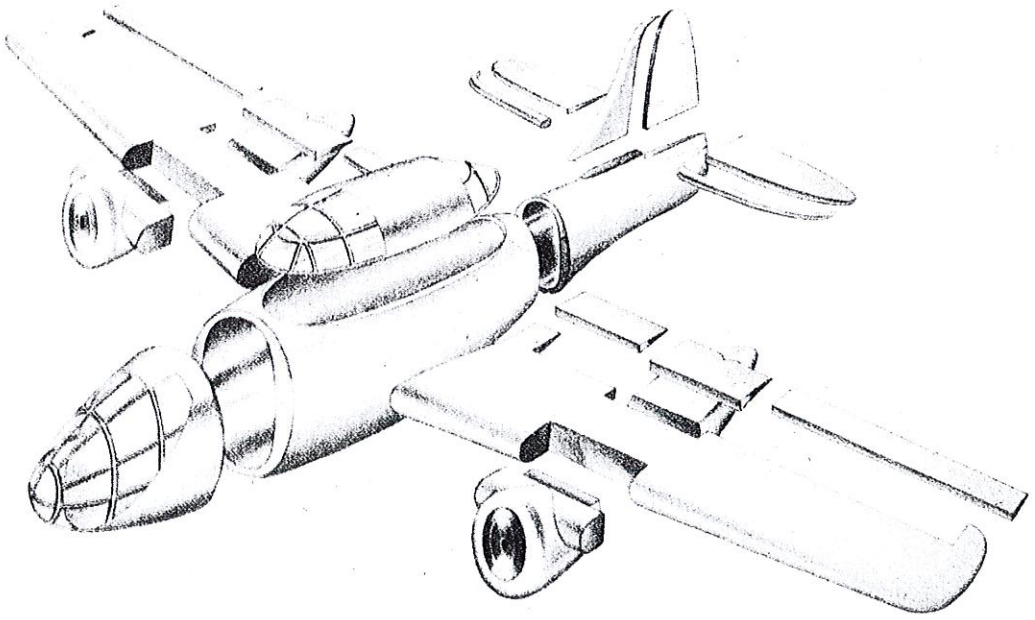


Fig. 2.
Preliminary Production
Breakdown Illustration

Finally pictorial drawings are made showing the individual joints in the structural work, the layout of the hydraulic system, the wiring, the instrument board and all other details. These drawings are made so accurately and so true to detail that many mistakes such as interferences are found and corrected, that otherwise might not be found until the machine is being produced, at which time corrections would be very costly in time and money.

Production illustrations are also used in ordering materials and letting subcontracts. In subcontracting it has been found that much time and many misunderstandings can be saved by using production illustrations.

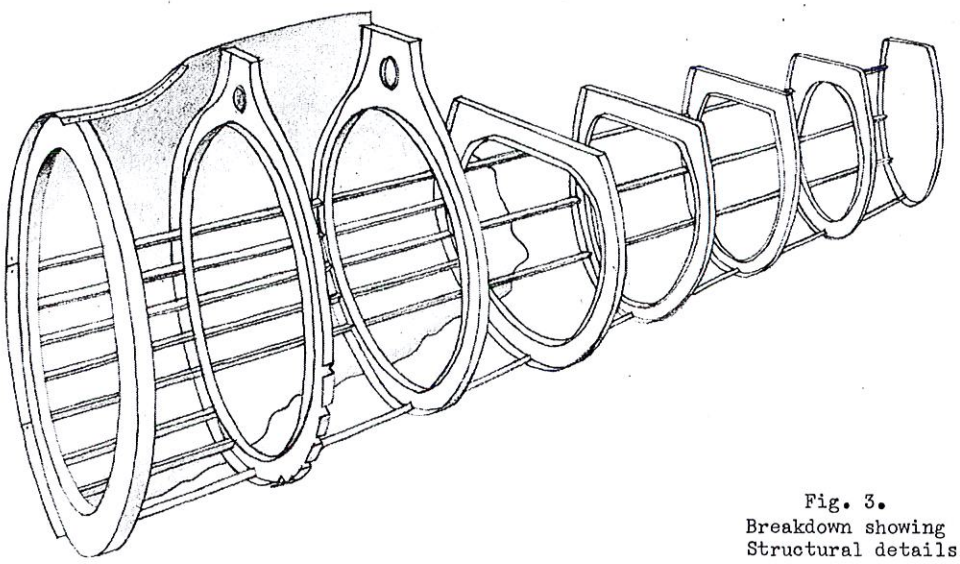


Fig. 3.
Breakdown showing
Structural details

Finally, production illustrations are drawn for every station on the assembly line. This is probably one of the most important uses of the pictorial drawings, as it has been proven that much time can be saved in assembly operations by use of pictorial drawings.

Because of the rush of the work and the fact that many new and only partially trained men are used, many mistakes are made in making various parts of the plane. It is the job of the salvage engineer to investigate any pieces on which mistakes have been made and decide whether they can be used or must be discarded. To do this the engineer must check the drawings of every part that touches the piece in question. Pictorial drawings on which the drawing number of every piece is marked are used in determining the drawings that must be checked in passing on any defective piece.

But when the plane is completed, the use of production illustration drawings is not over. Service manuals containing disassembled views must be prepared to show how the various pieces can be taken apart and put together again.

This gives a general picture of how pictorial drawings are used in the airplane industry, but many other industries are finding that pictorial drawings can be used for similar purposes in their own industries to save them both time and money.

The United States Arsenals are using production illustration to a great extent. The tanks, guns, gun mounts, in fact everything that is being turned out are drawn disassembled with appropriate instructions, which may be inserted in any language, so that assembly and repair may be done in any part of the world. The arsenals are using free hand pencil drawings similar to Figure 4 which are reproduced by the offset process.

Automobile manufacturers and others have been using such drawings for a long time, but frequently they were made as retouched photographs. The photograph method is slow and expensive and has certain inherent defects due to perspective, shadows and the inability to get the camera into close places.

Within the last few months, conferences have been held with men in various industries about the application of this work to their plants. In almost every case it has been received enthusiastically and most plants desire to have some of their men trained in this field. At one plant the engineers looked over the idea and decided that there would be no use for it in their plant, but when the plant manager was consulted, he wanted fifteen men trained as soon as possible. Usually the production departments are most interested because it is primarily a method of overcoming production difficulties rather than a help in design. One plant wanted all of their foremen to take the course for two reasons: first, because of the training it gave in reading blue prints, and second, because the ability to sketch would be very valuable to them in interpreting drawings and changes in drawings to the men under them. Another plant had been having trouble in getting small parts, such as fasteners, in the correct places in the assembly and they saw in the pictorial drawings a method of completely overcoming their difficulties.

Having determined the need, the Extension Division of the University of Illinois decided to offer a course in Industrial Production Illustration under the E.S.M.W.T. program. It

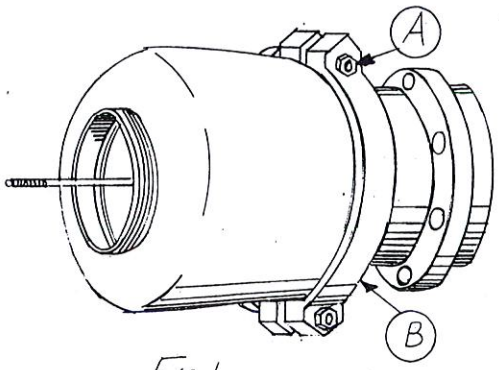
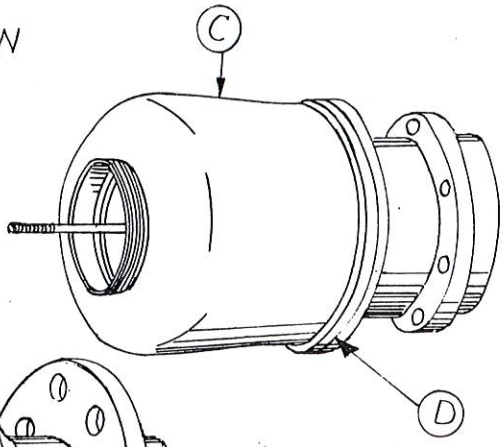


FIG. 1

3 REMOVE TWO NUTS (A) AND REMOVE BAND (B)

4 LOOSEN CYLINDER (C) BY TAPPING AND PRY OFF WITH A SCREW DRIVER AT (D) TAP WITH A FIBER HAMMER IF IT STICKS

5 REMOVE SCREW (E) IN PISTON ALONGSIDE OF STEM. WIPE OFF EXCESS GREASE.



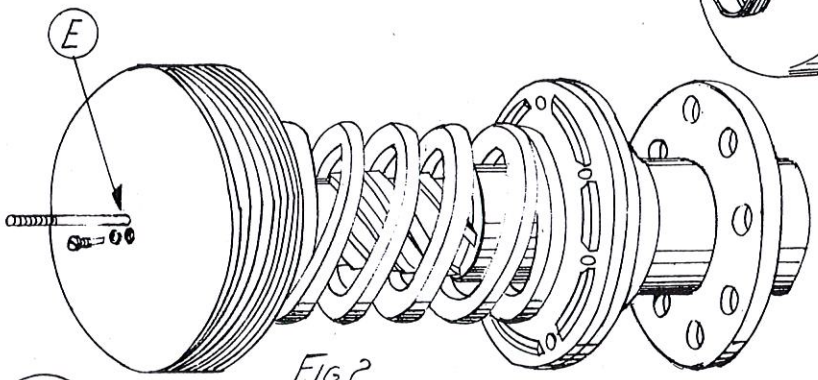


FIG. 2

6 PLACE MOUNTING FLANGE (G) IN BENCH VISE (J) PLACE RODS (K) IN HOLE OF MOUNTING FLANGE. PLACE ROD (L) IN THE SIDE OF WORK BENCH AND IN HOLE OF MOUNTING FLANGE AS SHOWN THIS PREVENTS ROTATING DURING COMPRESSING. COMPRESS SPRING WITH SPECIAL TOOL (F) AS SHOWN. REMOVE PLUG IN REAR CENTER AT (G) WITH SCREW DRIVER (H), LOOSEN LONG BOLT FROM (G)

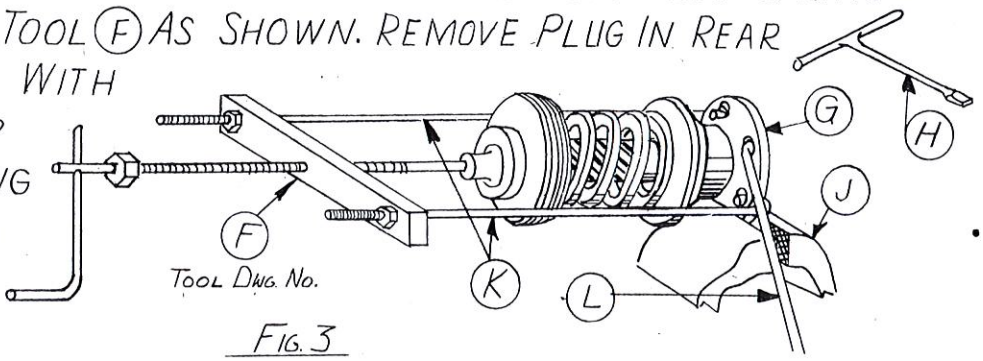


FIG. 3

Fig. 4. Assembly Instruction Drawing

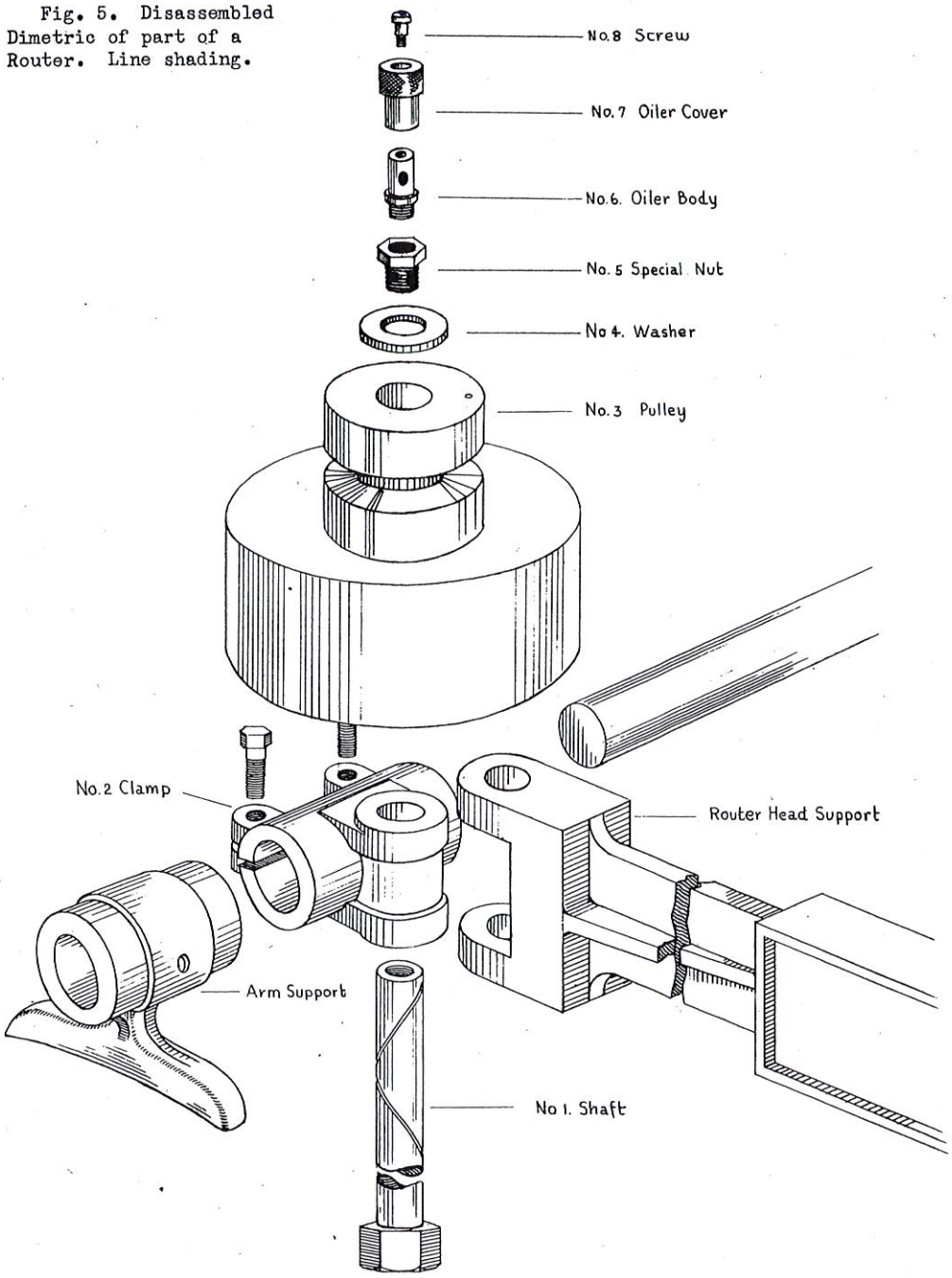


Fig. 5. Disassembled Dimetric of part of a Router. Line shading.

was to be general enough to cover the needs of the airplane industry around Chicago and St. Louis and also satisfy the needs of general industry throughout the state.

