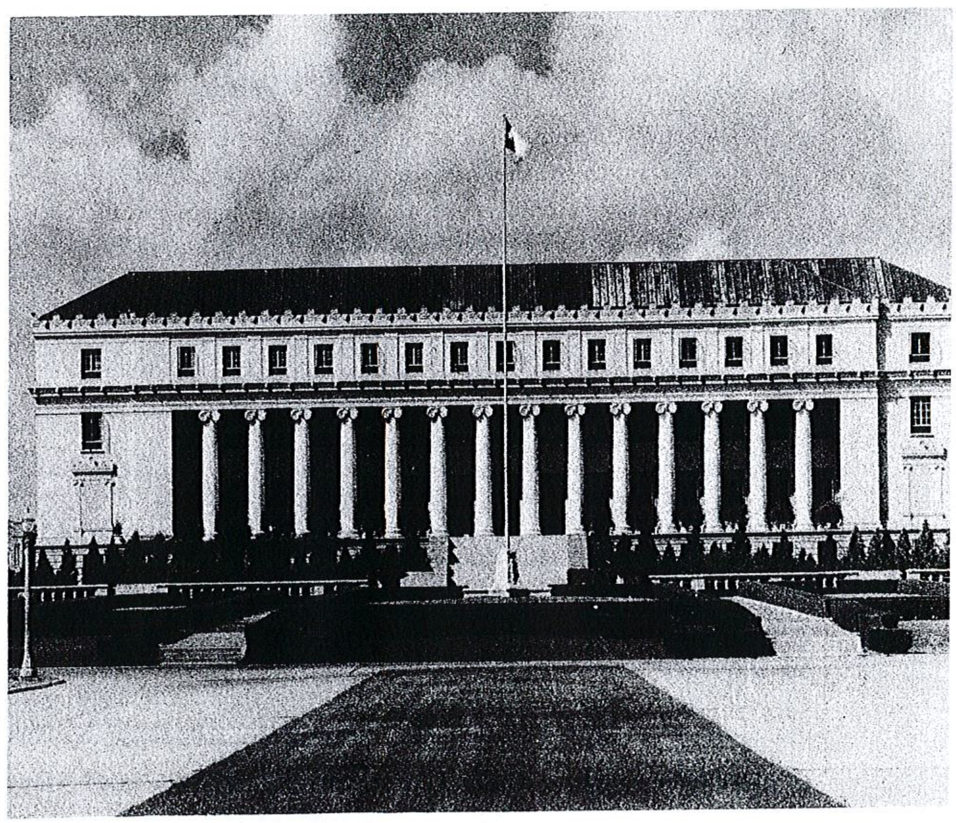
JOURNAL OF ENGINEERING DRAWING

VOL. 10, NO. 1 FEBRUARY, 1946 SERIES NO. 28



Administration Building
Agricultural and Mechanical College of Texas

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

JOURNAL OF ENGINEERING DRAWING

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

VOL. 10, NO. 1 — FEBRUARY, 1946 — SERIES NO. 28

CONTENTS

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Fourscore and seven years ago our fathers brought forth upon this continent a new nation, conceived in liberty and dedicated to the proposition that all men are createded equal. Now we are engaged in a great civil war, testing whether that nation, or any nation so conceived and so dedicated, can long endure. We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting-place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this. But in a larger sense we cannot dedicate, we cannot concecrate, we cannot hallow this ground. The brave men, living and dead, who struggled here, have consecrated it far above our poor power to add or detract. They will little note, nor long remember, what we say here, but it can never forget what they did here. It is for us, the living, rather to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us, that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion, that we here highly resolve that these dead shall not have died in vain; that this nation under God, shall have a new birth of freedom, and that the government of the people, by the people, and for the people, shall not perish from the earth.

ABRAHAM
LINCOLN
1809 – 1865

The Editor's Page

FRONT COVER OF JOURNAL

No doubt, you have observed the change in the design of the front cover of this issue of the Journal of Engineering Drawing. The late Professor Thomas E. French designed the lettering for the front cover which has been rearranged permitting the use of pictures in the hope that more interest will accrue from the first glimpse of each issue of the Journal. This is in line with practice of all leading magazines of today. We are indebted to Dr. Carl L. Svensen for rearranging the front cover material and the present layout. Professor C. H. Ransdell made the picture.

* * * * *

SEND YOUR PHOTOGRAPHS TO THE EDITOR

Please send a photograph or glossy print of your most attractive building or Drafting room to the editor of the Journal as we would like to run a picture from a different institution on the front cover of each issue of the magazine.

* * * * *

In memory of that great statesman, the spirit of Lincoln's Gettysburg address illustrated by Professor Carter is very appropriately presented at this time, when our great country is again going through a crucial stage.

* * * * *

Professor Cobaugh's discussion of the Place of Blueprint Reading in the Technical High School is interesting and reveals that he has given much thought to this vehicle of teaching the drawing language.

High School and Junior High School teachers please send your articles to the editor.

* * * * *

In planning your program and resolutions for 1946, be sure and include attendance at the Engineering Drawing Summer School in St. Louis, Missouri, June 18 to 28, 1946.

Professor Bragg is another Drawing teacher that has kept up with his Mathematics as evidenced by the tables for dimetric and isometric he has supplied with his paper on axonometric scales.

* * * * *

Professor Daniel Green has presented the graphic language in a very realistic way in his article "Drawing for Life and Industry". The enriching of Drawing courses with practical applications creates a desire to learn more about the art.

* * * * *

An application of Descriptive Geometry in the solution of a "Structural Geology Problem" by Professor Appleby is convincing evidence of the need for drawing teachers to work in industry to secure industrial experience to assist them in making their courses more interesting and useful for technical needs.

THE PLACE OF BLUEPRINT READING IN THE TECHNICAL HIGH SCHOOL

by

H. B. ÇOBAUGH
Professor of Drafting
John Harris High School, Harrisburg, Pa.

A few years ago it was indeed a rare thing to find a course in blueprint reading in any school curriculum, the trade school being no exception. The ability to read a blueprint, although always considered to be a desirable objective, was thought to be obtainable only as a residue from a course in formal mechanical drawing. Consequently, such courses were required in trade schools and were elected or required in other school situations. The picture is rapidly changing, however, as can be noted from the great increase in the publication of texts on blueprint reading. This fact alone indicates a new interest in the subject. Formal courses in instrumental mechanical drawing have their place, however, but do not meet the needs of all individuals. Even the career drafting student can benefit greatly from a course in blueprint reading with its wider coverage of subject matter.

The war and war training programs gave some of us an opportunity to try out some ideas which up to a few years ago would have been considered quite unorthodox. One recent text on blueprint reading says in its preface that the skills, knowledge, and techniques needed in making an architectural drawing are not needed in order that it may be read or interpreted. Such a statement may still shock a few in our ranks but not as many as would have been the case a few years ago. It has been demonstrated conclusively that this statement is true and that the time in which one can learn to read a blueprint can be shortened considerably over what was believed possible only a short time ago. This time saving has been attained largely by eliminating formal instrumental drawing and substituting free-hand sketching in its stead. This, however, is not the only difference between a course in mechanical drawing and one in blueprint reading. This time saving is expressed in a wider coverage of subject matter with a consequent overall gain by the student in his understanding of the elements of graphic representation. The variations, differentiations and peculiarities of representation in the various fields of engineering and industry can be penetrated more deeply.

As previously implied these courses in blueprint reading give no thought to the development of the hand skills needed in executing a drawing. In the technical high school the course in blueprint reading should not displace instrumental drawing but supplement it. In the trade school they may well displace existing courses in instrumental drawing with the exception of courses for career draftsmen. Certainly this should be done in the more advanced classes.

The question of "What is the objective?" must first be clearly understood in a given school situation before instituting any changes. Is the objective to develop hand-skill in representing objects in the industrial language? Is it ability to read blueprints? Is it a combination of both? The answer to these questions is usually not so difficult in a specific situation. In the technical high school the answer would seem to be that the student needs both training in hand skill and ability to interpret the language of industry. Hence, a course in blueprint reading should be a supplementary part of his instrumental drawing. Take another situation: in a trade school course for machinists some instrumental drawing might have virtue in teaching the laying out of work, but the ability to read blueprints is far more important. The fact is that no machinist can do his own lay-out work if he cannot read blueprints. So the question should be answered in terms of the relative importance of the objective or in terms of first things first.

The change in curricular framework in the technical high school need not be as radical as that in the trade school. In this last situation I am suggesting the actual elimination of formal instruction in instrumental drawing, at least for advanced classes, and substituting in its stead a course in blueprint reading as such. In the technical high school modification of the course of study in mechanical drawing rather than changed in curriculum would seem to be the better plan. Modify the course of study to include a specific program of blueprint reading instruction to run concurrently with instrumental drawing. This concurrent instruction can be a continuation or expansion of what the instructor has to do anyway. He has to teach the fundamental principles of orthographic representation by illustration, demonstration, discussion and such. Much of this instruction is independent of actual work with instruments. Why not continue such a period and definitely set aside time for related instruction and then bring more blueprint interpretation into the picture.

A syncopated outline for supplementing a course in mechanical drawing follows:

I. <u>Shape Description</u> (How the shape of a thing is represented on a blueprint)

   1. The idea of views with visualization practice.

(Continued on page 7)

(Continued from page 5)

2. Relation of views
   Projection
   Combining visualization and projection
3. Invisible edges in objects.
4. Cylindrical objects.
5. Auxiliary views.
6. Sectional views.

II. Size Description
1. Dimensions and notes.
   Common practices in dimensioning
   Scale drawings

III. Reading a Drawing or Blueprint
1. Scanning simple drawings or prints (answering questions on size, shape, location, etc.

IV. Advanced Blueprint Reading (Reading prints in a specialized field.)
1. Adaptation of methods of orthographic representation to various fields of engineering, trades, etc.
2. Scanning prints in specific fields beginning with simple prints and advancing to the more complex. (Real life prints and not text book illustrations to be used here.)

It will be noted that much of the preceding outline overlaps the present instruction and course in mechanical drawing. The arrangement of intermediate units as outlined is not so important. They may be arranged to suit the instructor. We all begin, however, at the same point so there isn't much choice here. The greatest variation in content will exist in the latter or advanced part of the course. Local industrial situations, individual interests, type of course individual plans in college, etc., will be determining factors in the selection of content. Naturally the student who plans to become an architect will want to be able to read architectural prints, and so on. It must be understood also that all of this will be scaled down to a level compatible with the age of the student and time available. The time available will be a limiting factor in determining the penetration into the more advanced phases of the subject in most schools.

In the trade school the previously given outline can function fully and still permit time for a comprehensive course in related information. Prints from local industries and other sources would be collected and used for scanning. These would be further arranged on a difficulty scale which in turn would finally give way to an arrangement favoring a wide coverage of subject matter. Concurrent with the blueprint scanning a comprehensive program of related instruction would be conducted. Space or the nature of this article does not permit the giving of such an outline for related instruction here. In fact, mention of what would be done in the trade school is only justified by the fact that the instructor planning a course in blueprint reading in the technical high school may acquire some ideas, ideas which may help him in filling in the content in his own course.

