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S P E E

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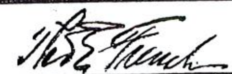
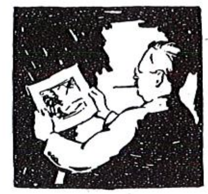
THE LIGHT IN BROWN HALL
A SYMBOL OF INTEREST
AND LOVE OF HIS WORK



A CHARACTERISTIC POSE
IN HIS OFFICE, WITH HIS
FAVORITE RAT-TAIL STOGIE

May your memory pictures
of Nineteen Twenty-eight all
be rare prints of happiness



Thomas Ewing French

A MANUAL
OF
ENGINEERING DRAWING
FOR
STUDENTS AND DRAFTSMEN

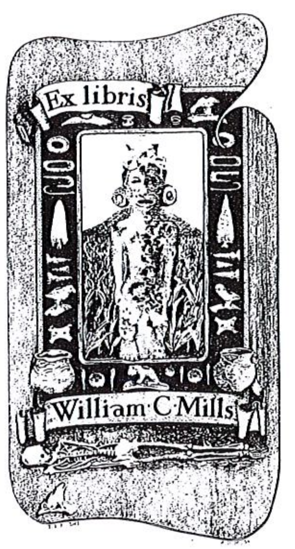
BY

THOMAS E. FRENCH, M.E., D.Sc.

Professor of Engineering Drawing The Ohio State University
Member American Society of Mechanical Engineers
Society for the Promotion of Engineering
Education. Etc.

PROF. FRENCH "FATHER OF THE STADIUM"

A SAMPLING OF
HIS BOOKPLATES



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PROFESSOR THOMAS EWING FRENCH

In Appreciation of an Inspirational Leader in Engineering Drawing

by

CARL L. SVENSEN, Professional Engineer
Member-Secretary, Texas State Board of Registration for Professional Engineers

"Lives of great men all remind us" are the words of the poet and they seem to apply especially to that inspirational leader in Engineering Drawing - Thomas Ewing French - who put away his tools in this life on November Second Nineteen Hundred and Forty-Four at Columbus, Ohio. Professor French's wife, the former Miss Ida J. Richards, died in 1903. His only survivors are a daughter, Miss Janet French, with whom he lived, and a brother Edward Houston French.

Professor French's death removes his presence but not his inspiration, for the inspiration of his genial personality, his keen mentality, his accurate judgment, his helpful friendliness, his written contributions and the memories of personal associations, will always remind us of the greatness of his influence - that "Lives of great men all remind us".

Dr. French to later friends, for he was honored with the degree of D. Sc. by Monmouth College in 1921, but Professor French to so many of his old time friends for so many years that this more familiar title is used in writing this appreciation of a friend of over thirty years and a former colleague of many years. Contributions to this tribute by Professor Ralph S. Paffenbarger and the McGraw-Hill Book Company are gratefully acknowledged.

Thomas Ewing French's life and work always reminds us of his intellectual greatness and of the largeness of his vision for "Engineering Drawing" - A VISION which he made REAL within his lifetime - A vision made real by the inspirational leadership of a mind that was ever youthful, ever keen, and ever progressive.

Thomas Ewing French was born at Mansfield, Ohio on November 7th, 1871 and died on November 2nd, 1944, just one week before his seventy-third birthday. The family moved to Dayton, Ohio in 1879 where his father was pastor of the United Presbyterian Church. His early education was obtained in this city where he attended the public schools, Cooper Academy, and Miami Business College. While attending high school he studied mechanical drawing in night school and before graduating qualified as a draftsman. He was employed by the Smith-Vaile Company, manufacturers of pumping machinery, 1888-1891 where he advanced to the position of Chief Draftsman. It was during this time that his teaching ability became apparent and he held a position as instructor in drawing in evening classes at the Y. M. C. A.

He soon realized the need for an engineering education as a foundation upon which to build a life career. With characteristic faith in his judgment he resigned his position and entered The Ohio State University in 1891 as a special student, motivated by the desire to study under a great engineer and teacher of that day, Professor Stillman W. Robinson. Older engineers will recall the classic books on Mechanism by Professor Robinson on which it was Professor French's privilege to assist with the drawings and the manufscript. This early association developed into a personal friendship which became a lifetime inspiration. He earned his way through college by working as a patent draftsman and as a part time assistant in the Department of Architecture and Drawing. He graduated in 1895 with the degree of Mechanical Engineer and was immediately given a full time teaching position. He was appointed Professor and Head of a new Department of Engineering Drawing in 1906, when he was only thirty-five years old.