To be complete and satisfy general industry a certain amount of orthographic projection had to be included, hence the first two weeks of the course were devoted to making two and three view drawings, both mechanically and freehand. Since freehand work is the final goal in certain industries, the technique of sketching must be thoroughly taught and speed must be emphasized.

In starting pictorial drawing, the mechanical method was taught first to give the theory and then other objects were drawn freehand. Isometric, dimetric, trimetric and perspective were taken up in that order. Care was taken to give the students a knowledge of the advantages and defects of each kind of projection as it

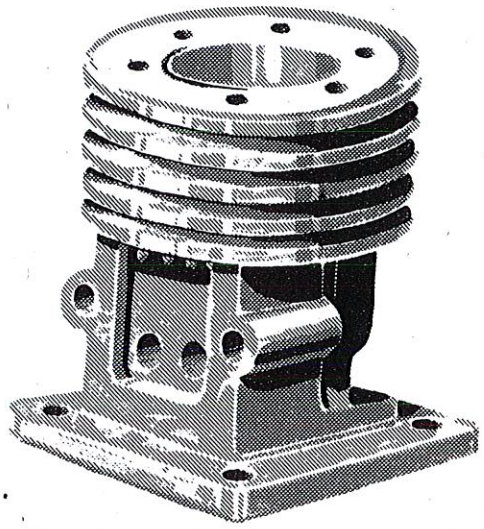


Fig. 6. Craftint Doubletone Shading

was studied so that they would be able to choose the best method of portraying each object.

The distortion that is so noticeable in isometric is greatly reduced in dimetric or trimetric, but up to this time these projections have been difficult and slow. In this course a new method of making any axonometric projection (isometric, dimetric or trimetric), that is both easy and fast is explained and used. For an explanation of this method see the article on Axonometric Projection by Prof. R. P. Hoelscher which will follow in the February number of the Journal. This method was taught in our classes with excellent results. In making exploded or disassembled views, it was found convenient to project one piece to proportion the drawing and then make the other parts freehand in order to save time. This is illustrated in Figure 5 where the pulley was projected and the rest made freehand.

When the shape of the object is such as to make oblique desirable it has been found to be a very useful form of projection. However, the student must be warned of the places where oblique drawings become objectionable. Oblique is fast, easy to draw and very flexible but gives a badly distorted picture when there are circles in the receding planes. Oblique has two distinct advantages: first, circles can be shown as circles, and second assembly stacks can be exploded along either a horizontal or a vertical axis, a procedure which frequently gives the best results.

Perspective gives a picture that is closer to what we see than the other projections, but until the student is thoroughly familiar with perspective and the rules for locating the point of sight he may find himself with a very distorted picture. In perspective the student begins with the visual ray method, then vanishing points on the horizon, next vanishing points of inclined lines. The measuring point method was considered to be the best method for use, particularly in the aircraft field. Several periods were devoted to drawing aircraft parts with the final problem being the drawing of the complete airplane and then breaking it down into the preliminary production breakdown drawing. Figures 1, 2 and 3 are perspectives made by students in one of the classes.

The amount of shading to be put on a drawing is determined by the purpose of the drawing, the company for which it is made, and the method of reproduction. Of course, it is impossible to make a finished artist in a course of this kind, but the students were exposed to

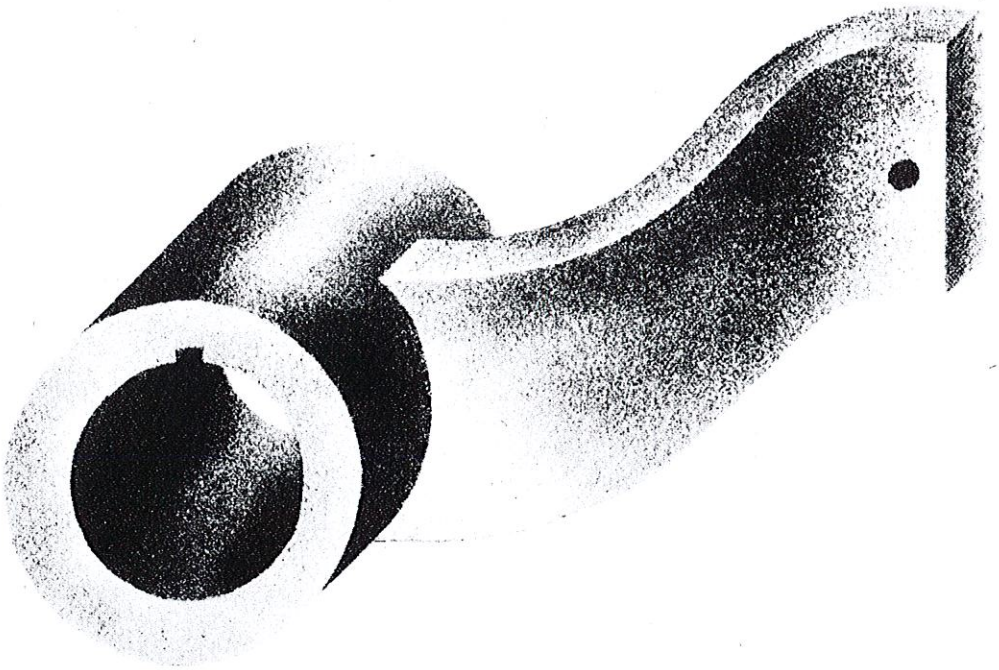


Fig. 7. Mechanical Oblique made from Orthographic projections. Sponge shading.

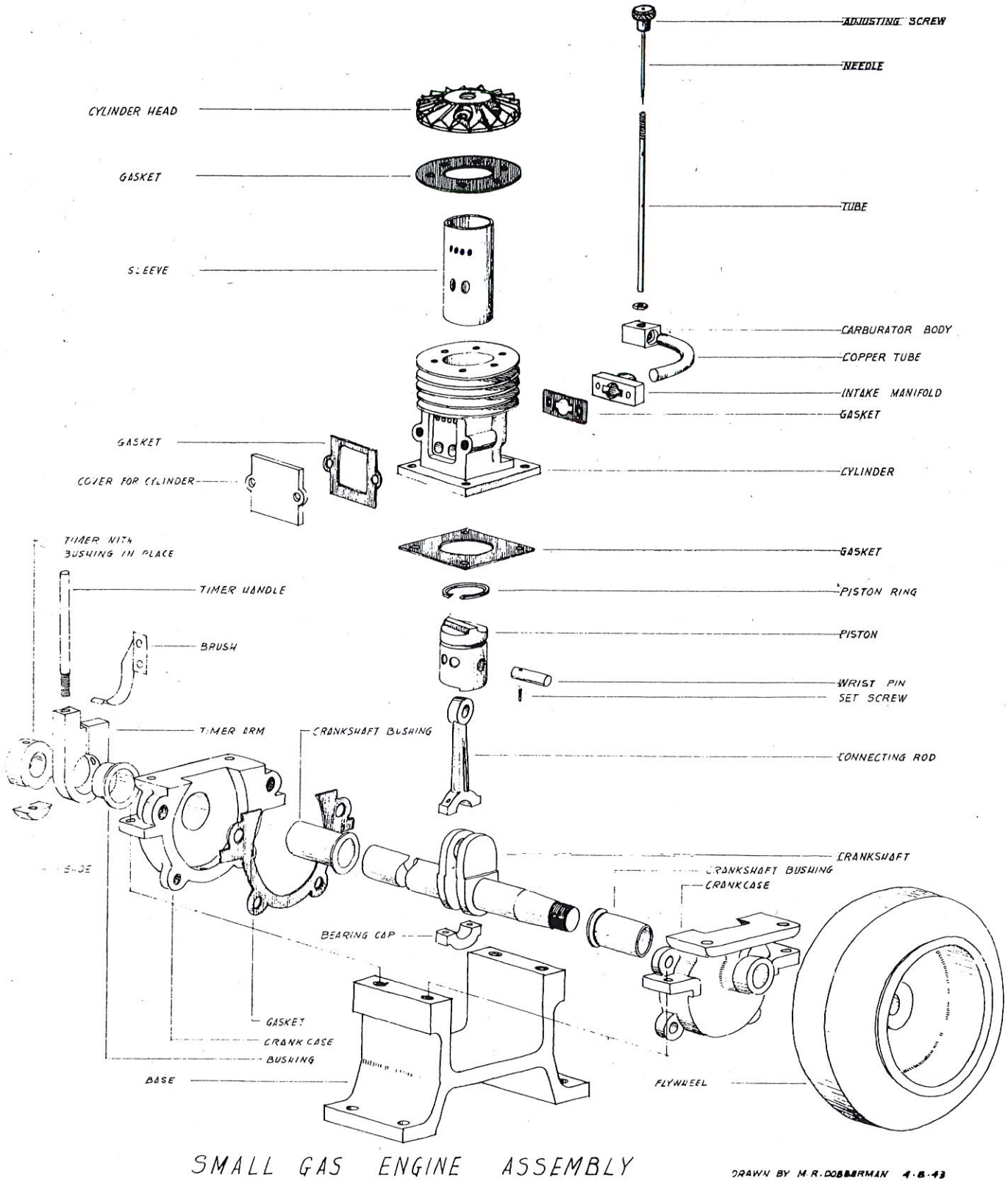


Fig. 8. Disassembled pictorial of Engine shown in Fig. 9.
Line Shading; freehand drawing.

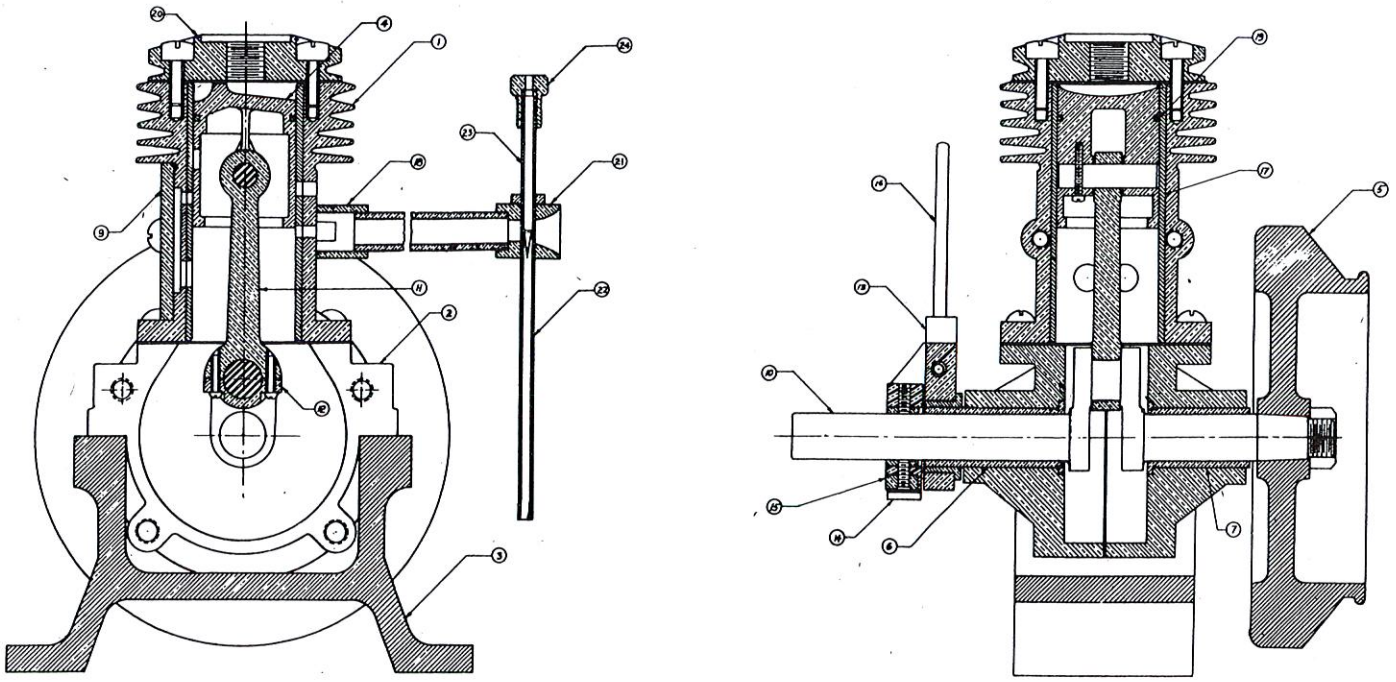


Fig. 9. Standard orthographic assembly of Engine

several different kinds of shading. For this work, the most important is probably line shading and a fairly satisfactory job can be done by following a few rules. However, it is usually necessary to counteract the tendency of the beginning student to use too much shading.