Print scanning is the big thing in any course in blueprint reading. Scanning may be conducted in different ways. Small prints may be projected on a screen while the instructor leads the discussion, asks questions, has the student sketch sections at the points he designates, and so on. Large prints require the making of slides as direct projection is limited to a comparatively small size. The cost of making a few slides of well selected prints is not prohibitive.

Scanning also may be carried on with the use of mimeographed questions attached to a print or prints. This method is more cumbersome and makes instructions more difficult in various ways. The time needed for checking answers is one serious drawback and it has others. There is one place, however, where it excells and that is in giving a test. In some school situations it may be the only solution due to the lack of projection equipment.

Another indispensable adjunct to a course in blueprint reading is a reference library. This may consist of a few well selected books in one situation or be a very complete library including a variety of engineering texts, handbooks, catalogues, copies of drafting room standards of local industries, etc.

Last of all let us say a few words about the instructor. Most any instructor of mechanical drawing is competent when it comes to teaching the elements of blueprint reading. If, however, his background consists alone of a few courses of mechanical drawing in college he is limited to these elements. Operations, specifications and other information called for on a blueprint are a closed book to him. Furthermore he is apt to be incompetent in any attempt at selection or arrangement of content in any of the advanced phases of instruction. Therefore, one prerequisite for a successful course in blueprint reading is to have an instructor who has had industrial experience in making or interpreting drawings. This requirement is not limited to the trade school but is necessary in any technical training program.

In conclusion let me emphasize these facts. Blueprint reading should be taught as such and not be a residual value of some other subject. It can be taught as a unit subject having a separate entity and should be so done in the trade school but not in the technical high school. Here it should be correlated closely with the course in mechanical drawing. Blueprint reading instruction as such permits a wider coverage of subject matter with a more direct approach to a desired educational objective. The most useful tool in teaching blueprint reading is "scanning" particularly in the more advanced phases of the subject. An instructor with a little industrial background and a minimum of equipment but vision and enthusiasm can do a big job when teaching blueprint reading.

PROGRAM

S.P.E.E. DRAWING DIVISION - SUMMER SCHOOL
June 18 - 28, 1946. Washington University, St. Louis, Missouri

TUESDAY, JUNE 18, 1946.

1:00 p.m. Registration.

3:00 p.m. Address of Welcome.

Purpose and program of the school.

Organization of the school.

WEDNESDAY, JUNE 19, 1946.

Theme: "What training in Graphics does Industry require of college men."

8:00 a.m. The Machine Industry.

9:30 a.m. The Electrical Industry.

1:30 p.m. The Construction Industry.

3:00 p.m. The Aircraft Industry.

7:00 p.m. Informal Dinner. Speaker.

THURSDAY, JUNE 20 THRU SUNDAY, JUNE 23, 1946. Convention Program.

Joint Meeting with M. E. Division of S.P.E.E.

(1) What the M.E. Department wants from the Drawing Department.

(2) What the Drawing Department can do for the M.E. Department.

(3) Screw Threads.

Joint Meeting with E. E. Division of S.P.E.E.

(1) What the E. E. Department wants of the Drawing Department.

(2) What the Drawing Department can do for the E. E. Department.

(3) Lighting of the Drafting Room.

Luncheon Meeting - Business session. - Election of officers.

Annual Dinner of the Drawing Division.

Soil Survey by Aerial Photography.

Convention General Session

What Engineering Drawing contributes to the General Education of the engineering student.

Industrial Inspection Trips

Post-convention sessions

MONDAY, JUNE 24, 1946.

Theme: "Course Content in Drawing and Descriptive Geometry."

8:00 a.m. Objectives and Philosophy of Engineering Drawing.

9:00 a.m. Developing Drawing Course Content.

10:00 a.m. Army requirements in Course Content.

1:30 p.m. Developing Course Content in Descriptive Geometry.

2:30 p.m. Navy requirements in Descriptive Geometry.

3:30 p.m. Standardizing Nomenclature in Descriptive Geometry.

TUESDAY, JUNE 25, 1946.

Theme: "Teaching Methods."

8:00 a.m. Teaching Lettering.

9:00 a.m. Teaching Shape Description.

10:00 a.m. Teaching Beginning Dimensioning.

1:30 p.m. Teaching Limit Dimensioning.

2:30 p.m. Teaching Shop Processes and Shop Notes.

3:30 p.m. Speed and Quality Incentives.

WEDNESDAY, JUNE 26, 1946.

Theme: "Organization and Administration of a Drawing Department."

8:00 a.m. Grading Methods, Standards and Records.

9:00 a.m. Granting College Credit for Previous Drafting experience.

10:00 a.m. Physical Plant and Equipment.

11:00 a.m. Methods of keeping staff abreast of times.

1:30 p.m. Fundamental Philosophy of Examinations.

2:15 p.m. Methods of constructing various types of Examinations.

3:15 p.m. Determining Validity and Reliability of Examinations.

THURSDAY, JUNE 27, 1946.

Theme: "Drafting Standards and Methods of Reproduction."
Theme: "Visual Aids to Learning."

8:00 a.m. A.S.A. Standards for Drafting Room Practice.

8:45 a.m. Gaging Methods for Threads and Fasteners.

9:30 a.m. Reproduction Methods in the Modern Drafting Room.

10:15 a.m. Optical Gaging Methods.

1:30 p.m. Projection Methods and Materials for Visual Aids.

2:30 p.m. Non-projection Methods and Materials for Visual Aids.

3:15 p.m. Models for Teaching Drawing and Descriptive Geometry.

FRIDAY, JUNE 28, 1946.

Theme: "Courses in Advanced Drawing and Advanced Descriptive Geometry."

8:00 a.m. Aircraft Drafting.

9:00 a.m. Nomography at the Undergraduate Level.

(Continued on page 17)

PROJECTIONS

Dean McMillan of the Engineering Faculty of the University of Capetown, Capetown, South Africa has subscribed to the Journal for two years. He is interested in teaching drawing and has a number of ideas about teaching the subject which we hope to publish soon in the Journal.

* * * * *

Professor L. A. Herr, Senior High School, St. Petersburg, Florida says "Please continue my subscription without omission of a number."

He is interested in securing copies of the Drawing test that is being worked up to help solve his problem of where instruction should begin for mixed groups taking drawing in the same class. Some beginners, some with one, two or more years of drawing all in the same class. Will some high school or junior high school teacher write a paper on how to handle this situation.

Professor Graney of Purdue take notice that people are waiting to secure copies of the Drawing tests.

* * * * *

Professor Earl C. Willey of Oregon State College writes "the Journal fills a needed spot" and he backs this statement up by subscribing for two years.

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In renewing his subscription to the Drawing Journal Professor A. H. Knebel of the University of Cincinnati writes "If each of the dollars we must spend had the equivalent purchasing power of the dollar I am enclosing for my Journal subscription we would be exceedingly well off."

* * * * *

In addition to renewing his subscription to the Journal Professor James A. Foster of Elkhart, Indiana suggests he would like to write an article for the Journal. This is certainly welcome news to the editor. Won't more Drawing teachers follow this example.

* * * * *

Professor H. J. Miller of Thornton High School, Harvey, Illinois has just returned from two years service in the Engineering Section of the Air Service Technical Command of the Air Corps and immediately sends in his subscription to the Journal with an offer of assistance at any time. This is encouraging and appreciated.

W. E. Street, Head of the Engineering Drawing Department of the Agricultural and Mechanical College of Texas has been elected President of the Brazos Chapter of the Texas Society of Professional Engineers for 1946 which meets in College Station. The Texas Society is affiliated with the National Society of Professional Engineers.

* * * * *

Word has been received that the proposed revision of the American Standard for Drawings and Drafting Room Practice (Z14.1), as submitted to the American Standards Association for adoption, is in the press. They will include: Arrangement of Views, Lines and Line Work, Sectional Views, Screw Thread Representation, Dimensioning, Notes, Trimmed Sizes of Drawing Paper and Cloth, Titles and Lettering.

The Sponsor Organizations include the Society for the Promotion of Engineering Education and The American Society of Mechanical Engineers.

Many men from industry and the teaching field have given of their time and worked for the past six years on this revision of the Drawing Standards and they are to be commended for their fine work. The editor has received a lot of inquiries during the past three years about when the Proposed Revision would be off the press. They are being published by the American Standards Association, 29 West 39th Street, New York, New York.

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Professor T. C. Brown, of State College, North Carolina is on leave this year. He states the Drawing Journal "is a fine little publication, worthy of the entire support of the drawing field, and when I get back into the work, I assure you that I shall renew my subscription."

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Professor J. G. McGuire of the Engineering Drawing Department of the Agricultural and Mechanical College of Texas was promoted to full Professor September 1, 1945. Sam M. Cleland of this Institution was promoted to Assistant Professor of Engineering Drawing.

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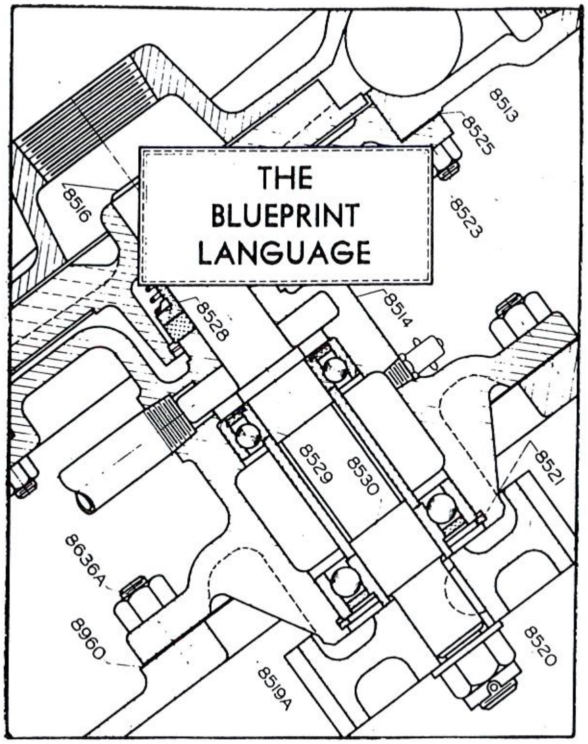
Professor B. Mattson Compton, Aviation Director Ogden Senior High School of Ogden, Utah, an instructor of Weber College has worked up a number of Graphic charts that save time. They cover Set-Back Chart for Bend Allowances, Mold-Leg Chart, Combination B. A. & S. B. Chart for 90° and Bend Allowance from 1° Through 180° of Bend.



THE BLUEPRINT LANGUAGE

By **Henry C. Spencer**, *Chairman of the Technical Drawing Dept., Illinois Institute of Technology,* and

H. E. Grant, *Assistant Professor of Engineering Drawing, University of Wisconsin*

This new combination text and workbook provides an unusually complete and realistic training in the essentials of blueprint reading for the machine industries. Over 100 major industrial companies have cooperated with the authors in the development of problems and illustrative material toward making *The Blueprint Language* meet the practical requirements of industry. Emphasis is placed on the visualization of machine parts and their uses. The book contains extensive chapters on shape description including views of objects; normal, inclined, oblique, and cylindrical surfaces and edges; and sectional and auxiliary views. There is a whole section on modern shop processes.

The Blueprint Language is profusely and entirely illustrated with facsimiles of actual commercial blueprints which cover thoroughly general principles and provide a wide variety of typical industrial problems. Pictorial drawings of the production-illustration type are used liberally throughout. Work sheets are provided for each blueprint, and problem sheets are given at the end of each chapter. A teacher's key, providing solutions for all work sheets, will be available for use with this text.