Block shading is more difficult and was not attempted, although very striking effects can be obtained by its use.

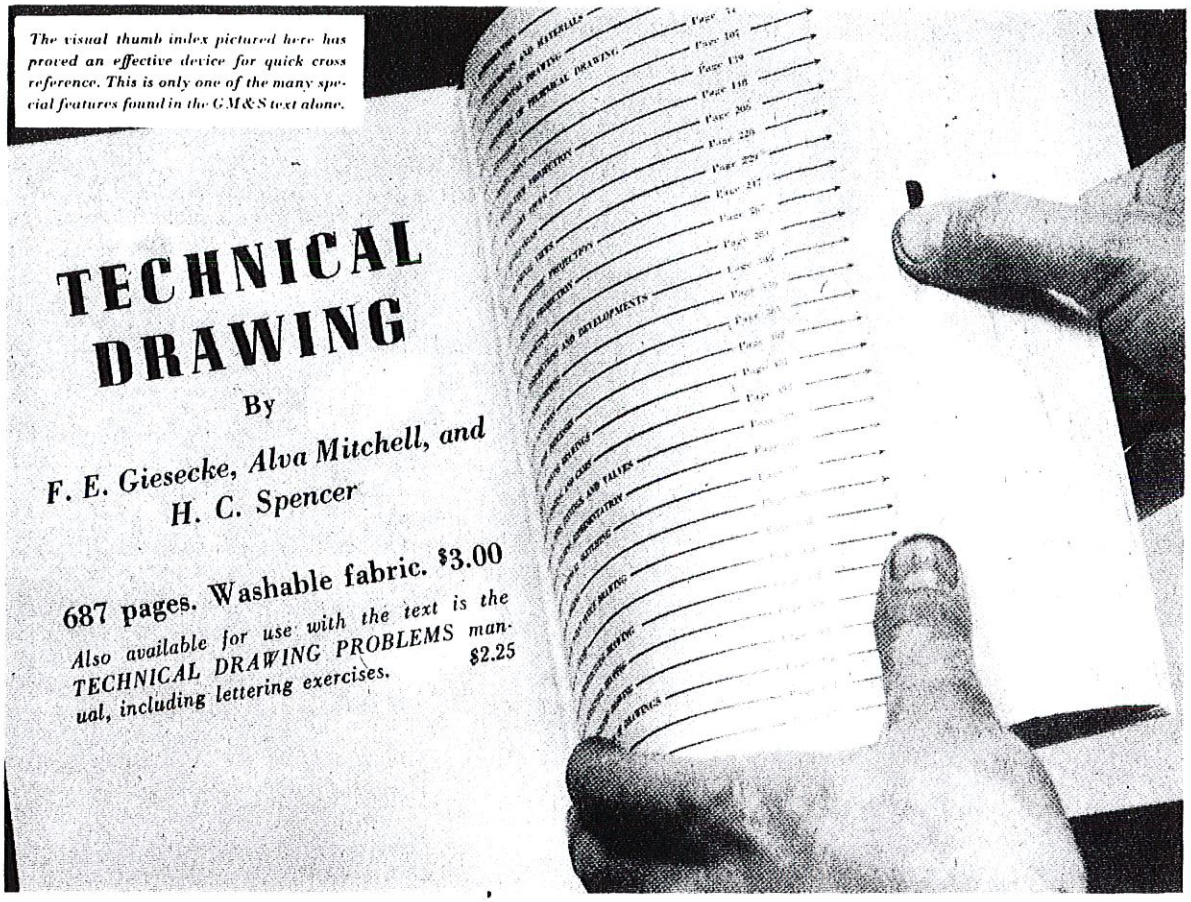
Commercial processes such as Craftint Doubletone were mentioned and sometimes tried. See Figure 6. Ability to use a brush is necessary for this type of shading. The airbrush gives a very finished drawing but requires considerable practice. Figures 1 and 2 were rendered by airbrush. It also has the disadvantage of requiring a halftone for reproduction. In certain industries airbrush work is used freely.

A simple method of shading that may be used to give the same general effect as the airbrush is illustrated in Figure 7. For this type of shading stencils must be cut as for the airbrush shading. A little bit of printer's ink is rolled out on a glass plate to a thin film. A rubber sponge is then patted on the ink which may be transferred to the drawing by patting the open space in the stencil. By patting lightly with a course sponge the effect of an unfinished surface may be given. By twisting the sponge tightly and patting harder and making the contrast between highlights and shades greater, the effect of a finished surface may be given.

In all of this work it is necessary to remember that the purpose of the drawing is to help the untrained men to understand a complicated structure or piece of equipment. It is not essential that the result be an artistic masterpiece or that the sheet be perfectly balanced. In fact it is sometimes necessary to restrain the artistic temperament for the sake of clarity. Parts should be arranged in a normal position and the relation between parts should be clearly apparent. The advantages of this type of drawing to the untrained man may be seen by comparing Figures 8 and 9. The orthographic sectioned assembly of a small motor is shown in Figure 9, while Figure 8 gives the same information in pictorial form.

Some industries claim that artists and illustrators are the best source of supply for this type of work, while other employers have said that they have had to fire every artist that they have employed. The artist has had training in freehand work and shading which is very important, but on the other hand the engineer has the technical knowledge to read the drawings, and what is more important, to know how the machine should work. It seems obvious that the ideal man would be one with engineering training and the ability to make and render pictorial drawings both mechanically and free-

(Continued on Page 20)



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PRE-SERVICE TRAINING IN ENGINEERING DRAWING

by
JUSTUS RISING
Professor & Head of Engineering Drawing
and
MAURICE R. GRANEY
Assistant Professor of Engineering Drawing
Purdue University

During the summer of 1942 the Engineering-Science-Management War Training Program of Purdue University offered a program of introductory engineering subjects to all recent high school graduates who were not planning to continue their education in college.

The purpose of the program was to provide students with elementary engineering training so that they might be prepared to aid in American War production. The general objective was three-fold:

1. To aid in the supply of a technically trained personnel - inspectors, draftsmen, technologists, etc. - for industry, civil service, ordnance, and other federal government departments.

2. To provide a ground work for further and specialized training in such fields as electrical engineering, jig and fixture design, metallurgy, production engineering, industrial chemistry, and in the armed services.

3. To enhance the opportunity for more rapid advancement of such trainees after employment.

The course was a full day-time program operating seven and one-half hours daily, Monday through Friday, and four and one-half hours on Saturday mornings for a period of ten weeks. It included basic training in five branches of the field of engineering. The subjects taught and the distribution of total time were as follows:

Engineering Chemistry	90 hours
Engineering Drawing	90 hours
Industrial Materials & Processes	45 hours
Elements of Engineering	105 hours
Mathematics	90 hours

All work offered in the program was of college grade but did not yield college credit. It was offered tuition free. Except for text materials, which cost the student $18.25, all expenses of the program were met by the Federal government. The course was open to girls as well as boys, the requirement for admission being graduation by an accredited high school with credentials in two years of mathematics including Algebra and Geometry, and at least one year of Science.

The teaching personnel was selected from the staffs of schools throughout the midwest. For the most part the teachers selected were members of college faculties, although in some instances high school teachers who had had sufficient industrial experience were used.

Eight centers in the State of Indiana participated with 275 students initially enrolled. Forty-three of the entering students, or about 15.6%, were girls. A number of students accepted employment before the ten week training period was completed. Some students withdrew for other reasons. Of those who completed the training, 187 or 68% did satisfactory work and received certificates. A breakdown of these figures for the various centers is tabulated in Table 1.

TABLE 1

Centers	Number Enrolled		Number Certified	
	Total	Girls	Total	Girls
East Chicago	19	6	10	4
Elkhart	24	7	19	5
Evansville	62	15	55	12
Gary	42	6	26	4
Hammond	37	4	24	3
Hobart	21	2	13	1
Indianapolis	45	3	29	3
South Bend	25	0	11	0
TOTAL	275	43	187	32

A brief personnel report showing grades and instructors recommendations was prepared

for each student. This was submitted to the local offices of the United States Employment Service. These offices cooperated with Engineering-Science-Management War Training Program in a judicious placement of students in industry.

Although changing conditions have removed the need for this type of program, a description of the subject matter content and methods of presentation of the drawing work are here presented. The application of the streamline procedures might well be widely applied to Engineering Drawing courses and thereby offset to a degree that major headache of drawing administrators, the curtailment of the time allotted to drawing.

The objectives may be classified in two ways:

1. The furnishing of instruction in the fundamentals of Engineering Drawing.

   (a) Lettering
   (b) Freehand sketching
   (c) Use of drawing equipment
   (d) Shape description
   (e) Size description
   (f) Working drawings

2. To train in technical and analytical reasoning.

   (a) To analyze a given problem or situation
   (b) To find and analyze the information required for its solution
   (c) To produce the required solution according to specifications
   (d) To express the results according to accepted practice

The course was administered in three 3-hour drawing periods per week. The course content, plan of organization and methods of instruction differed from most usual Engineering drawing courses in several important items.

1. Omission of pencil drawings on manila.

2. Omission of any use of ink.

3. Use of Purdue University Engineering Films for basic instruction. The effectiveness of the Engineering Drawing Films as a means of mass demonstration of good drawing techniques and explanation of drawing principles is due in large part to the manner of using them. The lesson is explained and demonstrated in sections at the end of each of which the projector is stopped and the lights turned on, to permit the student, on a prepared work sheet, to work an appropriate problem. The instructor then works the problem on a copy of the work sheet projected on the chalk board by means of a negative lantern slide. Question and discussion serve to clear up doubtful points after which the next section of the movie begins. All movies but those used at the first meeting of the class were preceded by the reading of appropriate text references.

4. Restriction of execution to freehand sketching for the first three weeks (27 hours) until fundamental principles had been covered.

5. Short exercises and lots of them to permit wide variety of problems.

6. Liberal use of prepared work sheets to reduce the amount of unnecessary repetition, to provide more time for new items and to permit concentrated attention on them.

7. Lettering practice administered daily in 15-20 minute periods in which the exercise material consisted of statements of principles relating to the day's assignment.

8. Use of instruments deferred until beginning of the fourth week after basic principles had been presented to permit concentrated attention on drawing techniques and "how to draw."

9. Assignment of drawings in groups according to subject matter with a large number of problems in each group for benefit of faster students.

10. Scheduling of a definite starting date for each group so as to keep the class together.

11. Assigning each group of exercises two grades, one for QUALITY of the work and the other for QUANTITY. QUALITY was based on neatness, accuracy, completeness and correctness; QUANTITY on the number of sheets completed. Knowledge of principles was evaluated by frequent objective type quizzes and a final examination. Lettering performance was evaluated by a test in composition near the end of the course. The daily exercises were not graded for record. A QUALITY FACTOR based on the time assigned for each group of exercises was used to convert QUALITY ratings to QUALITY POINTS. Each exercise had a QUANTITY POINT value based on estimated time required to complete it. The product of points per job times the number of jobs completed gave the QUANTITY points for a group. Lettering, Quizzes and Final Examination were rated for QUALITY only and QUALITY FACTORS used to convert ratings to points.

Figure A shows a frequency distribution of total points for 138 students.

Figure A

Total Points	Number of Students
2001-2100	--
1901-2000	---
1801-1000	----------
1701-1800	----------
1601-1700	----------
1501-1600	----------
1401-1500	----------
1301-1400	--------
1201-1300	--------
1101-1200	--------
1001-1100	------
901-1000	--
801- 900	----
701- 800	---
601- 700	-
501- 600	--

The manner of combining the elements of the course into a teaching program is indicated in the assignment schedule, Figure B. Groups of drawings are indicated by capital letters while individual items not included in the groups are designated by numerals. Explanations of the "Letters" and "Numerals" together with subject matter content, as well as method and materials of delineation are contained in the succeeding paragraphs.