Spring, 1946. $4.75 *(probable)*

AIRCRAFT DRAFTING

By **Hyman H. Katz**, *Supervisor of Engineering Training, Republic Aviation Corporation*

Written by an "insider"—a design engineer who has worked in a number of large aircraft companies and has supervised the training of hundreds of draftsmen for the aircraft industry—this book includes much practical information useful to the aircraft draftsman in addition to full training in the essentials of technical drawing and their application to aircraft. There is, for instance, considerable aircraft design data, information on lofting technique and processes, and information on such matters as change groups, bills of materials, and weight calculations. All the fundamentals of drafting are very clearly explained and fully illustrated. Wherever possible, illustrations are used in place of lengthy explanations, and the basic topic of orthographic projection has been presented in color to facilitate rapid comprehension. Pictorial drawing, now widely used in industry, and particularly in aircraft design, is stressed. All drafting fundamentals are specifically applied to aircraft problems. All illustrations have been done by skilled draftsmen, experienced in aircraft design.

Spring, 1946. $4.75 *(probable)*

MAKING PATENT DRAWINGS

By

Harry Radzinsky

Patent Attorney

Complete, step-by-step instructions for making drawings for all types of patents and trademarks according to the special requirements of the U. S. Patent Office. Includes much expert advice on all aspects of patent drafting. Fully illustrated. $3.00

THE MACMILLAN COMPANY • 60 FIFTH AVENUE • NEW YORK 11, N. Y.

AXONOMETRIC SCALES

by

F. C. BRAGG
Professor of Engineering Drawing
North Carolina State College of Agriculture and Engineering

Axonometric projection has been classified as (1) isometric projection (2) dimetric projection and (3) trimetric projection. The method of constructing drawings has been generally covered in most drawing texts although there is a tendency among some authors to slight the latter two types of drawing.

It is generally understood that, in isometric projection with the axes on the plane of projection at 120° with each other, the axes of the object in space make an angle of 35° 16' with the plane of projection. This means that the scale of an isometric drawing is equal to the cosine of $35^\circ 16'$ or 0.816 times the original scale. In the case of dimetric drawing a formula presented in one drawing book for the calculation of the angle on the plane of projection is given as follows:

$$\cos \alpha = -\sqrt{\frac{2h^2v^2 - v^4}{2hv}}$$

where α is one of two equal angles between axes on the plane and h is one of two equal scales while v is the third scale. This formula gives the angles for the axes on the plane of projection with known scales but does not convert easily to give the scale for known axes position. For trimetric projection no information is given regarding either axes position or scales.

This situation tends to obscure the ease with which scales may be computed for known axes conditions and the original arrangement of the three classes of projection tends to place most emphasis on isometric projection which in reality is nothing more than a special case of a general condition. It is our intention to present both formulae and tables for

(1) the relationship between the angles of the axes on the plane of projection and the angles between the plane of projection and the real axes of the object.

(2) the scalar relationship between the object and the drawing, and

(3) the ratio between the three axonometric axes.

Before presenting in tabulated form the relationship of the various angles and scales concerned, it might be well to give briefly the general set-up of formulae used in compiling the tables. First, let us designate the angles between the axonometric axes as α, β and γ. While we will designate the angles between the true axes on the object and the projected axes as A, B and C, A being for the actual axis between the isometric angles of β and γ, etc. The scale between the true axes and the isometric axes will be the projection of the real axis on the axonometric axis, i. e., it will be equal to cos A, or cos B, or cos C. Other obvious assumptions will be that the sum of $\alpha + \beta + \gamma = 360^\circ$ and that α, β and γ are always equal to or greater than 90° and never greater than 180°.

There are other sets of formulae which are a little more devious in derivation but nevertheless can be proved. First, we have three formulae as follows:

$$\sin^2 A = \tan(\beta - 90) \times \tan(\gamma - 90)$$

$$\sin^2 B = \tan(\alpha - 90) \times \tan(\gamma - 90)$$

$$\sin^2 C = \tan(\gamma - 90) \times \tan(\beta - 90)$$

The above formulae are used to find A, B and C when α, β and γ are given.

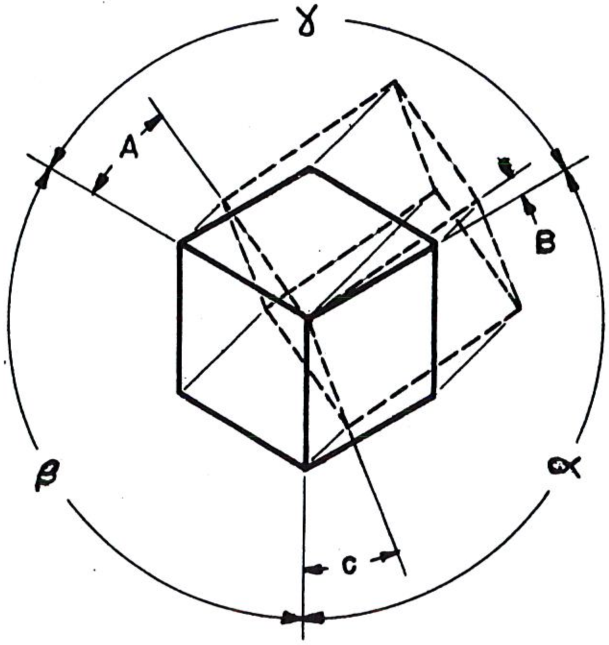
By reference to our original isometric case, it is apparent that the scale on the axonometric axes are equal to the cosine of the angle of the respective real axes with the projection plane. Further, the ratio of these scales will be the ratio of the cosines.

For special use in dimetric drawing the following formula is applicable:

$$\frac{\cos A}{\cos C} = \frac{1}{\sqrt{2 \cos 2\alpha}} \quad \text{when } \alpha = \beta$$

This formula is useful in determining the relative scale of the various dimetric axes as well as for finding the axes angles to use in obtaining desired relative scales.

In the appended table these various angles with their useful cosines and cosine ratios are express for all possible combinations at 5° intervals.



A CUBE & ITS AXONOMETRIC PROJECTION
showing:

Heavy Solid Lines ——— Projection of Cube
Dotted Lines ——— Actual Cube
Light Lines ——— Projecting & Dimension Lines
α, β & γ ——— Projection Axes Angles
A, B & C ——— Angles between Projection Axes & Actual Axes

TABLE OF ANGLES AND SCALES

	α	β	γ	A	B	C	CosA	CosB	CosC	CosA / CosC	CosB / CosC
**	120	120	120	35°16'	35°16'	35°16'	.816	.816	.816	1.000	1.000
	115	120	125	39°29'	34°51'	31°16'	.772	.821	.855	.903	.960
*	115	115	130	38°43'	38°43'	27°47'	.780	.780	.885	.882	.883
*	110	125	125	40°26'	30°19'	30°19'	.714	.863	.863	.827	1.000
	110	120	130	44°07'	33°33'	27°19'	.718	.833	.888	.808	.941
	110	115	135	43°04'	37°06'	24°20'	.731	.798	.911	.802	.875
*	110	110	140	41°12'	41°12'	21°20'	.752	.752	.931	.808	.808
	105	125	130	50°02'	28°18'	25°40'	.642	.880	.901	.713	.977
	105	120	135	49°27'	31°10'	23°10'	.650	.856	.919	.707	.930
	105	115	140	48°12'	34°25'	20°42'	.667	.825	.935	.713	.882
	105	110	145	48°08'	38°13'	18°12'	.693	.786	.950	.730	.827
*	105	105	150	42°57'	42°57'	15°32'	.732	.732	.963	.760	.760
*	100	130	130	57°02'	22°37'	22°37'	.544	.923	.923	.590	1.000
	100	125	135	56°46'	24°50'	20°34'	.548	.908	.936	.585	.969
	100	120	140	56°03'	27°17'	18°36'	.558	.889	.948	.589	.938
	100	115	145	54°42'	30°07'	16°40'	.578	.865	.958	.603	.903
	100	110	150	52°34'	33°33'	14°40'	.608	.833	.967	.628	.862
	100	105	155	49°17'	37°57'	12°33'	.652	.789	.976	.668	.808
*	100	100	160	44°07'	44°07'	10°09'	.718	.718	.984	.729	.729
	95	130	135	66°21'	17°12'	15°43'	.401	.955	.963	.417	.992
	95	125	140	66°00'	18°50'	14°20'	.407	.946	.969	.420	.977
	95	120	145	65°14'	20°42'	12°59'	.419	.935	.974	.430	.960
	95	115	150	63°59'	22°55'	11°39'	.439	.921	.979	.448	.940
	95	110	155	62°04'	25°40'	10°17'	.468	.901	.984	.476	.916
	95	105	160	59°06'	29°22'	8°48'	.514	.872	.988	.520	.882
	95	100	165	54°13'	34°51'	7°08'	.585	.821	.992	.589	.827
*	95	95	170	44°47'	44°47'	5°01'	.710	.710	.996	.710	.710

NOTE: (*) Dimetric Projection.
(**) Isometric Projection.

DRAWING FOR LIFE AND INDUSTRY

by

PROFESSOR DANIEL GREEN
The Stout Institute

The continued remarkable growth of technology in our American way of life has made it increasingly important for everyone to have some ability in the use of drawing. The extent to which this medium of communication and analysis is used by the general public is indicated by the frequency with which it appears in our text books, magazines, sales and service manuals and the like.

Our American way of life would be difficult if not impossible to carry on without the use of drawings. We could not build steam engines, airplanes, sewing machines, and refrigerators except as we set down the details for building them by means of drawings.

It would be useless to try to give the directions for building a modern battleship by means of English alone. Even if we were able to write out the directions, too many words would be required. To record the details for constructing a modern battleship, in drawings, one carload of blueprint paper is required.

The use of new products requires the dissemination of new knowledge, the overcoming of old prejudices, the perfecting of new techniques and processes, and the participation in new modes of life, all of which call for a reservoir of human intelligence to function not only in production but also in social and economic consumption. When the American public receives the finished products of technology, it has the problem of handling, use and care of them and drawings will help to do this.

DRAWING NEEDED TO SUPPLEMENT OUR ENGLISH

Ideas and symbols may be said to grow together and are in fact inseparable. The grasp of an idea may be gauged by the accuracy with which it is represented by symbols. Word symbols are often inadequate for the full expression of many types of ideas and relations such as location, direction, process, operation, timing, arrangement, size, shape, authority, control, comparison, motion, correlation, interference, identity, range, intensity and so on. If word symbols are inadequate, the corresponding ideas are bound to be vague. Drawing is peculiarly effective in the representation of such types of ideas and hence is an excellent supplement to English.

New undertakings coin new words and phrases, and often the best way of "putting these across" is by means of drawings. Drawings are useful to tell about new products and to show how to assemble, install, operate, and service them often being better than the product itself or a photograph of it. Moreover drawings are useful to show the economic significance of the products of technology.

DRAWING USEFUL IN MANY LIFE SITUATIONS

Many large groups of people find drawing useful in their daily life. The farmer finds it useful in mapping his fields in crop rotation. In the recent wheat allotment campaign, he was required to make a simple map to show his wheat acreage. The navigator uses charts and maps to chart his course. The forest ranger uses diagrams to locate forest fires. The musician uses diagrams in learning to play certain instruments and his music is really a diagram of notes, bars, and scales. The executive uses diagrams to chart his staff and to present data to his board of directors. The scientist uses drawing to analyze and explain physical, chemical and other natural phenomena. The student uses drawing in many of his learning situations. The landscape gardener, the interior decorator, the sign painter, the movie director and many others make frequent use of drawings.

It is evident that there are many Life Situations in which some phase of drawing would be useful to the ordinary individual. A list of some 185 such Life Situations was compiled by a committee from the Wisconsin Industrial Arts Association[1] from material contributed by a large group of teachers from Wisconsin and other states. This list was analyzed and the Life Situations classified into some thirty groups or organization patterns. The forms or patterns which are used to systematize material being termed organization patterns.

ORGANIZATION PATTERNS

Every relationship may be analyzed into units of some kind, which will be related by a common bond or characteristic, and in accord with some definite plan or organization pattern. Various media of expression - English, music, art, drawing, and so on - all have their characteristic forms or patterns whereby related material is organized or systematized. That each type of expression has several distinctive forms is indicated by the fact that each separate form has been given a distinctive label or name and that many of these are of current usage by persons who are active in those fields of expression.

(Continued on page 16)

[1]Source Material Guides for Course of Study Planning in Drawing for Wisconsin Schools. Issued by John Callahan, State Superintendent, Madison Wisconsin, 1941.

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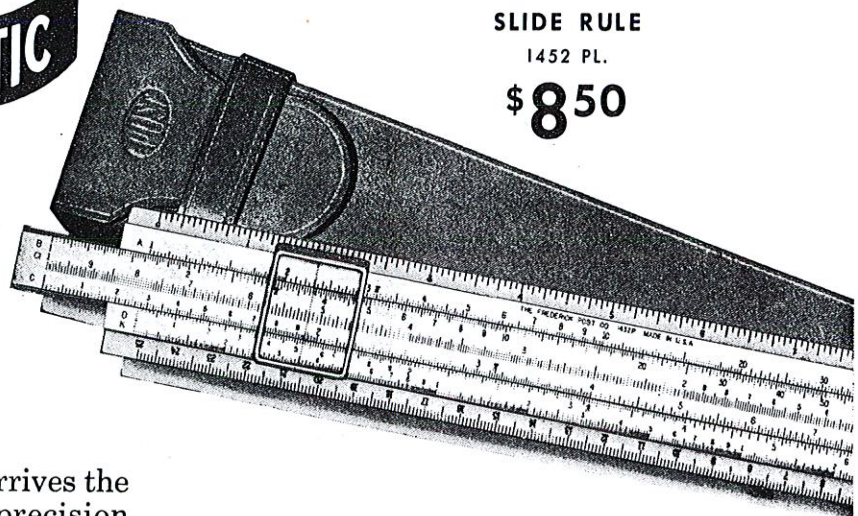

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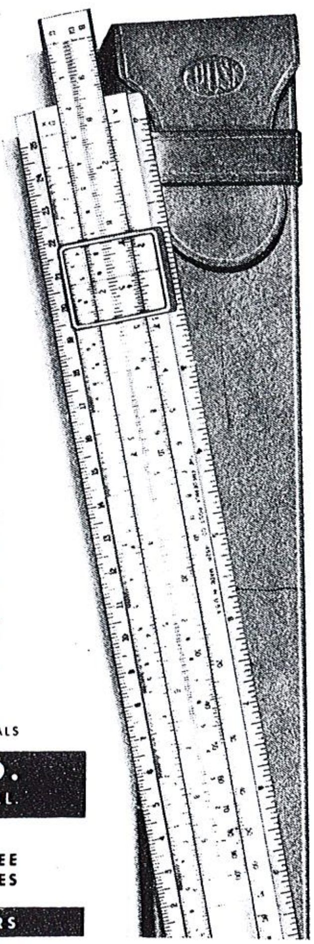


DRAWING FOR LIFE AND INDUSTRY

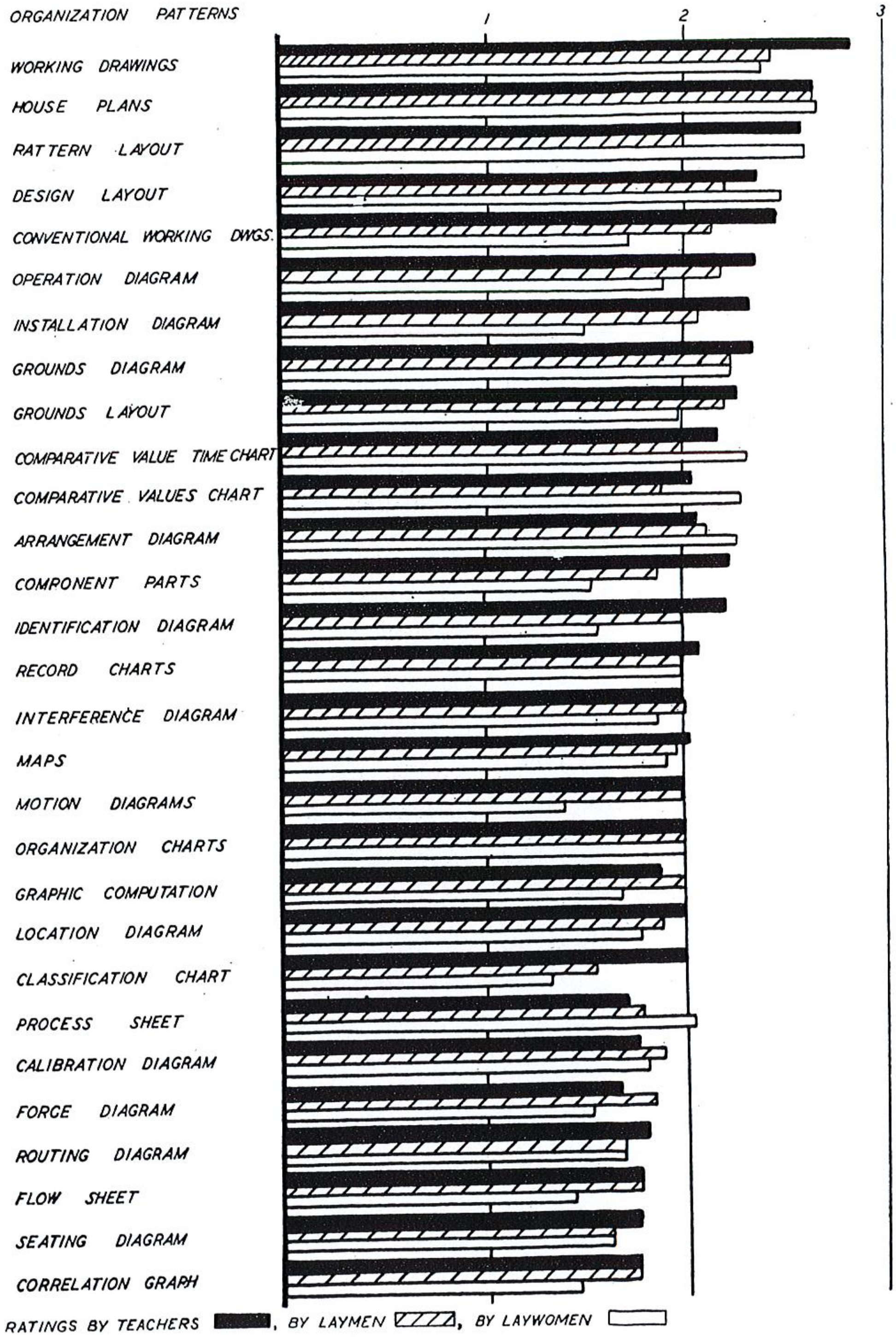


Fig. 1. How men and women in ordinary walks of life rate various types of drawings. Average values derived from total ratings on the basis of low 1, medium 2, and high 3.

(Continued from page 13)

In English, we have various forms indicated by such terms as ode, sonnet, theme, drama; in art we recognize such forms as still life, landscape, portrait; while in music we designate various forms by terms such as symphony, rondo, scherzo, and so on. In drawing, as in other types of expression, we may identify several types of organization patterns because they are of such common use that names have been applied to them such as maps, flow sheets, working drawings, operation diagrams, correlation graphs, and so on.

EVALUATION OF ORGANIZATION PATTERNS

Each of the thirty organization patterns were identified by a name and the function or purpose of each was defined. Using this list as a basis, an investigation was recently completed in which a representative cross section of the public was contacted to determine the relative value of the various types of organization patterns to the ordinary individual. Returns were received from 503 of the male populace, 171 from the female populace and 89 from instructors in drawing in Wisconsin Schools[2].

A graphic comparison of the relative values is shown in Fig. #1.* An examination of this chart reveals that many of the organization patterns were rated as fully as useful to the general public as working drawings. Insofar as this chart shows a representative cross section of the reactions of the general public, it would seem logical that content for drawing in lower secondary school should be made useful to the ordinary individual in the solution of Life Situations.

GOALS OR OBJECTIVES FOR DRAWING

An analysis of the Life Situations listed in the various categories of organization patterns revealed that they could be classified into three groups each having a distinct purpose. In one group the Life Situations dealt with language functions, in another with social and economic distribution and consumption, while the third dealt with planning for fabrication.

Using the foregoing purposes or functions as labels by which to designate the three groups and by which to connote the types of activities encompassed, an analysis was made and expanded into a tentative statement of goals or objectives for drawing, which is submitted; -

1. The objective of additional language vehicle, dealing with activities of recording, communicating, and analysis.

Recording and communication. English frequently is not enough to express the full meaning intended in many Life Situations and must often be supplemented by drawing.

Analysis. Drawing uses many different types of symbols in analysis, and often it is much easier to grasp the idea intended, when graphic symbols are used. There is also the apparent fact that the attention seems to concentrate when fastened on a drawing or sketch. It is a well known trick of the high-pressure salesman, when he finds that the attention of his prospect is wandering, to regain attention by a simple sketch.

Forming and developing ideas. When we first receive an idea, it is not always clear cut and fully complete. It is like a seed or germ which enlarges and grows as it gets nourishment and sunshine. As we give thought to an idea it enlarges and grows. Drawing is often a good medium for recording the products of thinking in forming and developing ideas.

Enlarging the vocabulary. It is often difficult to find a word to fit some particular thing, particularly when dealing with some new device. New undertakings coin new words and phrases, and drawing is often the best way of "putting these across" frequently being better than the object itself or a picture of it.

2. The objective of social and economic distribution and consumption, dealing with activities of using, handling, operating, and trading.

Drawings are often useful in educating the consumer, being useful in creating new desires for new products and in educating the consumer in the selection, use and care of these products.

3. The objective of planning for fabrication, dealing with activities of constructing, installing, and maintaining.

All man made products are planned. The growth from the original plan may be quite involved, but many errors may be saved if carefully planned drawings are first made on paper. Since much layout on material is on flat surfaces, the scale layout on paper may be useful as a substitute for the layout in material.