ADVANCE REFERENCE READING

51. Use of Scale
52. Use T-square and triangles
53. Uses of compasses; Applied Geometry
54. Auxiliary Views
55. Sectional Views

LESSON TOPICS

56. Organization of Class
57. Lettering
58. Freehand Drafting
60. Shape Description
61. Use of Scale
62. Size Description
63. Detail Sketches
64. Use of Instruments
65. Applied Geometry
66. Detail Drawings
67. Auxiliary Views
68. Sectional Views
69. Threads and Fasteners
70. Detail and Assembly Drawings
71. Limit Dimensions

LANTERN SLIDE LECTURES

73. Shape Description
74. Use of Scale

Figure B
SCHEDULE OF ASSIGNMENTS

WEEK	PERIOD	ADVANCE REFERENCE READING	TOPIC	LECTURE AND EXAMINATION	MOTION PICTURES	LETTERING	SKETCHING	DRAWING	WEEK	PERIOD	TOPIC	LECTURE AND EXAMINATION	LETTERING	DRAWING
1	1		56,57,58		80,81	86	93+A		6	16	69			L
	2		60	73		87	A+B			17			91	L
	3					88	B+C			18	70	77	91	M
2	4					89	C+D		7	19			91	M
	5				80	90	D+E			20			91	M+N
	6			75		91	E+F			21			91	N
3	7	51	61,62	74		92	G		8	22			91	N
	8		63			91	H			23				N
	9					91	H			24	71	78		N+O
4	10	52,53	64,65		82,83			96,97	9	25	70			O
	11		66			91		I		26				O
	12			76		91		I		27				O
5	13	54,55	67,68		84,85		94,95+J		10	28				O
	14					91		K		29				O
	15					91		K		30		79		O

FUNDAMENTALS OF ENGINEERING DRAWING

By WARREN J. LUZADDER

Assistant-Professor of Engineering Drawing, Purdue University

A Word About the Author

WARREN J. LUZADDER, author of Prentice-Hall's new book, "Fundamentals of Engineering Drawing," has had wide experience both as a professional engineer and as a teacher of Engineering Drawing.

He is Assistant-Professor of Engineering Drawing, Purdue University, where he has been teaching this subject for the last 13 years. At present he is teaching the Basic Drawing Course in the Army Specialized Training Program.

Professor Luzadder, a registered professional engineer, has served in an engineering capacity for the Indianapolis Railways and Indiana State Highway Commission. He also served as Draftsman for the Purdue University Problems in Engineering Drawing.

But probably he is better known to engineering teachers as co-author of the numerous motion pictures covering various phases of Engineering Drawing. These motion pictures which were prepared in collaboration with Professor Justus Rising of Purdue University have been exhibited from coast to coast by many universities, trade schools, and high schools.

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- ASA Standards.
- Glossary of Common Shop Terms.
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By

Warren J. Luzadder
Assistant Professor of Engineering Drawing

Myrl H. Bolds
Instructor in Engineering Drawing

J. Norman Arnold
Associate Professor of General Engineering

Franklin H. Thompson
Instructor in Engineering Drawing

Purdue University

TABLE OF CONTENTS

Within each group the sheets are arranged approximately in an order of increasing difficulty. The instructor, therefore, may select sheets adapted to the abilities and interests of his students and himself. There are more than enough problems for the usual elementary course in Engineering Drawing.

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EXAMINATIONS

75. Quiz 1
76. Quiz 2
77. Quiz 3
78. Quiz 4
79. Final Exam.

LECTURE WORK SHEETS

Group A

92. Use of Scale

MOTION PICTURE FILMS

80. Capital Letters
81. Freehand Drafting
82. Use of T-square and Triangles
83. Applied Geometry
84. Auxiliary Views
85. Sectional Views

MOTION PICTURE WORK SHEETS

86. Capital Letters (freehand) (Large Letters)
90. Capital Letters (freehand)(Medium Letters)
93. Freehand Drafting (freehand)
94. Auxiliary Views (freehand)
95. Sectional Views (freehand)
96. Use of Triangles (Instruments)
97. Applied Geometry (Instruments)

LETTERING

57. Motion Picture
58. Motion Picture Work Sheet, Large Capitals
87. Stroke Sheet - straight capitals
88. Stroke Sheet - curved capitals
89. Stroke Sheet - numerals
90. Motion Picture Work Sheet - medium capitals
91. Practice Exercises

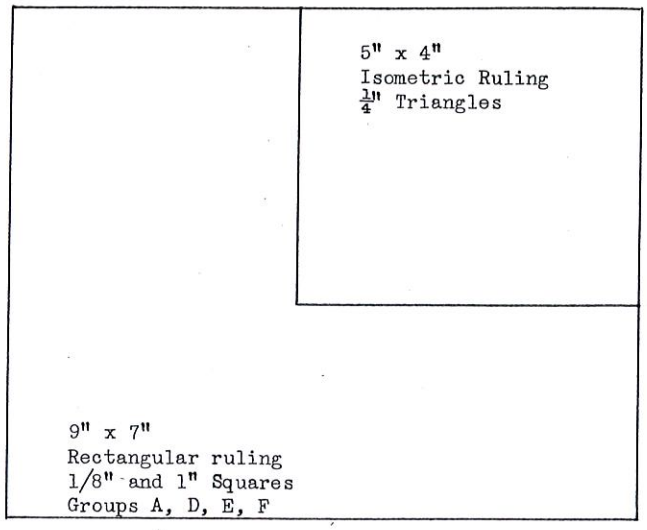


Figure C

Group A (Six Fig. C work sheets - Freehand)
Three views and pictorial from model
Pictorial from three views
Side view and pictorial from top and front views
Top view and pictorial from front and side
Front view and pictorial from top and side
Pictorial from three views (curved)

Group B (Five Fig. D work sheets - Freehand)
Six views from pictorial representation printed on isometric part of work sheet Fig. D
(a) Rectangular Objects (2 sheets)
(b) Curved Objects (3 sheets)

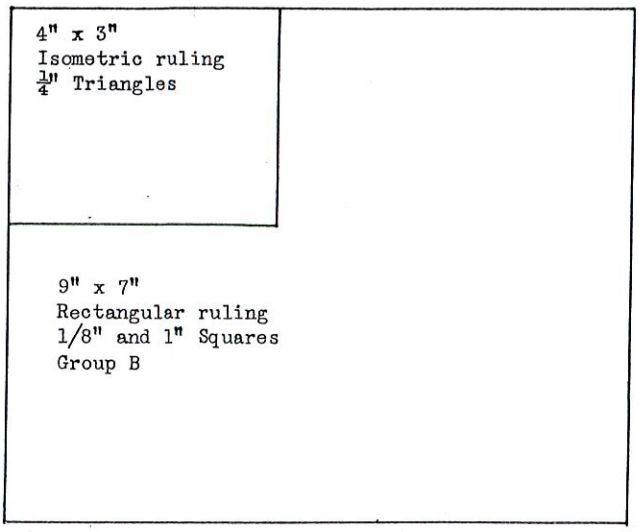


Figure D

Group C (Two sheets - Freehand)
Three view drawings to supply missing lines

Group D (Nine Fig. C Work sheets - Freehand)
Sketch two views from text
Add third view and Pictorial

Group E (Five work sheets - Freehand)
Identification of Surfaces (1 sheet)
Sketch two views from text; add third view and Pictorial (4 Fig. C sheets)

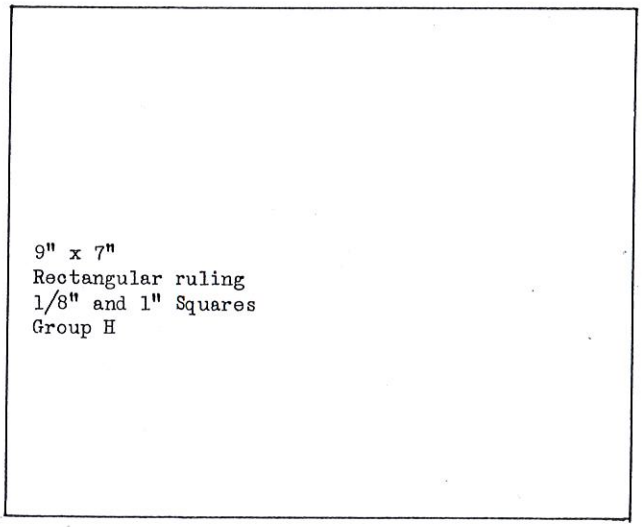


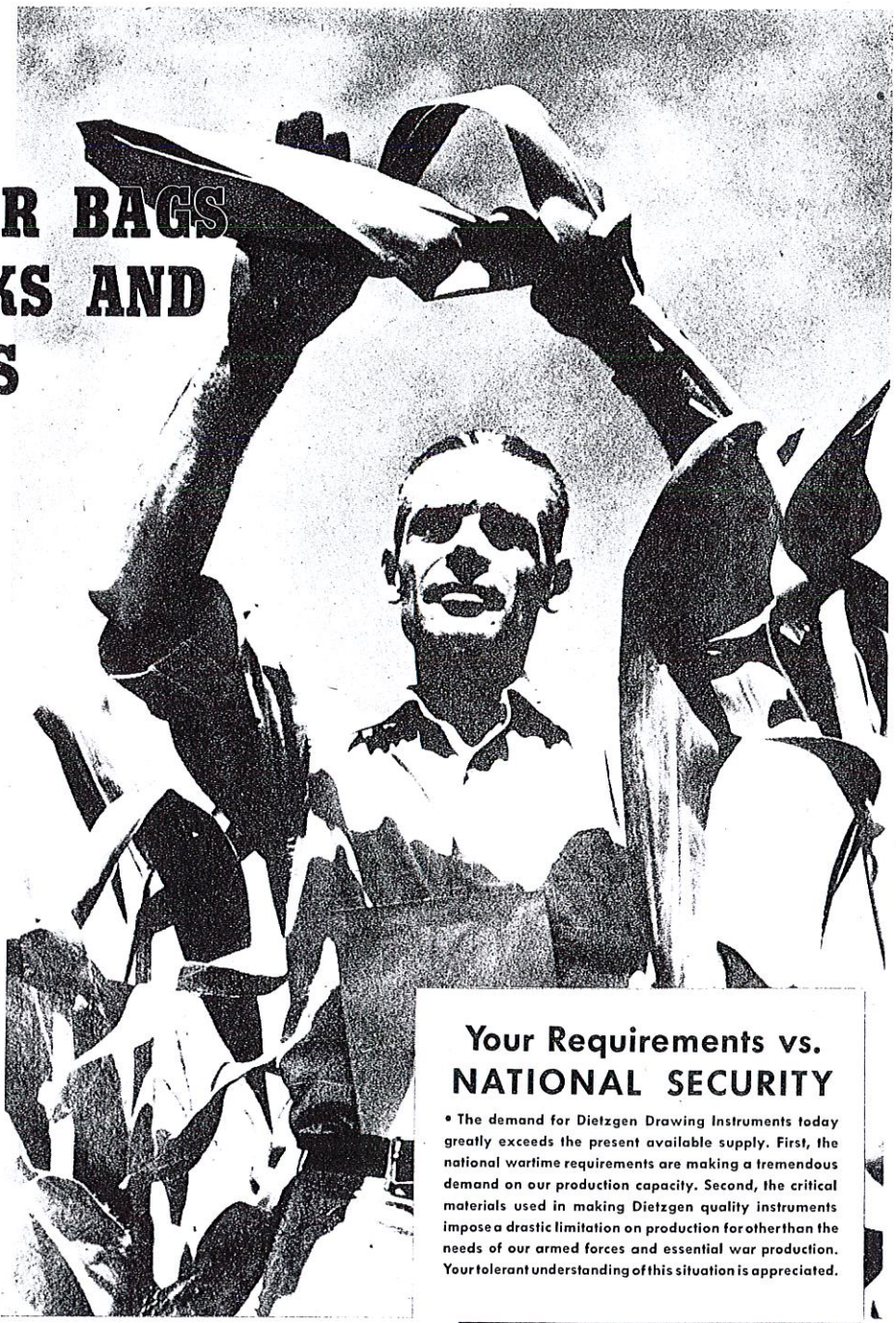
Figure E

Group F (Four work sheets - Freehand)
Identification of Surfaces (1 sheet)
Sketch two views from text; add third view and Pictorial (3 Fig. C sheets)

(Continued on page 18)

HE TIED PAPER BAGS ON CORN SILKS AND TASSELS

—Educators know what it means



BACK in the 1920's, Lester Pfister was a not too prosperous farmer living near El Paso, Illinois. He was not too poor to dream, however, and he dreamed of a more perfect, more productive corn. Then an idea came to him . . . and he spent his next ten summers out in the blazing sun tying paper bags on corn tassels and silks, making thousands of hand pollinations. By careful selection, weaklings among the corn plants were eliminated. His neighbors laughed at his crazy experiments, and by 1935 he was virtually penniless. All he had to show for his efforts were four gnarled, runty nubbins. But these ears had within them, he knew, the parenthood of such corn as was never seen before. Indeed, in the eight years following, other farmers planted more than 15 million acres of corn from hybrid seed produced from those four ears. Today, Pfister's Hybrid is known to farmers in every state of the union.

Just as Lester Pfister carefully nurtured his strain of corn through the years and shielded it from deterioration, so the true educator who works beyond the day's lesson toward the betterment of the human race, seeks to nurture the minds of the boys in his class, to surround them with influences of a constructive and inspiring nature. From these lads must come the leadership of this country tomorrow, in their minds may be the parenthood of a world far better than any we have ever known. In minds so nurtured, the ideas that can mobilize all an individual's energy behind them far more easily take root. In minds so nurtured, the spark of achievement possessed by *all* is more easily fanned into flame.