THE TRAINING PROGRAM IN DRAWING

In the transition from Drawing for Life to Drawing for Industry, the training program would be marked by five major steps:

1. The acquisition of the basic elements.
2. The use of the basic elements in combinations or combining forms-schemata.

(Continued on page 19)

[2] Practices and Needs in General Drawing - Traditional and Proposed Content, Palmer O. Johnson, Master's Thesis. Stout Institute, Menomonie, Wisconsin.

*From Drawing for Life and Industry by Daniel Green, published by the Bruce Publishing Company, Milwaukee, Wisconsin.

THE REPORT OF CIRCULATION MANAGER AND TREASURER OF THE JOURNAL OF ENGINEERING DRAWING AS OF JUNE 25, 1945

FINANCIAL REPORT:

Cash Received

On hand June 1, 1944	$ 89.95
Received from advertising	358.40
Received from subscriptions -- cash or check	462.84
Total	$ 911.19

Disbursements

Printing of magazine and freight to Manhattan	$ 626.55
Postage on magazine and correspondence and Express charges	83.00
Envelopes and Stationery	37.83
Bank Charges	1.52
Total	$ 748.90
Cash on hand June 25	$ 162.29
Bills Receivable for May advertisements @ $12.50	$ 50.00
Cash Received and Receivable	$ 961.19
Cash Paid and Due	748.90
Net Balance	$ 212.29

Signed:

J. N. Wood
Circulation Mgr. and Treas.

(Continued from page 8)

10:00 a.m. Pictorial Drawing (Production Illustration)

(1) Uses in Industry.

(2) Teaching Methods and Special Equipment.

11:30 a.m. Courses in Advanced Descriptive Geometry.

1:30 p.m. Need for graduate study in Graphics.

2:30 p.m. Requirements for a graduate degree in Graphics.

3:15 p.m. Map Drafting.

6:30 p.m. Farewell Dinner.

EXHIBITS

The following exhibits are planned for the period of the Summer School. They will be operative at such times as the program of the summer school is not in session.

Foreign Drawings - Professor H. E. Grant.

Historical Material - Professor H. M. McCully

Student Material and Course outlines - Professor R. S. Paffenbarger

Visual Aids - Professor G. H. Ransdell

(Continued from page 16)

3. Application of schemata in organization patterns or patterns of general use.

4. Evaluation of these patterns in terms of abilities or traits or capacities caused by their use.

5. Pointing special capacities toward a chosen goal.

The experienced draftsman acquires a collection of schemata from which he selects in making up his various organization patterns. However, in collecting the schemata, he would have to rely upon certain basic relations which underlie all drawing. Since these relations are basic they would be more likely to be transferable than the material of specialized courses.

It would seem logical that for a general program in drawing that preliminary offerings should begin with basic things and progress through various differentiated techniques and procedures using typical Life Situations to exemplify the projects.

BASIC RELATIONS

Naturally if there are basic relations which are really basic in all types of drawing, some general basis or principle must be used as a guide in the selection.

The following is submitted; -

The organized graphic controls for guiding action as represented by various types of organization patterns such as maps, working drawings, operation diagrams, flow sheets and so on can all be resolved into basic type figures, either as units or as modifications or combinations of units. These are the ingredients of layout and drawing - not unrelated lines. A line has no significance until it is associated or related with other lines. All graphic representation regardless of the type of organization pattern used, involves the use of basic type figures.

Basic type figures consist of lines which are associated or generated (formed) in accordance with some principle or law of relation. Seven groups of basic type figures may be identified - the square and rectangle, the circle, radial figures, the triangle, symmetrical figures, regular curves and irregular curves.

Basic relations are the principles or axioms of relation found in the use of basic type figures. Three kinds or classes of relations may be identified - association, generation, and configuration.

A full treatment of the above cannot be undertaken in this article for lack of space, a brief analysis only being submitted. In specifying line relations in association, the orientation of two or more points in the line are specified in relation to one or more reference lines. In the case of straight line two points must be located, while with curved lines several points must be orientated. Five methods of orientation may be identified - base line and offset, rectangular coordinates, bearing and distance or polar coordinates, triangulation, and the radial method.

Lines are said to be generated by moving a point in relation to certain fixed controls. Several different types of controls may be identified, only the more common of which are given - one point control, two point control, point and line control, one circle control, two circle control and so on.

The relation of one part of a figure or pattern to another is termed configuration. Such relations are ordinarily specified by the relations between the reference lines of the related parts. These relations are thus line to line relations. Here again the principal of point and line relations in association will apply.

CONCLUSIONS

It would seem to be a reasonable assumption from the foregoing that, in the lower Secondary School at least where general education is stressed, the purposes of drawing would be better served if material is used which fits general Life Situations. The author has found that material in project form seems to hold the interest of the student better than unrelated material. Moreover a very satisfactory method of presenting projects is through the use of instruction sheets. These can be built up so that each is a unit in itself and have many advantages such as the inclusion of related material, better organization, supplementary problems, allowances for individual differences, retardation due to absence or other causes and so on. A typical instruction sheet is shown in Fig. #2*.

*From Drawing for Life and Industry by Daniel Green, published by the Bruce Publishing Company, Milwaukee, Wisconsin.

INGREDIENTS OF DRAWING

PROJECT: To Learn the Construction of Radial Figures and the Relation of Radial Figures to the Circle.

Problem:

To construct a six-pointed star, or a hexagonal handwheel.

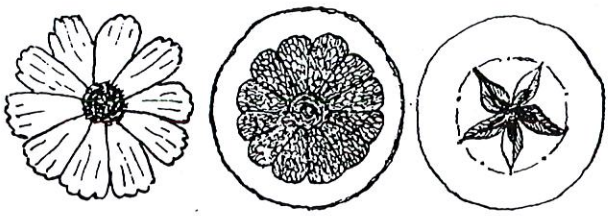


Fig. 104. Many of the forms in nature have an orderly arrangement of parts around a center.

Information

Many fruits, vegetables, and flowers grow on a central stem and have the parts arranged in an orderly manner around a center, as shown in Figure 104. In a like manner, a number of figures are built around a center like the petals of a flower as shown in Figure 105. These we call radial figures. These can all be built up by dividing a circle into equal parts in the same manner that we divided the clock face, as shown in Figure 107.

Procedure

1. *Lay Out the Sheet.* Center the circle in the center of the sheet by drawing diagonals through the center of the drawing space, as shown in Figure 106, in the same manner that we found the center of the football field.

2. *Construct the Star.* Draw a 4″ circle and divide it into six equal parts with a T square and a 30°–60° triangle, as shown in Figure 107. Connect every other point on the circumference by a straight line, thus forming the star (Fig. 108).

A number of radial figures commonly used in construction are called regular polygons. They include triangle, square, pentagon, etc. These can all be built by dividing the circle into as many equal parts as the figure has sides. Regular polygons with more than four sides are named by the number of sides, as pentagon, 5 sides; hexagon, 6; and octagon, 8.

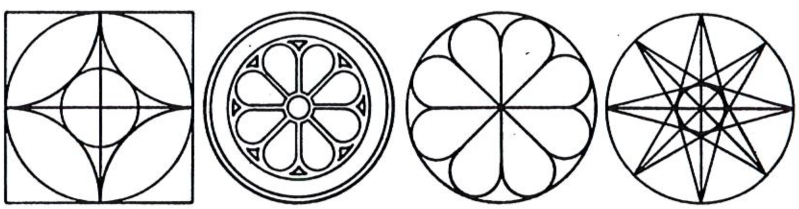


Fig. 105. Many forms in construction, called radial figures, are built around a center like the petals of a flower.

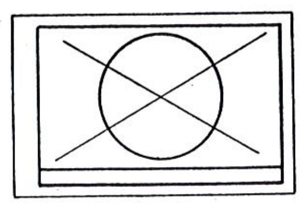


Fig. 106. Centering a circle in the drawing space.

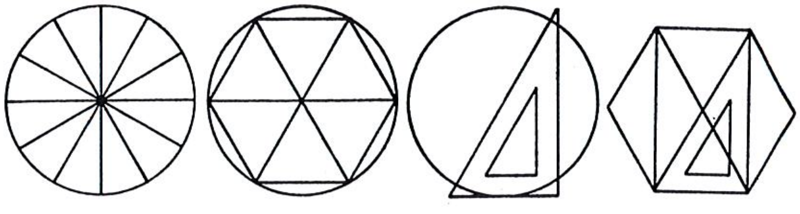


Fig. 107. Dividing a circle into equal parts.

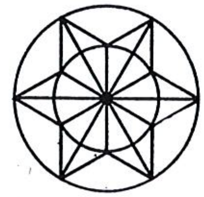


Fig. 108. The six-pointed star is formed by dividing a circle into six equal parts.

Fig. 2

THE APPLICATION OF DESCRIPTIVE GEOMETRY TO THE SOLUTION OF A PROBLEM IN STRUCTURAL GEOLOGY

by

ALFRED N. APPLEBY
Assistant Professor of Drafting - College of the City of New York

There are many occasions when the geologist might profit by a knowledge of descriptive geometry. Too often difficulty is encountered in attempting to project the imagination into a third dimension while studying the usual two-dimensioned geologic sketch. Sometimes the explanation in the text is difficult to correlate with the illustrations, to the extent that misconceptions often arise. This confusion does not occur in topographic or areal geologic studies, but does in the interpretation of trends of hidden structures. A good working knowledge of descriptive geometry is an invaluable aid to the geologist. This fact was recognized by Bailey Willis, for in his "Geologic Structures" he devoted an entire chapter to some principles of descriptive geometry. Unfortunately, this chapter is not sufficient to impart a working knowledge of the subject. However, the fact that he included such a chapter in a purely geologic work indicates two things. First, a knowledge of descriptive geometry is important to geologists; second, too few geologists understand it.

A case in point is the determination of the direction of maximum stress resulting in regional jointing in rocks. Of course the whole question cannot be answered by a descriptive geometry solution. The graphical solution is valuable chiefly for purposes of elimination or confirmation of supporting theories.

It has long been established that bodies subjected to simple compressive stress will fracture along shear planes whose attitude is theoretically at 45 degrees to the direction of application of stress. Practically, numerous experiments have shown that when a mass is brittle the shear planes of fracture are at less than 45 degrees to the direction of stress, and that plastic materials fracture in planes at more than 45 degrees to the direction of stress. The variation from the theoretical angle of 45 degrees depends upon the character as to brittleness or plasticity of the stressed material. On the other hand if the mass is under tensile stress, the angle of the planes of fracture to the direction of stress becomes more than 45 degrees for a brittle substance and less than 45 degrees for a plastic substance. It is, of course, true that fractures caused by shear or rotational forces will not differ in appearance from those caused by simple compression. It is emphasized that the evidence offered here must be supported by other data.

It must be understood that the terms "brittle" and "plastic" are relative; that since rock is the material under discussion these terms are analagous to the terms "competent" and "incompetent". This paper does not apply to rocks or minerals so brittle as to shatter under stress nor so plastic to flow under stress.

Some years ago the writer had occasion to make a detailed study of the jointing in the highly crystalline rocks of the Highlands of northern New Jersey. The formations were largely gneisses, highly metamorphosed and recrystallized. They had been subjected to much diastrophism and had been invaded by magmas in many places. The rocks were characterized structurally by fracturing that resulted in a criss-crossing of joints that formed definite patterns of high-angle parallel sets. High angle faulting was a minor feature. The area studied was about 600 square miles in extent.