Instructors in mechanical drawing know the influence that can be exerted on youthful minds and imaginations by the drawing instruments these boys use. Usually a lad's drawing set is his introduction to the world of craftsmanship, of precision work, of disciplined thought and controlled activity. First impressions here are unusually important. Caught at the flood tide of his interest, a fine drawing set can lead a boy's imagination to the great engineers and scientists and their achievements, which in turn lends new dignity and respect to the work he is doing. Familiarity with fine tools of precision and craftsmanship gives the lad a foretaste of the fruits of achievements, lift his standards, sharpen the distinction between good work and shoddy. Too vital to be regarded casually at *any* time, a student's drawing set should be selected with the utmost care. Here is one time in a student's life when wisdom counsels *the best the student can afford.*

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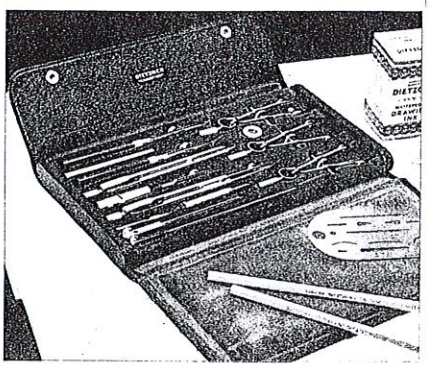


EVERYTHING FOR
DRAFTING AND SURVEYING

(Printed in U.S.A.)

COMBINED BEARING CAP, SPEEDOMETER GEAR AND WORM HOUSING AN ADVANCED DRAWING PROBLEM

by
H. WESLEY SAVAGE
FRANK ZOZZORA
Professors of Graphics - Lafayette College

The accompanying drawings show the pattern, core, casting, and finished product of a combined bearing cap and speedometer worm housing to be used in connection with an automotive transmission.

Figures 7, 8, and 9 show the finished machined casting. Figures 1 and 2 are views of the pattern, an assembly of four parts. Figures 3 and 4 are illustrative of the casting process. Figure 5 shows the core, and Figure 6 is a picture of the rough unfinished casting.

Referring to Figure 7, the housing is used to enclose a bearing retainer, a threaded piece for adjusting the position of the retainer, a bushing for the speedometer worm and the worm itself. At the rear part of the housing is a cylindrical portion machined inside and out to fit in a corresponding machined hole in the transmission casing. The engine drive shaft is coaxial with and passes completely through the bearing cap housing. The bearing cap enters the transmission casing to the position where the back surface of the square flange is flush with the transmission casing. The bearing cap is fastened to the transmission casing by four stud bolts set in the transmission casing and passing through four holes in the corners of the square flange of the bearing cap housing.

The interior portion of the bearing cap is machined at the rear to receive a retainer for a roller bearing which is fitted on the drive shaft. Immediately forward of this machined hole is a cored recess of somewhat larger diameter to accommodate the gear and worm for driving the speedometer.

The forward part of the housing is also generally cylindrical but includes bosses in the lower left portion to accommodate the speedometer worm and its bushing. The worm hole is threaded for the bushing and passes into the interior of the housing at a 45° angle. Within the housing and coaxial with the worm hole is a drilled hole and a machined surface at right angles to the hole to provide bearing surfaces for the bottom of the worm. The forward surface of the housing is planed and a bored hole passes through it into the housing. Through this hole an adjusting piece is passed for properly positioning the bearing retainer at the rear of the housing. A cover plate fits around the drive shaft and over the adjusting piece and is fastened to the outside surface of the housing by means of the lower left stud bolt and a cap screw at the top.

Figures 1 and 2 show the pattern. Made of some easily worked material such as wood, it comprises four parts, numbered 1, 2, 3, and 4 in Figure 2, which are then fastened together by any suitable means to form an integral piece.

Required: An engineering report including:

(1) These notes and drawings.

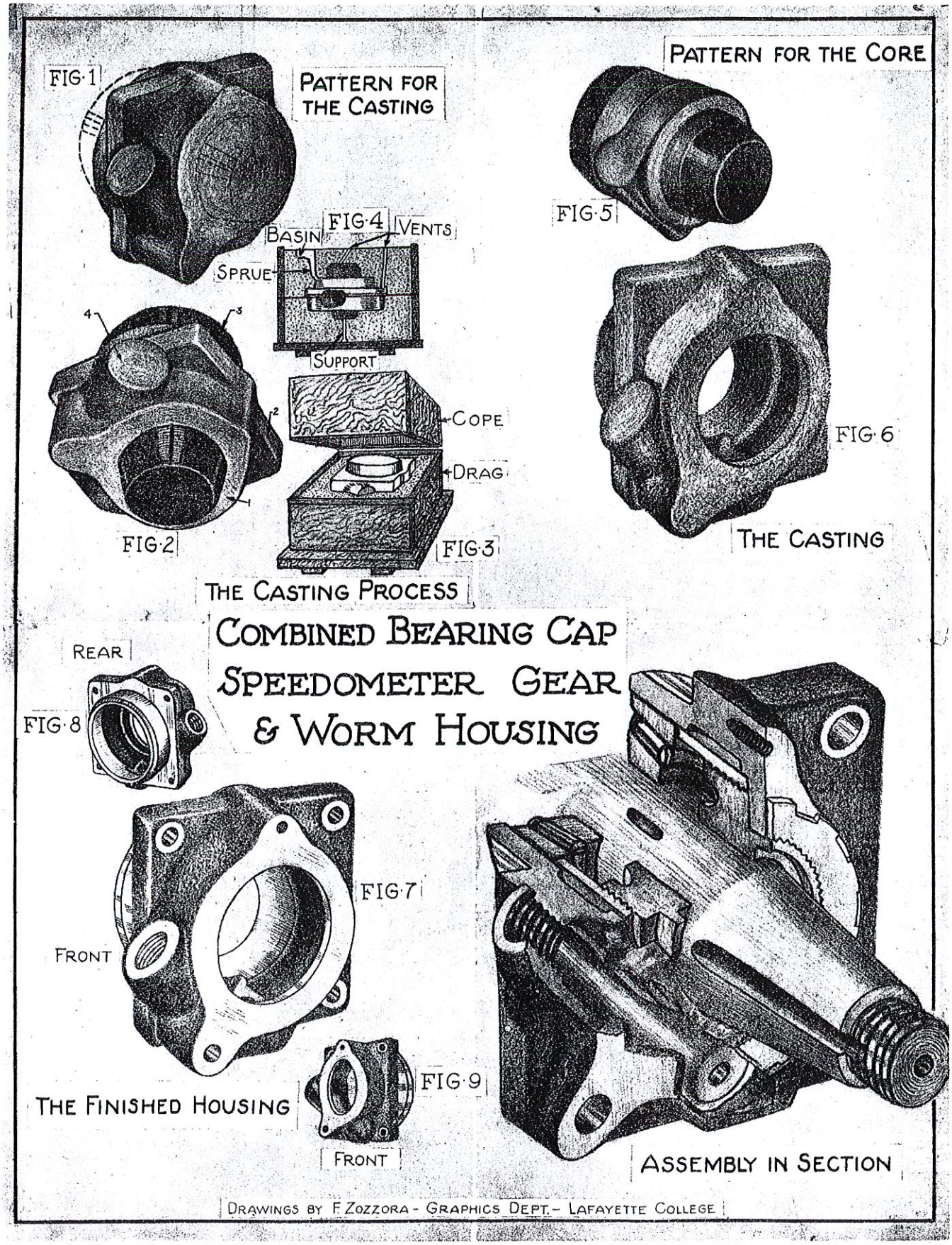
(2) A set of technical sketches:

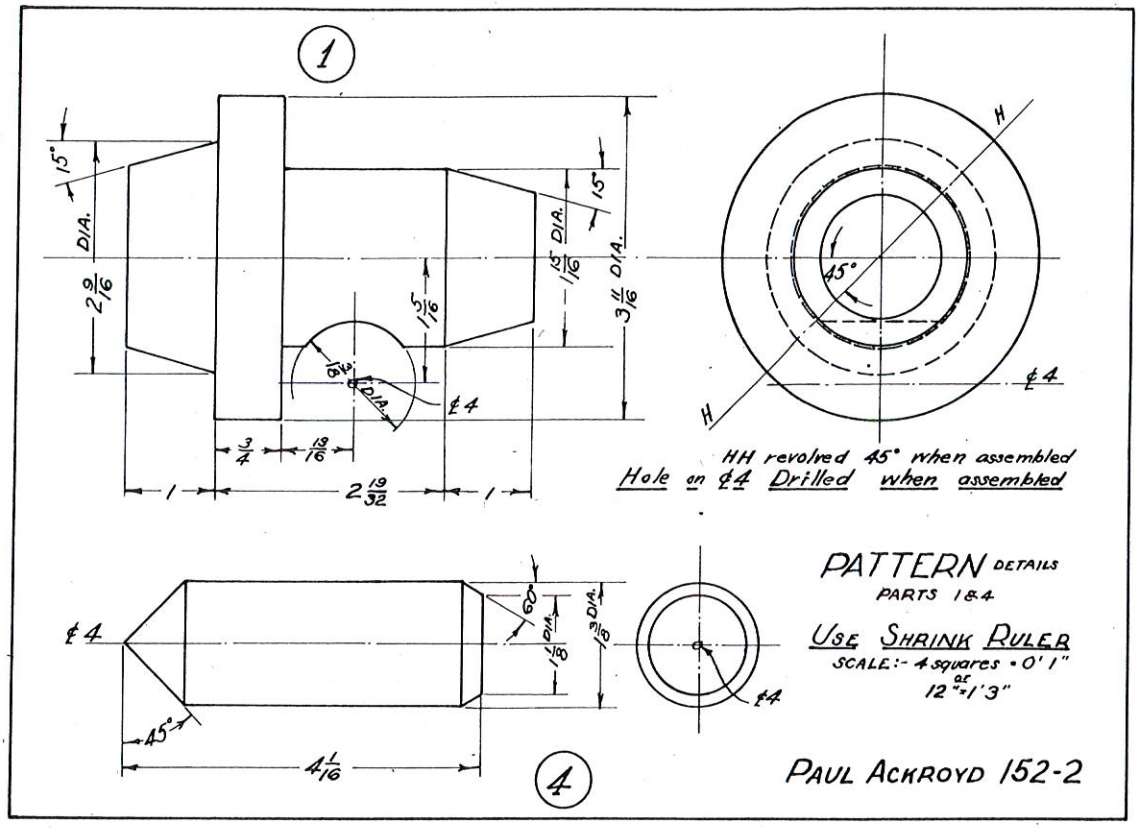
(a) A detailed drawing of each part of the pattern
(b) An assembly drawing of the pattern
(c) A drawing of the core (omitted)

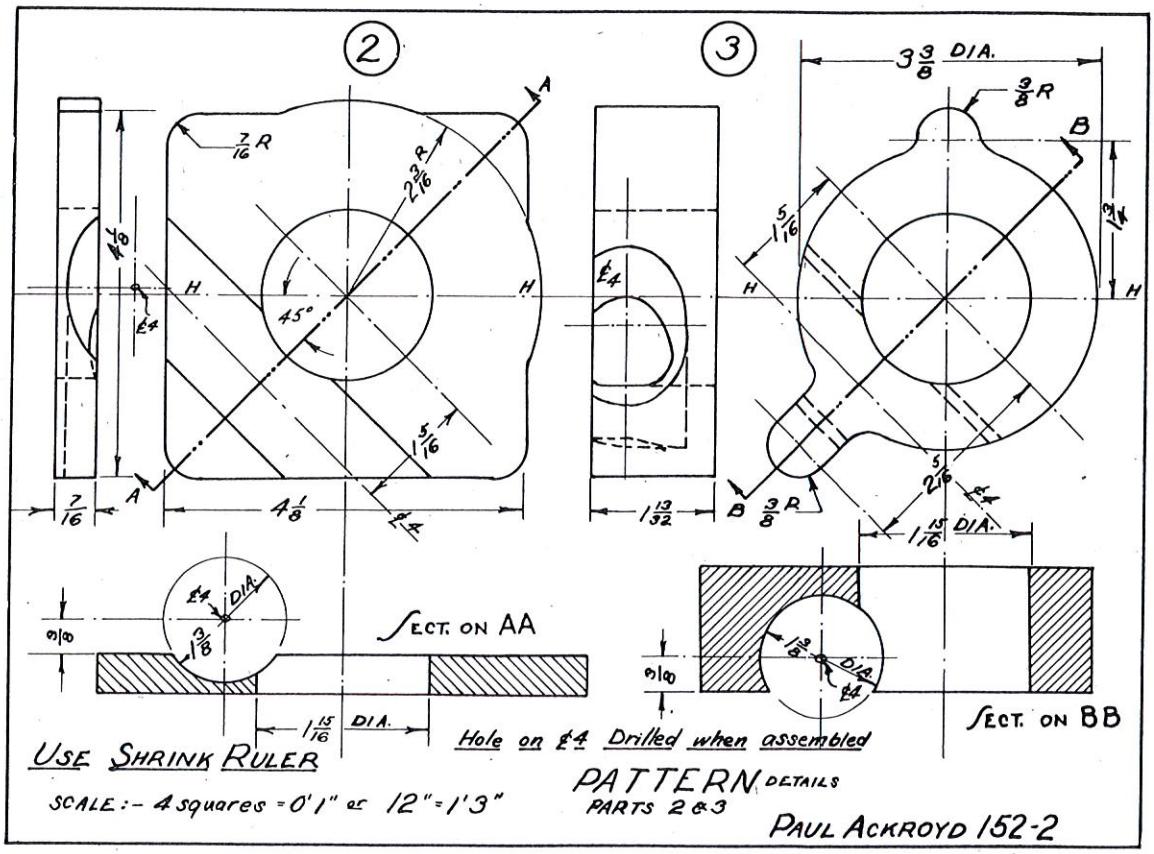
Each sketch is to be dimensioned completely according to pattern and foundry practice, accounting for shrinkage in the casting and for fillets and rounds.