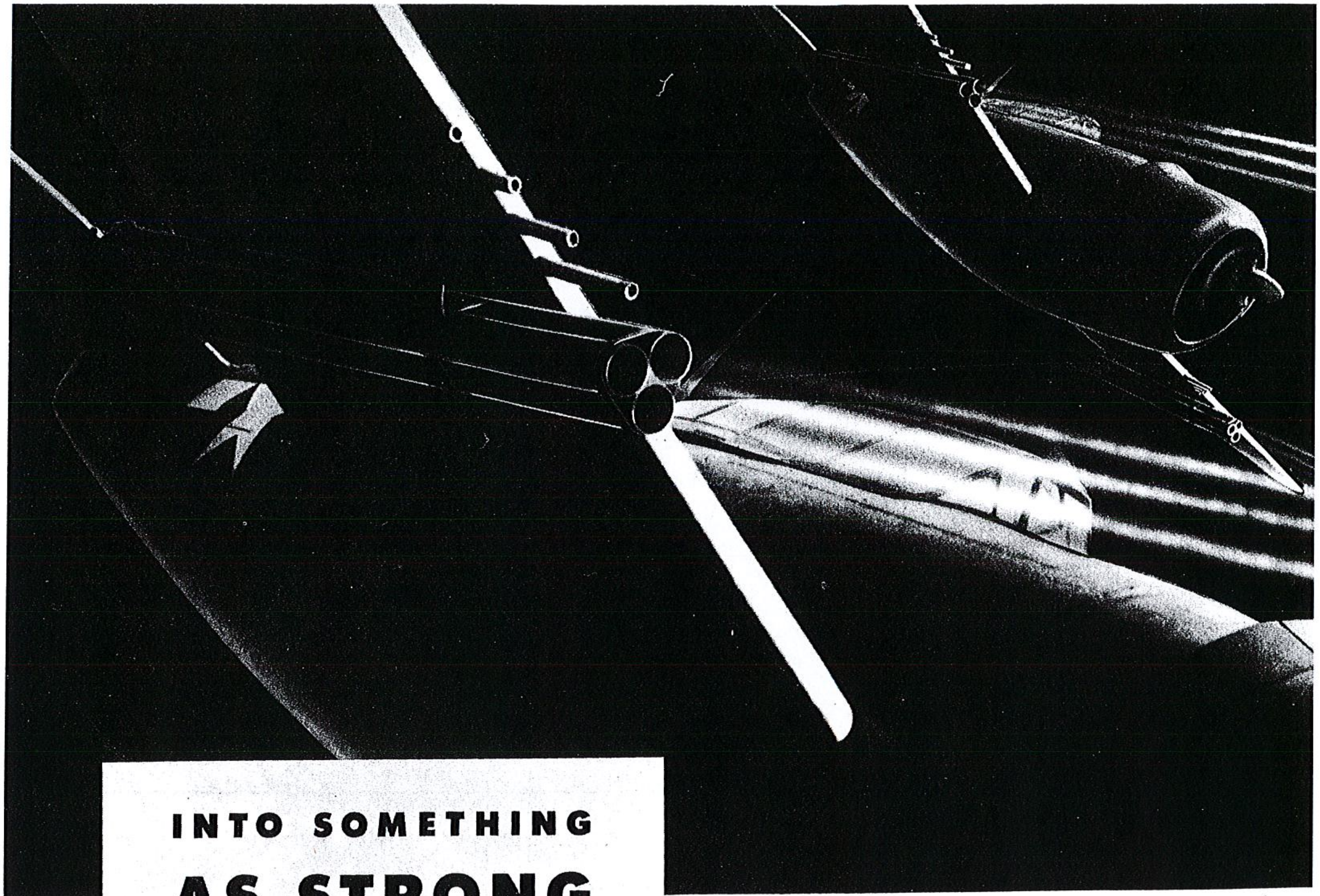
Readings of the dispositions of the joint systems were taken at numerous outcrops. The strikes and dips of conjugate pairs of parallel joints were recorded as indicated by a Brunton compass. In the course of the study over 1500 sets of conjugate joints were examined, each pair typical of the dominating parallel joints at an out-crop.

The surfaces studied were practically planes, regardless of intrusions or inclusions in the rock. There was considerable supporting evidence to indicate that the joint faces were planes of shear. Assuming this to be true, the next step in the problem was to find the angles between pairs of conjugate shear planes.

"Strike" is measured along a horizontal line in a plane and is designated by a compass direction. "Dip" is the angle measured along the plane perpendicular to the strike. In other words, the strike line is a horizontal of the plane and the dip line is a line of slope of the plane. If a pair of principal planes is set up, the traces of the planes under study can be easily determined and the angle between them measured.

The horizontal plane was assumed to be tangent to the earth's surface at the point studied, and since compass readings were used, the vertical plane was arbitrarily set up perpendicular to a north-south line. The ground line was, therefore, an east-west line. Because of the fact that the horizontal plane chosen was a basal plane, first angle projection was used as lending itself to a clearer visualization than third angle projection. The traces of typical pairs of intersecting joint planes were then found, as illustrated in Figure 1.

(Continued on page 23)



INTO SOMETHING

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Ever since the ancient Egyptians pounded papyrus pulp into crude sheets, man has fretted at paper's easy destructibility but has done little about it. Yet today, with his new-found ability to delve into and reconstruct the molecule he not only is making paper tougher, resistant to sunlight, weather and rough handling, but is binding the fibers of paper pulp together into sheets strong enough to make airplane bazooka barrels out of, and into laminations that are actually stronger in some respects than steel.

Where lies the truth then? Is flimsy paper made strong by the addition of something else; or *do all things in the universe possess latent strength awaiting only to be revealed?* It must strike every intelligent and responsible educator that the fundamental possessions out of which a few individuals build a lifetime of achievement and happiness are shared by more than that few. "The fault, dear Brutus, is not in our stars." Always the fault lies with man's perception or the lack of it, the degree of his ability to make manifest the potentialities possessed by all. And since the future welfare of our country depends on what happens to the boys and girls of today, every responsible educator is constantly seeking ways and means of developing in his students the habits of work, the ideals and ambitions which alone lead on to victory.

There is no easy formula. But instructors in mechanical drawing for example find one dynamic at hand in the very drawing instruments their pupils use. Does it matter, some will ask, *what* instruments they use? Does it matter whether these instruments be cheap and shoddy, or echo a loving care and craftsmanship in their manufacture? Does it matter whether these tools which may serve their possessor for many years are a matter of pride or a matter of indifference to the student? As well ask, does it matter what kind of work the lad does, what standards of behavior are given him? For inevitably the boy responds in kind. Indifference too, cast upon the impressionable mind of a lad in his teens will return after many days, compounded and tragic. The added cost of *good* tools is so slight that economy here has no justification. The conscientious instructor answers this question once and for all by insisting that the student's set be the best he can afford.

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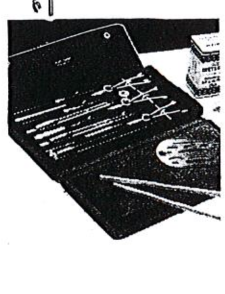

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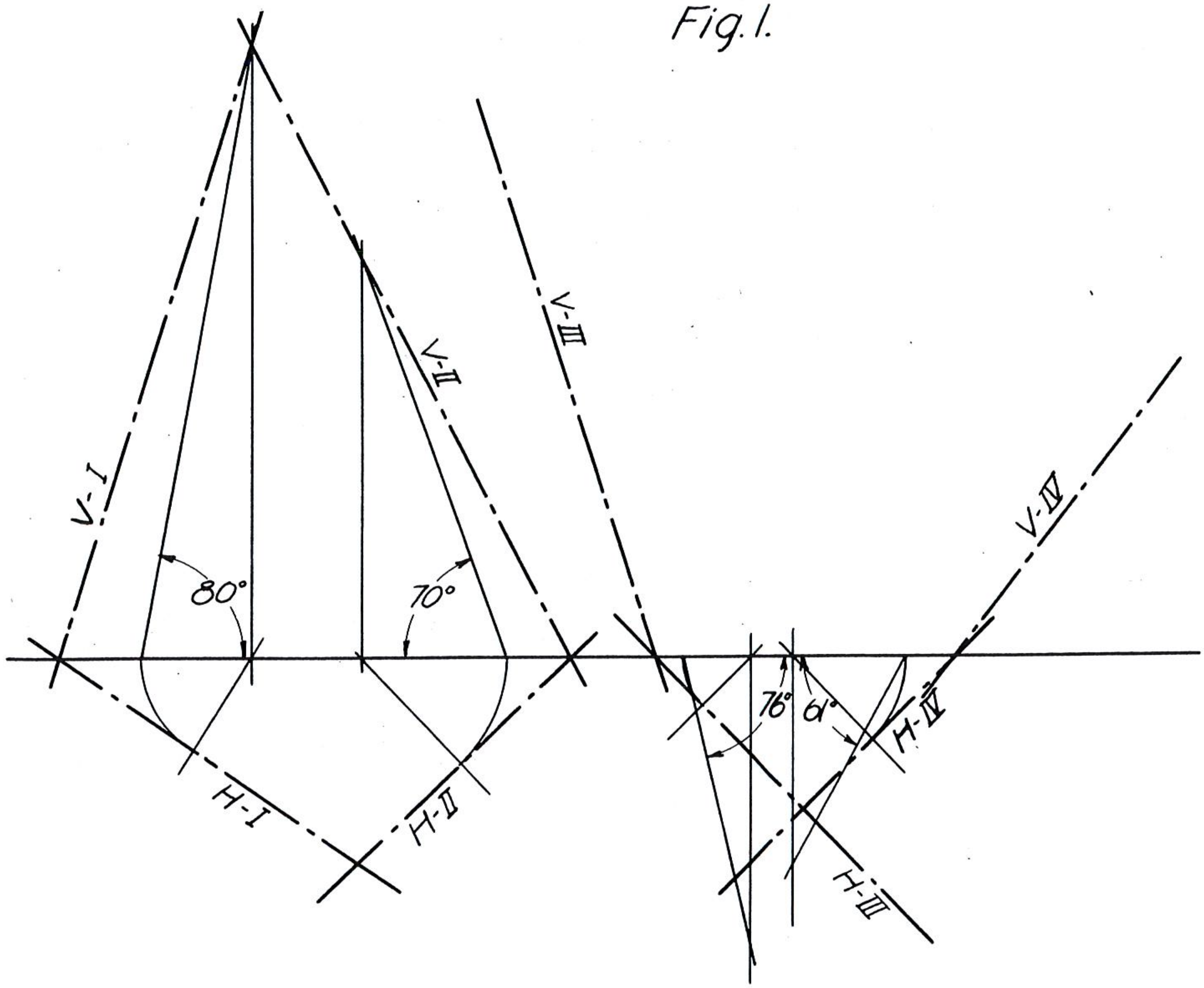
Fig. 1.



Plane I - Strike N55°W, Dip 80° SW. Plane III - Strike N 44°W, Dip 76° NE.
Plane II - Strike N 46°E, Dip 70° SE. Plane IV - Strike N45°E, Dip 61° NW.