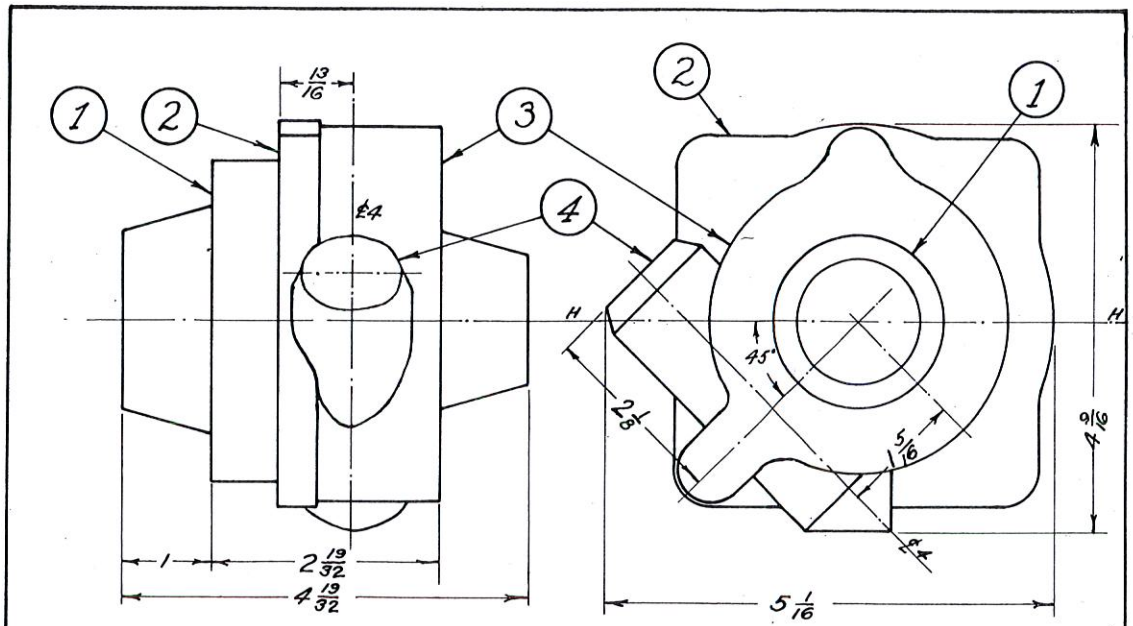
(3) A working drawing of the housing, buff paper with instruments, for the machine shop using limit dimensions and complete with all necessary views for describing the portions of the housing.

EDITOR'S NOTE: The complete information accompanying this problem has been here somewhat abbreviated, due to lack of space. The additional information given with it covers the method of casting and coring this piece, the machine operations on the casting, and certain essential dimensions necessary to draw it. The drawings following the problem, on pages 16, 17, and 18, are student drawings illustrating the solution.


FIG·1
PATTERN FOR THE CASTING
PATTERN FOR THE CORE
FIG·5
FIG·4
BASIN
VENTS
SPRUE
SUPPORT
COPE
DRAG
FIG·2
FIG·3
FIG·6
THE CASTING
THE CASTING PROCESS
COMBINED BEARING CAP
SPEEDOMETER GEAR
& WORM HOUSING
REAR
FIG·8
FIG·7
FRONT
THE FINISHED HOUSING
FIG·9
FRONT
ASSEMBLY IN SECTION
DRAWINGS BY F. ZOZZORA - GRAPHICS DEPT. - LAFAYETTE COLLEGE


1
15° DIA.
2 9/16
1 5/16
15/16 DIA.
15°
3 11/16 DIA.
3/4
19/16
2 19/32
1
1
℄
H
H
45°
℄
HH revolved 45° when assembled
Hole on ℄ Drilled when assembled
4
℄
60°
1 1/8 DIA.
3/8 DIA.
45°
4 1/16
℄
PATTERN DETAILS
PARTS 1 & 4
USE SHRINK RULER
SCALE:- 4 squares = 0'1" or 12" = 1'3"
PAUL ACKROYD 152-2

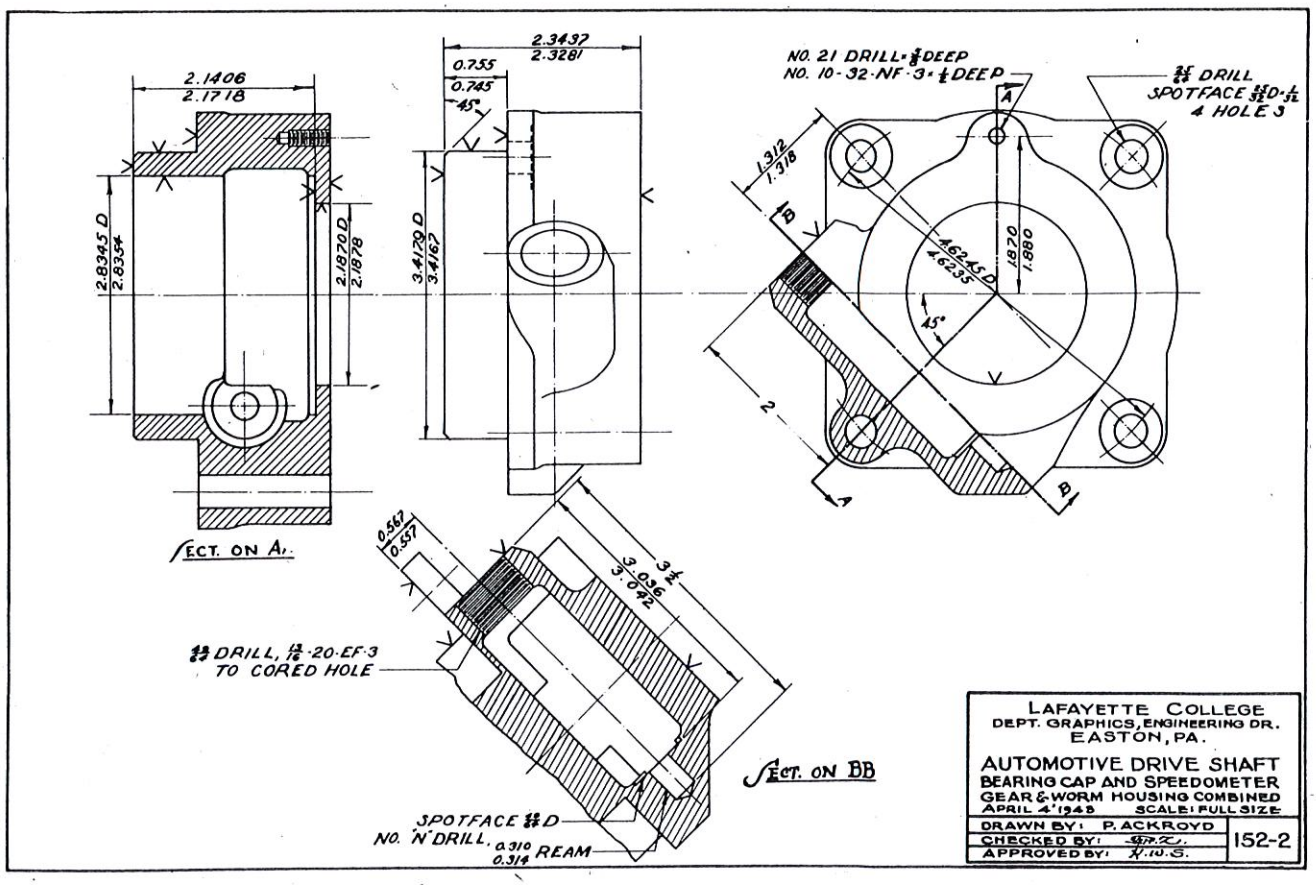

2
7/16 R
2 3/16 R
A
A
H
H
45°
℄
4 1/8
7/16
4 1/8
5/16
℄
3
3 3/8 DIA.
3/8 R
B
B
3/8 R
1 3/4
5/16
H
H
℄
1 13/32
2 5/16
℄
1 15/16 DIA.
9/16
℄
DIA.
1 3/8
1 15/16 DIA.
SECT. ON AA
9/16
1 3/8
DIA.
℄
SECT. ON BB
Hole on ℄ Drilled when assembled
USE SHRINK RULER
SCALE:- 4 squares = 0'1" or 12" = 1'3"
PATTERN DETAILS
PARTS 2 & 3
PAUL ACKROYD 152-2



Hole on ℄4 for part #4 Drilled when parts #1, 2, & 3 are assembled

USE SHRINK RULER PATTERN ASSEMBLY
SCALE:- 4 squares = 0'1" or 12"=1'3"

PAUL ACKROYD 152-2



LAFAYETTE COLLEGE
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AUTOMOTIVE DRIVE SHAFT
BEARING CAP AND SPEEDOMETER
GEAR & WORM HOUSING COMBINED
APRIL 4 1948 SCALE: FULL SIZE

DRAWN BY: P. ACKROYD	152-2
CHECKED BY: [illegible]	
APPROVED BY: [illegible]	

PRE-SERVICE TRAINING IN ENGINEERING DRAWING

(Continued from Page 13)

Group G (Four work sheets - Freehand)
Add arrow heads and dimension figures to work sheet.
Add witness and dimension lines and arrow heads to work sheet
Dimension given orthographics (2 sheets)

Group H (Ten Fig. E work sheets - Freehand)
Detail sketches of simple objects from dimensioned pictorial

Group I (Eight drawing sheets)
Detail drawings; simple objects from dimensioned pictorial

Group J (Two work sheets - Freehand)
Draw Auxiliary Views from two given views
Draw Sectional Views from two given views

Group K (Five drawing sheets - from pictorial)
(One mimeographed work sheet)
Detail drawing requiring Auxiliary View
Detail drawing requiring Sectional View
Detail drawing requiring Auxiliary View
Detail drawing requiring Sectional View (Three ribs)
Detail drawing requiring Revolved Sectional View
Add symbolic cross hatching to assembly drawing

Group L (Four work sheets - Instruments)
Add Threads - Conventional and symbolic
Add Specifications and dimensions of fasteners
Add Fasteners to assembly drawing
Use of tables

Group M (Two work sheets; Two drawing sheets)
Add cross-hatching and bill of material to assembly drawing
Add Shop Notes to given details
Make detail drawings of C-clamp
Make assembly drawing of C-clamp

Group N (Five drawing sheets)
Details machinist's clamp
Assembly drawing of machinist's clamp
Details of Drill Jig (two sheets)
Assembly of Drill Jig

Group O (One work sheet; two drawing sheets; one work sheet; eight drawing sheets)
Add limit dimensions to given views
Details with limit dimensions (two sheets)
Add dimensions to given views
Details from Assembly (four sheets)
Details from Assembly (four sheets)

"Work Sheet" as used above indicates an exercise sheet on which certain material was printed to shorten the time of completion. A "Drawing Sheet" contained only the border lines and title block and the student made the entire drawing. "Drawing Sheets" were executed with instruments; some of the "Work Sheets" were made with instruments, others were made freehand. "Work Sheets" were mimeographed on 20# Mimeobond (Hammermill) and surprisingly good results were obtained by using 16# mimeobond instead of tracing bond for the "Drawing Sheets". All "Work Sheets" and "Drawing Sheets" were $8\frac{1}{2}$" x 11".

The number of jobs in each group was estimated from previous experience in preparing course outlines for freshmen engineers. A summary of detailed reports for 172 students shows the following results:

Group	A	B	C	D	E	F	G	H	I
Jobs assigned	6	5	2	9	5	4	4	10	8
Average No. Jobs completed	4.6	4.6	1.7	5.9	2.7	2.5	3.2	5.3	5.1

Group	J	K	L	M	N	O	Total
Jobs assigned	2	6	4	4	4	5	77
Average No. Jobs completed	1.6	3.5	3	2.9	2.2	2.1	51
						%	66

Deducting the time required for lettering, lectures, motion pictures and examinations reduces the equivalent time of the course from 30 periods to about 22 periods and results in an average performance of about 2-1/3 group work sheets per 3-hour period. Two of the instructors who taught two classes each and who are now members of the Purdue Engineering Drawing Staff, state that the beginning of the course was very satisfactory but that the latter part was too easy and that more difficult problems had to be substituted in order to maintain the tempo established by the first part. On the basis of the results obtained, in training high school students for industry, the methods and materials employed ought to be worth a trial in Engineering Drawing Courses.

(Continued from Page 21)

curricula, staff members leaving on short notice to join the Colors, or to take up their work in new and unfamiliar surroundings - have resulted in our present mailing list becoming all but obsolete. We must have new subscribers, both to take up the slack of those who are lost for one war reason or another, and to continue a small but steady increase which is the mark of any healthy magazine. And we must have lists of interested persons from which to solicit them.