TRACES OF TYPICAL PAIRS OF INTERSECTING JOINT PLANES

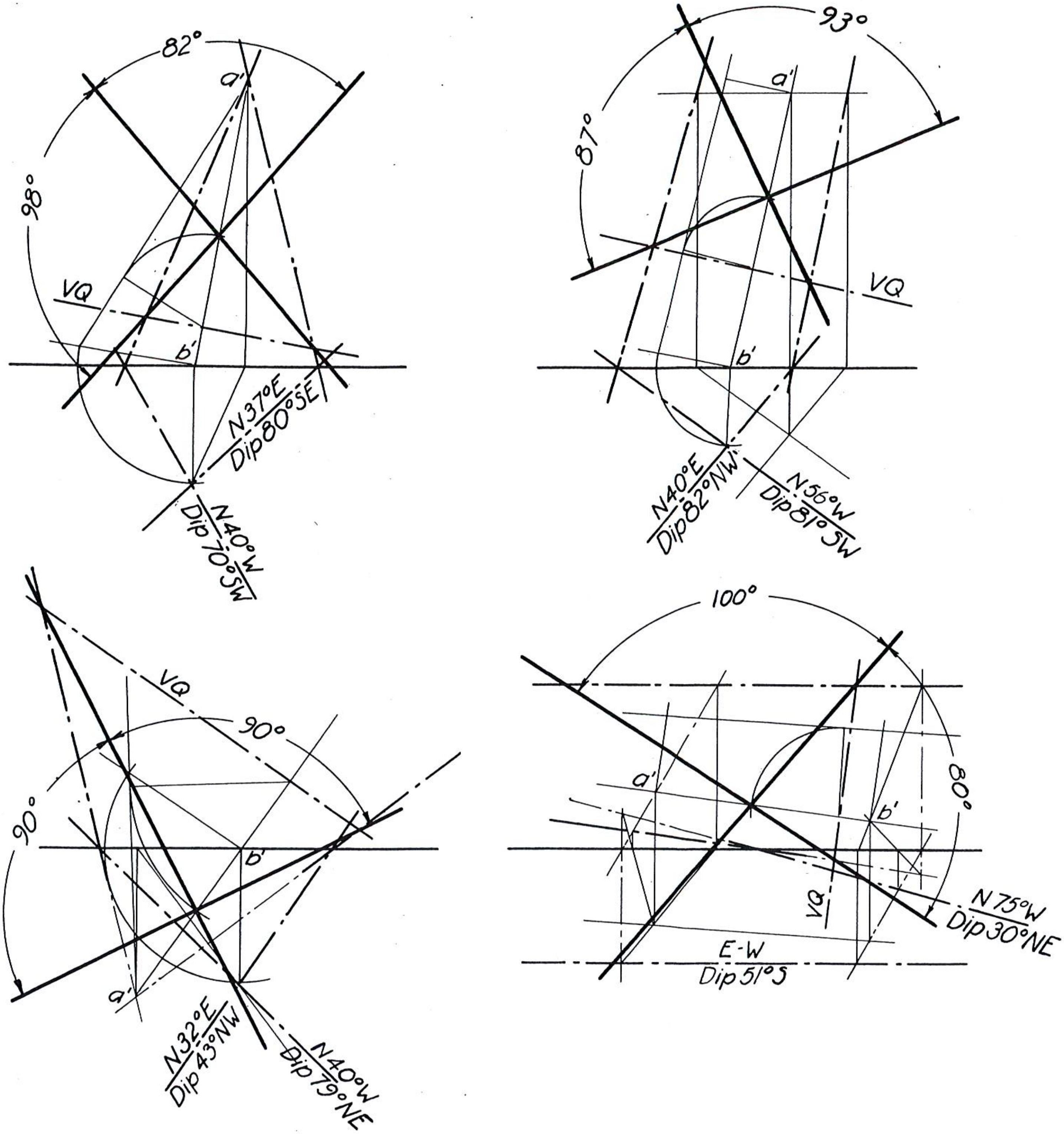
(Continued from page 21)

After the traces of a pair of planes were determined, the next step was to find the angle between the planes. The line of intersection of the two planes is normal to a plane containing the angle measuring their dihedral angle. Figure 2 illustrates the finding of the dihedral angle between sets of conjugate planes. These are typical examples showing that while the set-up of the traces may vary considerably, the dihedral angles between the planes may be nearly the same in size.

In each case of Figure 2, a'b' is the vertical projection of the line of intersection of the conjugate joint planes under consideration, and VQ is the vertical trace of a plane Q passed perpendicular to AB, the line of intersection. The vertical projecting plane of AB is rotated about a'b' into the vertical plane, in order to determine the true distance from VQ to the intersection of the three planes, which is the vertex of the plane angle of the dihedral angle to be measured. The plane Q is is then rotated about VQ into the vertical plane, and the angle measured.

The examples chosen in Figure 2 illustrates very clearly an important point in the problem under discussion. These cases were exemplified because of the marked differences in the dispositions of the joint planes. It may be noted that in each of these cases the

Fig. 2



FINDING THE DIHEDRAL ANGLE
BETWEEN SETS OF CONJUGATE PLANES

(Continued from page 23)

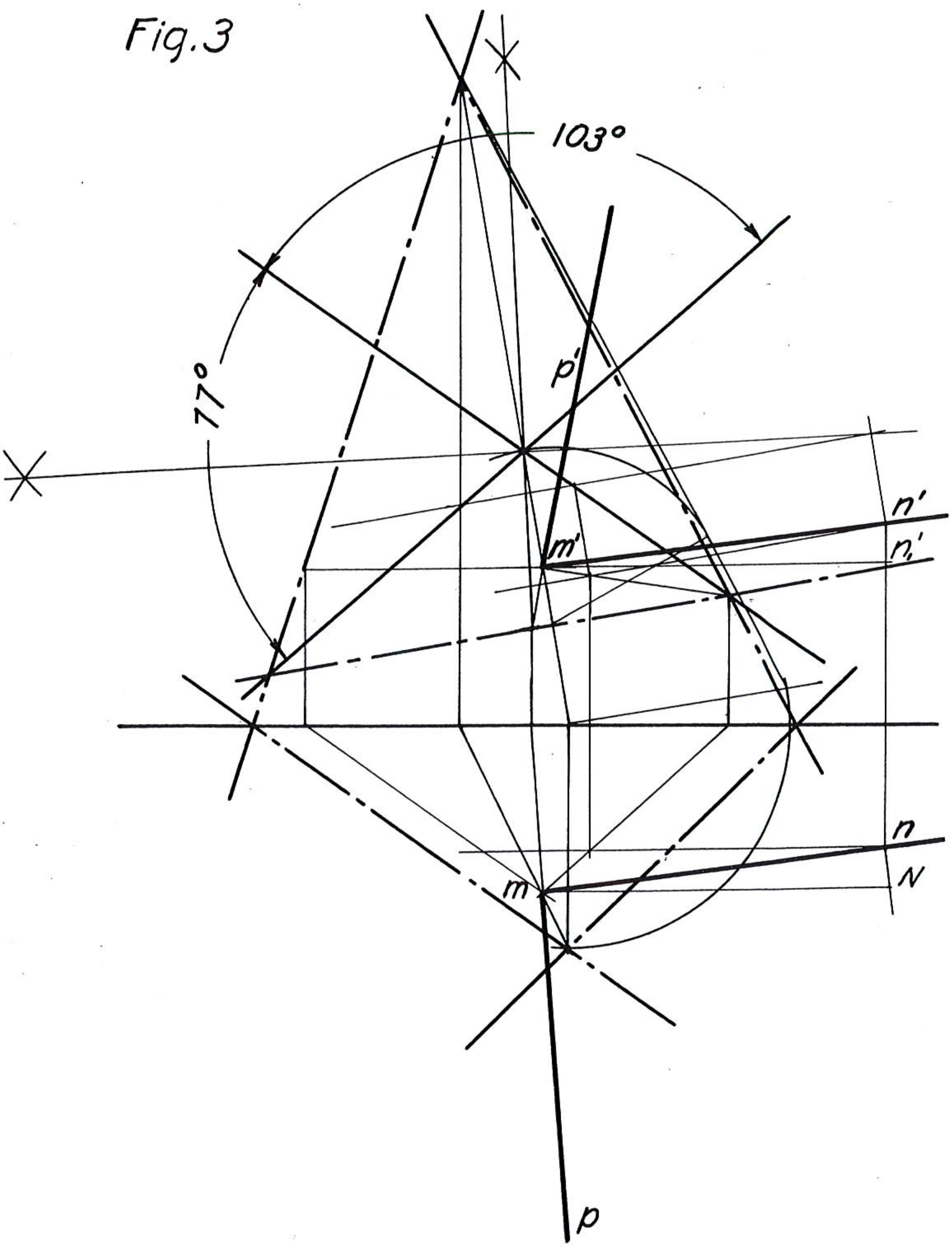
angles between the planes are not greatly different from the others, either in size or in attitude; furthermore, neither size nor attitude of the dihedral angles is apparent from a mere comparison of strike and dip angles.

The last step in the problem was to determine the direction of the force causing fracture. This direction, in the case of a simple compressive stress, would coincide with the position of the bisector of the plane angle of the dihedral angle between the planes of fracture, and would be perpendicular to the line of intersection of the plane of fracture. In other words, this line of direction of force would lie in the plane of the plane angle of the dihedral angle.

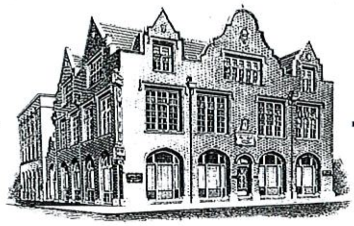
In Figure 3 the projections mn and m'n' represent the line MN, the bisector of the 77 degree angle, and the projections mp and m'p' represent the line MP, the bisector of the 103 degree angle. The "strike" of MN is the direction of the horizontal projecting plane of MN and its "dip" is the slope of MN. Upon measuring with a protractor it was found that the direction of force, assuming it to be compression was N 83 degrees E, dipping 6 degrees W (angle Nmn, Figure 3). Using the same procedure with MP, the strike was found to be N 3 degrees W, dipping 20 degrees N. It may be noted that while the angle bisectors MN and MP are in fact perpendicular to each other, their horizontal projections (from which the strike readings are taken) can be perpendicular only when either MN or MP is a horizontal line.

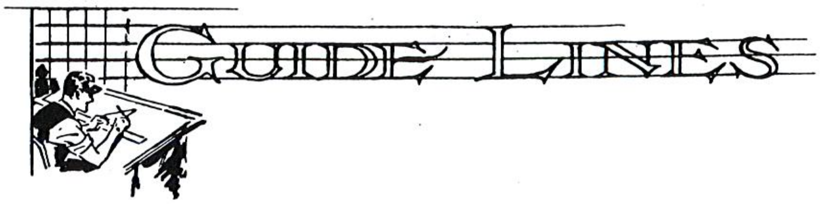
The procedure outlined in this paper was followed in the examination of about 400 pairs of joints selected at random from recordings of about 1500 joint sets. The joints chosen for examination were taken from outcrops extending about 40 miles from north to south. In over 80% of the pairs, the indicated direction of causal stress was within 10 degrees of an EW line. It was concluded from this investigation, supported by other evidence, that the causal stress of these fractures was a simple compression, originating somewhere to the east of the area studied.