We therefore ask that you of the larger institutions send us lists of your present staff members, so that we may circularize them. We further ask that if any of our present subscribers have knowledge of persons or groups of persons interested in the teaching of engineering drawing (and there must be many such new groups) that they inform us of their location and names, if possible.

This is the one way to keep our circulation up without the expenditure of a considerable amount of money which we do not have. With a magazine conducted as this one is, having a comparatively small and highly selective circulation, operated on a non-profit basis, and a very limited budget, the matter of securing subscribers is vital. We feel that since this magazine is a co-operative enterprise conducted for the benefit of the teaching profession, we may ask the cooperation of you who are our subscribers to assist us in securing these up-to-date lists. Such lists and names should be sent to Prof. F. A. Smutz, Circulation Manager, Kansas State College, Manhattan, Kansas.

CONCEPTS OF TEACHER TRAINING AND TEACHING METHODS

by
ALBERT THOMAS
Professor of Machine Design and Drawing - Alabama Polytechnic Institute

Teachers of engineering subjects are greatly indebted to the Journal of Engineering Drawing for many excellent discussions of methods of teaching, of "checking" and grading student work, and some discussion of desirable objectives and teaching procedure. At this time of our change over to the QUARTER PLAN it seems that a re-statement of objectives and basic principles may be desirable, and perhaps timely for serious consideration.

Effective teaching requires a definite planning of class-room procedure and a continuing effort (follow-up and checking) to make the PLAN work, in order that desirable learnings may be thoroughly mastered by the student. In my study of the psychology of method, the basic outline of good teaching procedure was set forth as EXPLANATION, DEMONSTRATION, IMITATION, INSPECTION, REPETITION. The author implied that this routine procedure was paramount in any and all teaching procedure. In my thirty-six years experience I have found this routine procedure very effective, and too, I have found many instructors who had never heard of such procedure and were inclined to scoff at the mention of psychology. Perhaps that is one of the reasons why so many teachers are not as effective and successful as they might be, and so many students are thereby not sufficiently interested, and withal, great numbers of them fail in many courses.

How many students do you find who deliberately expect (at the beginning) to fail the course? I am one of those who think that perhaps the teacher is at fault when so many students "fail" a course, and the Department is more or less lax in the matter of METHOD, which should be explained, adopted, and used by the Staff. We have adopted the policy of asking every member of our staff to outline his method of instruction and basis of grading and to bring the procedure into an open discussion of merit, and clear out possible confusion and ineffective methods.

Since the primary function of teaching is to EFFECT learning, we should be most careful to set up the most effective method outstanding as of TO-DAY!

"If the learner has not learned,
The teacher has not taught;
The student has not studied, and
The worker has not wrought!"

The grading chart should be GRADED and reasonably "scaled" according to previous training (high school, if any) and present student ability. The early requirements should be normal for the beginner, then gradually stepped up in number and degree of neatness, accuracy, etc. according to instruction and well-explained principles, with continuous emphasis on encouragement of the student and due recognition of his progress.

A careful analysis of teacher roll-books and student reactions will reveal some surprising inaccuracy and real lack of social and professional justice. Some inequalities are natural and normal mistakes; some low marks are the direct results of ineffective teaching, and a few are plainly "rank" injustice. A fair appraisal of all contributing factors should be maintained at all times. Every conscientious teacher feels the need of a standard rating scale and an adopted basic procedure.

We find amongst our instructors (from time to time) those who have had no training in methods, and no clear conception of effective teaching procedure. Then we see the urgent need of clearing away the confusion and the adoption of a more direct, explicit method as a basic training for those who would become instructors. Most assuredly we see as a prerequisite, fundamental course treatment of subjects which they may expect (or be allowed) to teach. Reading between the lines, I fear that there are many instances of instructors attempting to teach subjects which they themselves have never mastered; they only casually review textbooks before attempting to teach them. The splendid teacher is thoroughly grounded in subject matter and method, and will develop a charm of personality and an ever pleasant manner of approach which engages and holds the interest of students. Yet even he must use the outline of method over and over continually, to put over the subject and get satisfactory learning.

It is a joy to find a young teacher who can interest the students in a manner which makes them sit up and pay attention; he gets the work done. Every teacher worthy of his calling should re-examine his own class-room procedure and make continual checks on methods of instruction and results accomplished, so that he may compare the effects and eventually develop a challenging manner of presentation and most effective procedure. Invaribly I find that lack of understanding and misconceptions come from pressure and short-cuts - inadequacy of method and insufficient practice. I immediately require practice sheets, make corrections, repeat the assignment, and then I get the satisfactory results. Unfortunately we never find the time to develop the principles of all subjects as thoroughly as we would like.

Teaching distinctly requires a perception of relations. This implies due consideration

THE ARMY, THE NAVY, THE MARINES, AND THE COAST GUARD, ACCORDING TO THE 1943 VISUAL REVIEW (SVE) USE MOTION PICTURES TO IMPROVE AND ACCELERATE THEIR TRAINING PROGRAMS. ESMWT ALSO USES FILMS EXTENSIVELY IN CIVILIAN CLASSES TO STEP UP TRAINING FOR ESSENTIAL INDUSTRY.

PROFESSOR JUSTUS RISING HAS PIONEERED IN THE DEVELOPMENT OF THE FOLLOWING FILMS AS A MEANS OF MORE EFFECTIVE INSTRUCTION IN ENGINEERING DRAWING. THE PURDUE RESEARCH FOUNDATION HAS MADE POSSIBLE THE REPRODUCTION OF THESE AND OTHER ORIGINAL TEACHING AIDS SO THAT THEIR WORTH MAY BE DEMONSTRATED BY OTHERS.

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FILMS SLIDES AND WORK SHEETS MAY BE BOOKED FROM L.D.MILLER, ENGINEERING EXTENSION SERVICES, OR PURCHASED FROM JUSTUS RISING, DEPARTMENT OF GENERAL ENGINEERING, PURDUE UNIVERSITY. LAFAYETTE, INDIANA.

THE FILMS AND THEIR USES ARE DESCRIBED IN EDUCATIONAL SCREEN DECEMBER 1940 VISUAL REVIEW 1942 AND FUNDAMENTALS OF ENGINEERING DRAWING BY LUZADDER 1943.

of subject matter, of student aptitude and time for preparation, of method of presentation and class-room procedure, and the bringing of all factors into orderly relation. The good teacher has a "yard-stick" of reasonable assignment. Many teachers are too theoretical, especially as to student reaction; subject matter is "rolled out" like a high-speed movie film, and no time is allowed for questions or discussion. There is no "bringing out" nor clearing of principles, in fact, NO MEETING OF MINDS, no exchange or paralleling of experiences, and no repetition nor review to "fix" the desirable learnings.

The great number of failing grades in every institution (in "mine and yours") should be proof positive that we, a so-called "practical people" are doing a most unfair and foolish thing to expect human efficiency without providing the right incentive and fulfilling the essential conditions of method.

The following article appeared in our Auburn News, and was reprinted locally:

"Dr. Walter Dill Scott, President of Northwestern University, declares that the stern professor who ruthlessly flunks a large portion of his class and who is loath to give an "A" is not a very good teacher. After thorough investigation, he grouped the instructors into two major divisions, rating as best those who put over their subjects to a majority of students in their classes. These were recommended to department heads for salary increases. The poorest instructors gave seven times as many low grades as the 'best' group, and they were not recommended for reappointment." Dr. Scott further declared that "The function of a professor is to develop intellectual interests rather than to provide difficult hurdles."

How many of us are sincerely and deeply interested in doing our best to inspire the student, to help him find that undeveloped talent, to nurture and encourage the student's feeble effort, to guide to fulfillment of skill, precision, and high accomplishment as it is possible for each human being to attain.

Many institutions are examining into the records of teachers as a result of their announced requirement of new efficiency and a continuing improvement in the quality of teachers and teaching. Some have employed a Dean of Production to direct the new effort to clear out the indecision and confusion, and to promote study and wider reading amongst all teachers to the end that they shall improve teaching technique. There can be no argument that a teacher should KNOW his subject, and should keep up-to-date on latest developments and be able to give the student the modern interpretation.

There is also a definite trend to provide for adequate free-time and require "open-office" hours at times when students may come for consultation and guidance. The next and more important step (in our humble opinion) is to provide a central study hall in each division of the University, with a staff director and secretary on duty all day, and good teachers of various subjects reporting for student aid at scheduled hours, so that the timid student will have an opportunity to get his unfinished problems explained, and some help in learning how to study and how to arrange required work in neat, acceptable form.

Finally, - we must select our textbooks with more care and consideration of the effective method of appeal to the student. A textbook that does not provide for the FIVE STEPS OF METHOD should not be called a textbook. The content and course treatment should conform to normal specific principles which can be developed and "put over" to a majority of the students in the time alloted for the course. Why make a student buy an "encyclopedia" for each and every course? The trend is definitely away from the 500 page book to the more usable 100 page loose-leaf type with provision for notes.

WATCHMAN; What of the night? FOR FREEDOM, how goes the fight? Are you making PLANS for the after-the-war situation? The thoughtful teacher must realize that things may change suddenly, and that a PLAN must be made ready for any and every eventuality, for immediate expansion to meet the situation. Teachers and members of every institution must keep informed, must analyze the facts and circumstances which will coagulate to give shape and form to the next era of civilization. Teachers must learn to read the blueprints and be ready to give impetus to the new and most challenging regime of directive principles in order that we may achieve the PLAN.

(Continued from Page 9)

hand. This combination is almost impossible to find at the present time but in the future we may find it advisable to include a certain amount of training in this field in our engineering curriculum.

The purpose of this course is to train men or women to make pictorial drawings both mechanical and freehand and shade them if desired, so that they can interpret drawings to others or illustrate methods of production for any of the purposes outlined in this paper.

Men who are training in this work should be impressed with the fact that speed is usually very important particularly in the freehand work. Any tricks of drawing or standardizations of method, form or arrangement that can be devised are of great value in producing results. Certain variations from theory may be acceptable if they speed up the work without impairing its clearness. The important thing is that these drawings must not show anything incorrectly and that the engineering must be accurate.

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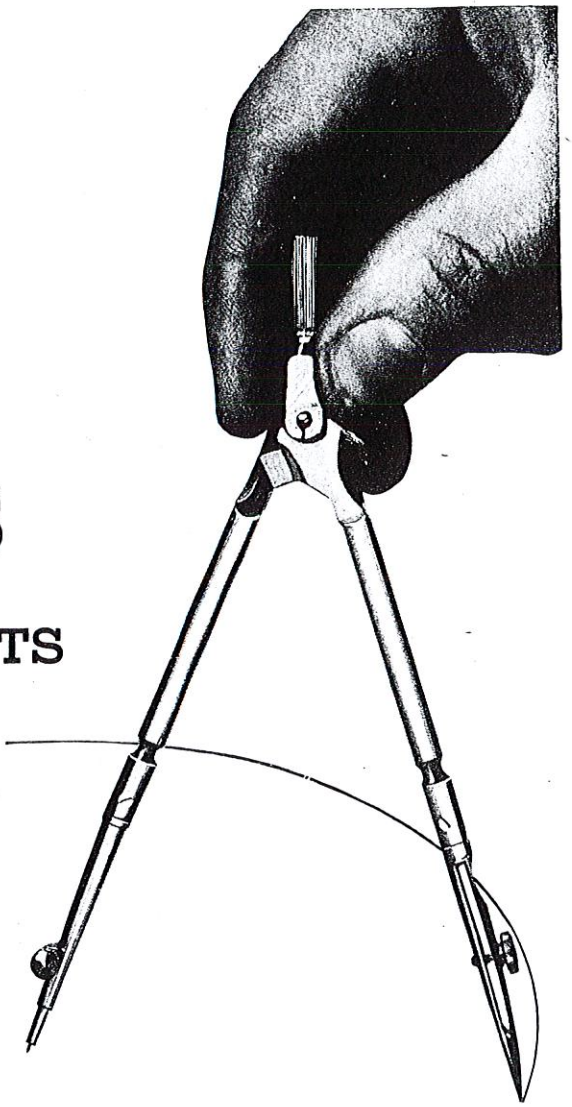

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The business meeting and conference of the Division of Drawing was held at the Annual Convention of the S.P.E.E. in Chicago, June 19, 1943, with a registered attendance of 46. Officers elected for the coming year were:

W. E. Farnham, Chairman, Tufts College
E. F. Tozer, Secretary, Northeastern University

Executive Committee
R. W. French, 1 year, University of Minnesota
F. A. Heacock, 2 years, Princeton University
R. P. Hoelscher, 1 year, University of Illinois
G. M. Phelps, 3 years, Renssalaer Polytechnic Institute
F. M. Porter, 5 years, University of Illinois
N. D. Thomas, 1 year, Ohio University
E. C. Willey, 4 years, Oregon State College

Editor T-Square Page
W. E. Street, A. and M. College of Texas

Journal of Engineering Drawing
R. R. Worsencroft, Editor, University of Wisconsin
J. N. Arnold, Advertising, Purdue University
F. A. Smutz, Circulation, Kansas State College

It was voted at this meeting that the Engineering Library of the University of Illinois be designated as the depository of the books belonging to the Division. In connection with this designation, Prof. T. E. French was appointed to arrange, in conjunction with the JOURNAL, for a competition to secure a suitable book-plate to be placed in these volumes. Details concerning this competition will appear in the February issue of the JOURNAL.