Fig. 3



DETERMINATION OF THE DIRECTION OF FORCE CAUSING FRACTURE





DRAWING PROBLEM

A DESCRIPTIVE GEOMETRY PROBLEM that may be of interest to drawing teachers is presented for your consideration. Professor F. M. Porter of the University of Illinois supplied this problem.

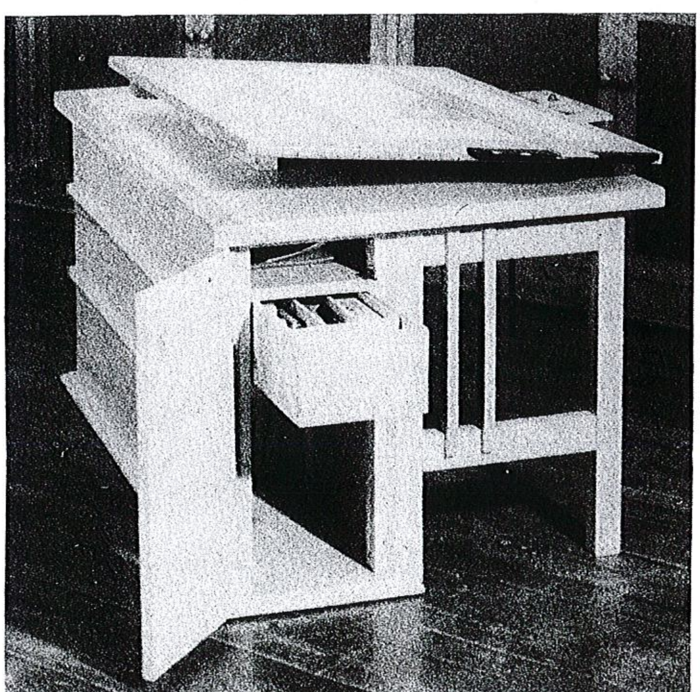
Given: A right elliptical cone of known base and altitude.

Required: To determine a plane whose intersection with the cone is a circle of specified diameter.

Send the editor your solutions and the simplest one will be published in the next issue of the Journal.

A LOW TYPE DRAFTING DESK

Two photographs are shown of a desk designed by members of the teaching staff of the Department of Architecture at the University of Kansas. This is a low desk. The student sits in an ordinary chair and keeps his feet on the floor. This greatly increases the comfort over perching and balancing on a stool and keeping the feet on a foot rest. But, the low desk makes the inspection of drawings by



the instructor somewhat more difficult. The architectural instructor, however, usually gives considerable time to the consideration of the work of the individual student and generally sits in the chair while making suggestions to the student.

Possibly our usual high drawing tables are more convenient to the teacher, chief draftsman, or chief engineer than they are to the man who makes the drawings. Should we give greater attention to the comfort of the man who works at the drawing board?

The low desks are $26\frac{1}{2}$" above the floor, and the size is 33" by 60". The lighting is two 150 watt incandescent lamps in a white enamel trough for each desk. Each lamp is shielded to protect the eyes of persons who are standing.

Supplied by Professor George J. Hood, University of Kansas.

(Continued on page 29)

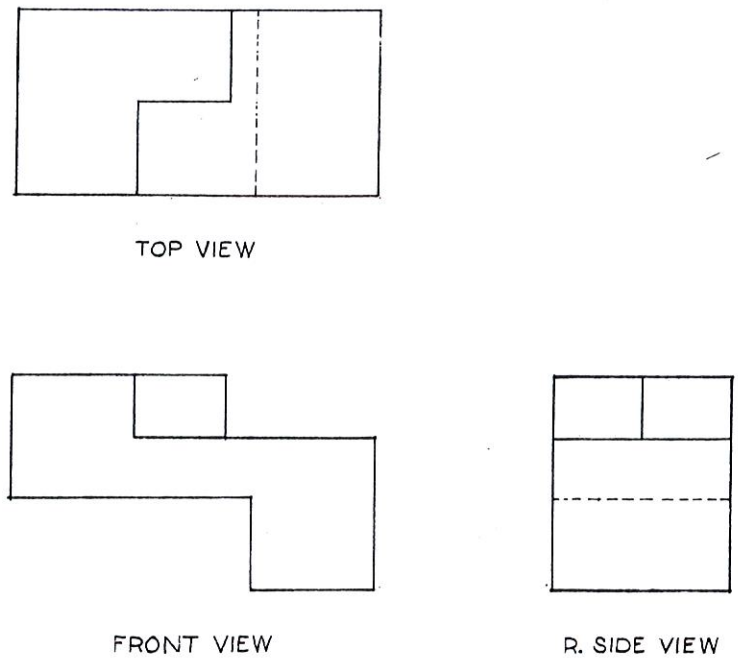
MAGNETIC DRAWING BOARD

Mr. Jud of San Antonio, Texas has given the Army Service Forces, Eighth Service Command, McCloskey General Hospital of Temple, Texas a MAGNETIC DRAWING BOARD. It is being used by disabled boys in drawing classes at this hospital. Mr. Jud first made the board for his own use after his left side became paralyzed due to a prolonged illness.

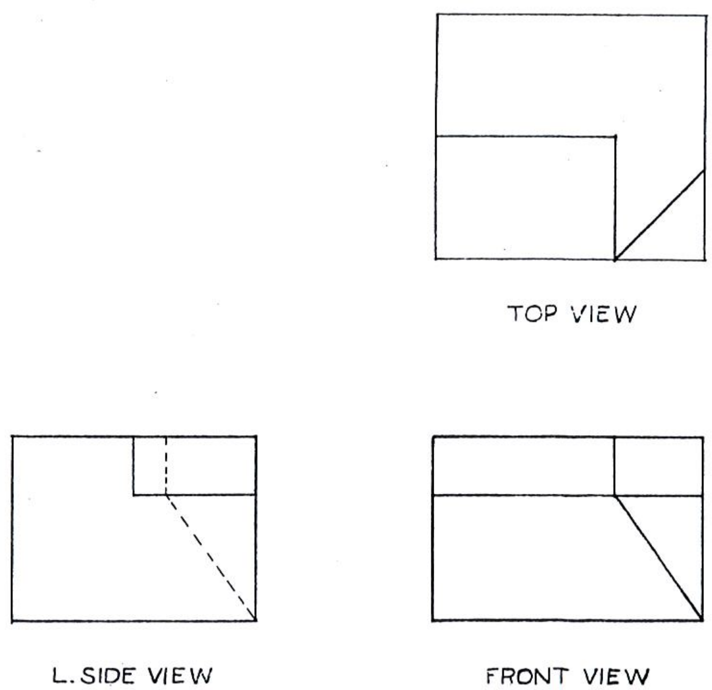
DRAWING MADE BY STUDENT WITHOUT HANDS

The drawing reproduced on the next page is a pencil drawing made by George W. Goslin, a student in The College of Engineering at the University of Texas, who has no hands. This young man lost his hands in an accident about nine years ago. They were cut off through the palms, leaving no fingers on either hand and only a stump of a thumb about half an inch long on the left hand. He took the regular course in Engineering Drawing last year and used no special equipment except a board equipped with a parallel straight edge instead of a T-Square. When lettering he holds the pencil between the stumps of both hands.

Mr. Goslin was in one of Professor J. D. McFarland's classes at the University.



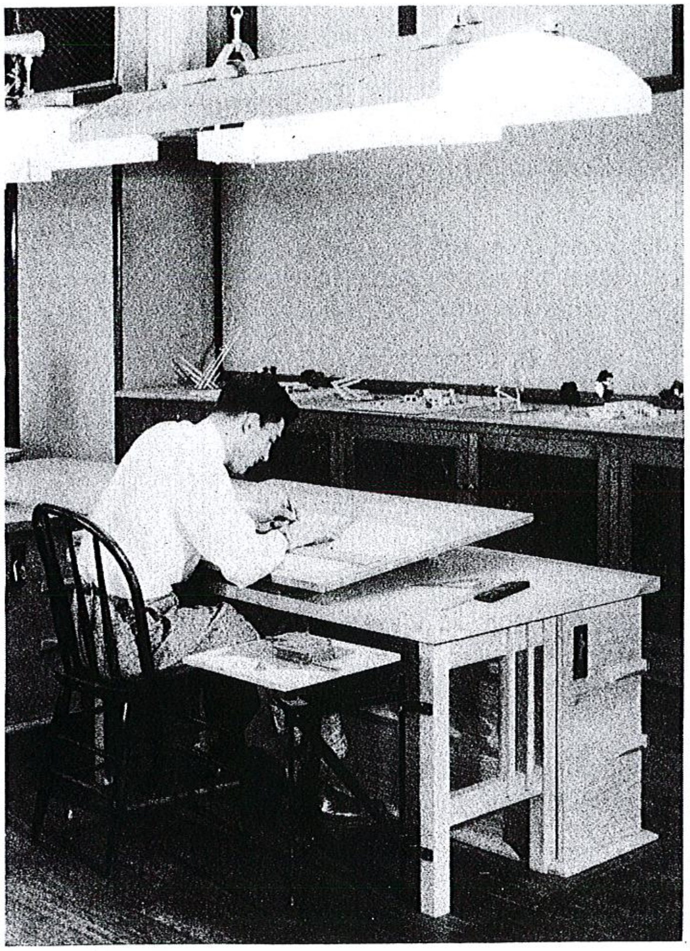
ANCHOR PLATE



BRACKET

(DRAWING MADE BY STUDENT WITHOUT HANDS)

A LOW TYPE DRAFTING DESK
(Continued from Page 27)



BOOK PLATE COMPETITION

The Engineering Library of the University of Illinois was designated as the depository for Drawing Division books in June 1943. The members felt that the ownership of the books belonging to the Division should be indicated by placing a suitable book plate in each one.

A book plate competition was announced by Professor Thomas E. French of Ohio State University in the February 1944 Drawing Journal to secure designs for this book plate.

The Committee and the Journal are desirours of completing this competition. Please make and enter your designs in this competition in accordance with the following rules by June 1, 1946.

1. The size of the book plate shall be no larger than 5 x 5, and of any shape. The original drawing may be in any multiple of this size, if suitable for reduction.

2. The design shall at least include the following lettering:

   DIVISION OF DRAWING AND DESCRIPTIVE GEOMETRY, S. P. E. E.

   and in smaller lettering:

   Presented by

   Space in which date of acquisition may be lettered shall also be provided.

3. The plate shall be designed for reproduction in black and white.

4. The design shall have no identification of the artist on its face. The winning design shall be returned to the artist for insertion of name and date in some part of it. Other designs will be returned to their owners.

5. (a) All plates entered should be sent directly to:

   W. E. Street, Editor
   Department of Engineering Drawing
   Agricultural and Mechanical College of Texas
   College Station, Texas

   and shall include with them a sheet giving the name and address of the artist.

   (b) The Editor will inscribe each design with suitable identification, and forward to the Committee for judging.

6. Any member of the Division or subscriber to the Journal may enter this competition. Designs are particularly solicited from Division members.

7. All designs must be received by the Editor on or before June 1, 1946.

8. The judges of the designs will be selected by the Committee, and their decisions will be final. Judging shall take place at the annual meeting of the Division in June, 1946.

9. The name of the winner and his design shall be published in the Journal as soon as practical after the judges decision. The winning design shall become the property of the Division.

10. The Journal reserves the right to publish any or all of the designs submitted, so long as the artist's name is used in connection therewith.