Dr. Claire V. Mann presented the Division with a copy of the book entitled "A History of the Missouri School of Mines", which he has just recently completed.

Reports were received from several committees, including the Publications Committee for the JOURNAL, the standing committee on Drawing Instruments and Supplies by Prof. H. H. McCully, and the committee on Graphic Talents by Dr. C. V. Mann.

It was voted that a committee consisting of Dean H. H. Jordan, W. E. Farnham, and E. F. Tozer should assemble from the books and records of the Division, the constitution, by-laws, and supplementary resolutions governing the work of the Division.

The business portion of the meeting being concluded, two technical papers were presented: "Teaching Production Illustration" by Prof. C. H. Springer, which appears in this issue of the JOURNAL, and "A New Exact Method of Axonometric Projection", by Prof. R. P. Hoelscher of Illinois, which will appear in a later issue.

* * * * * * * * * * * * * * *

Concerning the status of the proposed revision of the A.S.A. Z 14.1 standard entitled "American Standard Drawing and Drafting Room Practice", Prof. F. G. Higbee, Chairman of the Committee on Revision informs the JOURNAL that the revision is nearly complete, and will be published for final submission and approval in the near future.

As the JOURNAL is about to go to press, there comes to it the information of the appointment of a committee on Formulation of National Tests in Engineering Drawing. The objectives of the Committee under this set-up, as stated by its Chairman, Dr. C. V. Mann are (1) the construction and adoption of such an examination as will effectively determine whether or not the examinee possesses and can use sufficient knowledge, skill and technique to entitle him to full credit in the courses in Engineering Drawing currently offered in those engineering colleges whose curricula have been officially approved by the E.C.P.D., and (2) to produce a series of intensive objective tests which cover the several individual fields of knowledge and drawing technique into which the subject as a whole may be broken down.

Further consideration of the work of this committee, and its objectives will be covered in the next issue of the JOURNAL, when, we trust, time and space will be more plentiful.

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As this issue goes to press, preparations are already afoot for the annual solicitation of subscriptions. The Publication Committee trusts that the JOURNAL has been satisfactory enough to merit renewal of your subscription, and that you will renew promptly upon receipt of bill.

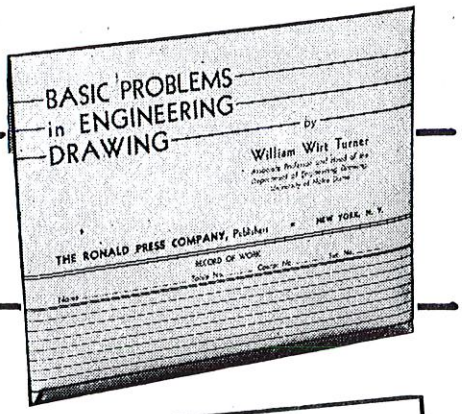
However, that is not the matter with which we are most concerned here. The dislocations of the war - the dispersion of military and naval programs among many colleges that have never included drawing in their

(Continued on Page 18)

BASIC PROBLEMS in Engineering Drawing

By William Wirt Turner

Head of Department of Engineering Drawing, University of Notre Dame



HERE is a series of work sheets of drawing problems expressly designed to meet today's requirements. It provides a systematic course of instruction planned to accomplish definite objectives which combine a real grasp of essential fundamentals, maximum benefits to the student in the available time, and close relationship to drafting room practice. It may be used with any standard textbook on Engineering Drawing.

The problems cover in logical progression, both as to subject matter and degree of difficulty, those basic phases of engineering drawing which are commonly given in the beginning course. When supplemented by the customary lectures and tests the sheets should be adequate without the assignment of additional class problems. In their preparation great care has been taken to have them conform to the recommendations of the American Standards Association.

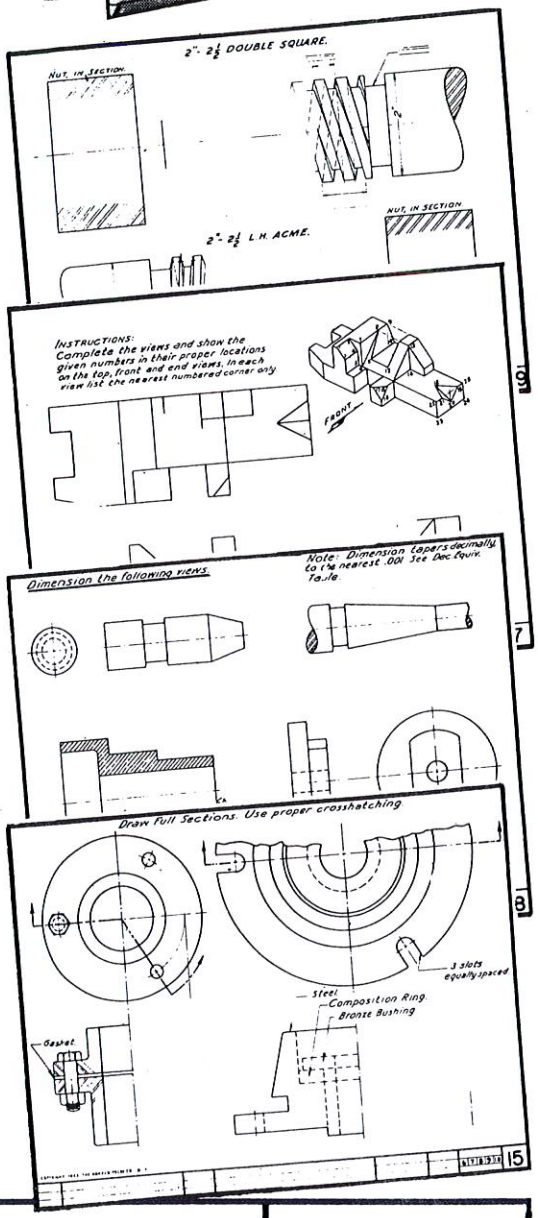
Includes Problems on:

Lettering Exercises, Inclined and Vertical; Convential Lines; Scale Reading; Completion Problems in Projection; Auxiliary Projections; Revolutions and Auxiliaries.

Double Auxiliaries; Sections; Conventions; Dimensioning; Pictorial Drawing; Screw Threads; Intersections; Developments.

IN formulating the series the aim has been to give the student the maximum of basic work in a minimum of time and an economy of materials consistent with adequate practice on the essential problems. This streamlining has been made possible by strict adherence to fundamentals, and by avoiding the inclusion of material not usable in the first course. Especially has there been careful design and refinement of each problem and of the series to eliminate that type of practice work that consumes time but is really little more than mechanical repetition. Thus, the problems lend themselves to quick solution; the student thereby does not become weary, for he senses progress and this increases his interest in the work.

THE physical form and arrangement has other features of great importance in practical teaching. It aims to reduce the heavy burden of administrative work on the instructor by the completeness of the drawings, clarity of directions of just what is to be done, and other expediting features. Nothing in the course is 'experimental. It has been tested thoroughly in practical use with regular students, Navy groups and Engineering, Science, and Management War Training classes. (*Solutions available for instructors' use.*)



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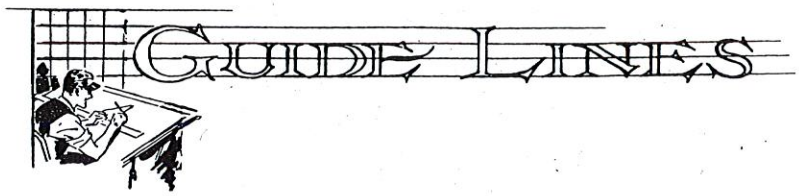

Since the Editor's Page in this issue has been used for another purpose the editor is taking advantage of this column to make the few editorial comments that are necessary, and to give you some slight information of what may be expected in future issues.

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We commend to your particular attention the drawing problem contributed by Professors Savage and Zozzora in this issue. While at first glance it may seem to be rather simple to be called an advanced problem, a further study will reveal many interesting possibilities, as well as sound pedagogical values. As one valuable feature, it presents to the student the fundamentals of the pattern-molding-casting process in a simple and understandable way, and from the viewpoint of the draftsman. This in itself, is an invaluable asset in these days of curtailment of shop courses. At the same time, it requires work in technical sketching and working drawings, which is an essential of all drawing problems. And most important of all, it permits the student to do a little thinking on his own account; note how the pattern drawings of the student differ in their selection of pattern details from those suggested in the problem itself. We could wish for more problems of this kind for the JOURNAL.

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The article by Professors Rising and Graney is the record of a carefully planned and well executed program in engineering drawing adapted for the ESMWT program. While extensive need for these courses has declined, this article is printed as a very interesting record of how such courses were handled, as well as an illustration of how our drawing departments can rise to an emergency when it confronts them. Then too, perhaps some lessons can be learned from it to apply to our regular drawing courses.

* * * * * * * * * * * * * *

Professor Albert Thomas presents in a brief article, some essentials of teacher training which may well be applied to beginners in the teaching of engineering drawing. We believe it to be quite timely, coming as it does, shortly after the Hoelscher report which included some comment on a similar report. We regret that lack of space has made it necessary for us to edit the article somewhat.

* * * * * * * * * * * * * *

With Professor Springer's article, "Methods and Uses of Production Illustration", as an introduction, we are inaugurating a series of articles in this and future issues covering the field of pictorial representation. This first article covers admirably the field of its usefulness and importance, and goes on to enumerate the various methods by which such drawings may be made. Future articles will cover in more detail the latest construction methods for such drawings. As now planned, axonometric projections will be taken up in the February issue, and perspective in the May issue.

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The editor has at last succeeded in collecting one complete set of JOURNAL issues, from its inception in 1936 to the present. These have now been bound in two volumes - 1936-39 in one, 1940-42 inclusive in the second. Other issues will be bound as soon as they reach the proportions of a volume. It has been the editor's idea to retain this set of bound issues for the use of succeeding editors, so that they may become familiar with the general make-up and text content of past issues, in planning the content of future issues. However, we believe that a second set should be bound and filed along with other of the Division's books at the Engineering Library of the University of Illinois.

To make up this set, the following issues are needed. If you have extra copies of these, or are willing to contribute your personal copy, please send them on to the editor.

Vol. 1. No. 1. December, 1936.
Vol. 1. No. 3. October, 1937.

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REPORT OF THE BIBLIOGRAPHY COMMITTEE

Prof. H. H. Fenwick, Chairman
(for the period to October 1, 1943)

New Books and New Editions

Author	Title	Edition	Publisher	Year	Pages	Price
Babbitt, A.B. & Swartz, D.S.	Mechanical Drawing, including Blueprint Reading		Henry Holt & Co.	1942	217p.	$1.20
Bush, G.F.	Reading Engineering Drawings		John Wiley & Sons	1942	60p.	$2.00

REPORT OF THE BIBLIOGRAPHY COMMITTEE

New Books and New Editions

Author	Title	Edition	Publisher	Year	Pages	Price
Carter & Thompson	Engineering Drawing (and) (Single Volume of Problems)	2d. ed.	International Textbook			$2.25
DeVette, W.A. & Kellog, D.E.	Blueprint Reading for the Metal Trades		Bruce Pub. Co.	1942	132p.	$2.50
Dwight, Carleton	Reading Blueprints in the Machine Industries		McGraw-Hill	1943	143p.	$1.75
Eardley, A.J.	Aerial Photographs; Their Uses and Interpretation		Harper & Bros.	1942	203p.	$2.75
Field, W.B.	Introduction to Architectural Drawing	2d. ed.	McGraw-Hill	1943	241p.	$3.00
Goff, F.L. & Novak, L.R.	Reading Aircraft Blueprints		McKnight & McKnight, Bloomington, Ill.	1942		$2.00
Heed, H.L.	Ship Structures & Blueprint Reading		Cornell Maritime Press	1942	258p.	
Hesse, H.C.	A Manual in Engineering Drawing		Macmillan	1942	118p.	$1.50
Hobart, D.E.	Blueprint Reading.	Rev. ed.	Harper & Bros.		58p.	$1.00
Hoelscher, R.P. & others	Industrial Production Illustration		McGraw-Hill	1943	172p.	$3.50
Jordanoff, Assen.	Jordanoff's Illustrated Aviation Dictionary		Harper & Bros.	1942	415p.	$3.50
Lawson, P.J.	Practical Perspective Drawing		McGraw-Hill	1943	218p.	$2.75
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Putman, W.C.	Map Interpretation with Military Applications		McGraw-Hill	1943	67p.	$1.25
Rowe	Engineering Descriptive Geometry		Van Nostrand		299p.	
Russ, J.M.	Quiz Questions to Accompany French's Engineering Drawing		McGraw-Hill	1943	42p.	$0.25
Sahag, L.M.	Engineering Drawing		Ronald Press	1942	394p.	$2.75
Smutz & Gingrich	Descriptive Geometry	2d. ed.	Van Nostrand		237p.	$2.50
Svensen, C.L.	Essentials of Drafting	3d. ed.	Van Nostrand	1943	295p.	$2.35
Tharratt, George	A Manual of Aircraft Production Illustration		McGraw-Hill	1943		
Thayer, H.R.	Industrial Drawing		McGraw-Hill	1942	195p.	$1.75
Turner, W.W.	Basic Problems in Engineering Drawing		Ronald Press	1943		$1.25

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*HARRY C. BRADLEY, *Late Professor of Drawing and Descriptive Geometry, Massachusetts Institute of Technology.*

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