Professor French's classes were diversified in keeping with his broad vision of the value of drawing for "developing the visual imagination". In addition to the usual engineering drawing and descriptive geometry courses there were included courses for home economics students, courses for agricultural students, courses in lettering in design, courses for teachers of mechanical drawing, and many other courses, all cherished by the students who were privileged to learn from this inspirational teacher.

Those who have witnessed Professor French's teaching will recall the precise exactness of his presentation, the artistry of his illustration and the pleasant memory fixing qualities of his lively comments. Classes were an enjoyable affair which made the students feel the personal interest of this great teacher who had a way of bringing out their fullest intellectual capacity and understanding.

Professor French's broad outlook on life was reflected in his view of his life work with engineering drawing. He saw it as equally valuable as a cultural subject and as a practical or useful subject. In a paper on the "Educational Side of Engineering Drawing" for the Society for the Promotion of Engineering Education back in 1913 he stated his position as follows:

"The analogy between drawing and language is often referred to. I prefer to go farther in saying that drawing, as a mode of thought expression, <u>is</u> a real and complete written language, with its orthography, its grammar and its style, its idioms and its abbreviations; and that in teaching it we are not only preparing the student in a subject needed in his course but, from the very nature of it, have in our hands an exceptional cultural subject for strengthening the power and habit of exact thinking, that most difficult of all habits to fix, and for training the constructive imagination, the perceptive ability which enables one to think in three dimensions, to visualize quickly and accurately, to build up a clear mental image."

And at the end of his paper he concludes: "Finally, let us have drawing taught well and understandingly, for its own sake, for the sake of the subjects following, and for the students' sake, for whom, with the power it awakens, it really becomes drawing in relation to life."

Professor French's teaching methods reached far beyond his immediate classrooms through his ability to put his practice into writing and the widespread use of his books. Exactness, clarity of expression, and smooth phraseology are characteristic of his books. He was forever seeking to keep abreast of the "state of the art" and to be informed of progress, of changes and of reasons.

His most widely known book, "A Manual of Engineering Drawing" was first published in 1911. This book had its origin in 1910 when the newly organized McGraw-Hill Book Company sought an authority to write a book on mechanical drawing, and engaged Professor French for the work because of his national reputation earned by his constructive work and new teaching methods. The book became an immediate success, continuously occupying a leading place in this field, and passing through edition after edition to the recent sixth edition, with a seventh revision under way at the time of his passing on. So familiar has this text become that the words "French" and "Engineering Drawing" have become synonymous for it.

"Mechanical Drawing for High Schools", written in collaboration with Carl L. Svensen, resulted from a protracted discussion of the whole matter of the relation of mechanical drawing to secondary school education. This led to an investigation and study of the subject over the entire United States and in particular of mechanical drawing in the high schools of Ohio. Many schools were visited by the authors and a special study was made of almost every mechanical drawing course in the state. One result was the publication by the Department of Public Instruction, State of Ohio, of a comprehensive bulletin prepared by the authors on "A Study of Mechanical Drawing in the State of Ohio".

From this study there evolved the book on Mechanical Drawing for High Schools for the authors found that "a system of standardization appears to be needed to give the subject the standing to which it is entitled as a cultural subject as well as a practical one, a real language to be studied and taught in the same way as any other language." (1918) This book first published in 1919 has had four editions and a fifth edition is in preparation. The book was selected by the United States Armed Forces Institute and a special edition of 120,000 copies has just been printed by the publishers.

In all of Professor French's work as an author the same thoroughness was always present and resulted in the excellence of books on diverse applications of related subjects. Books of which he was co-author included, Essentials of Lettering with Robert Meiklejohn, Agricultural Drawing and the Design of Farm Structures with F. W. Ives, Lessons in Lettering (Books I and II) with William D. Turnbull, and Engineering Drawing Sheets with H. M. McCully. Professor French's publishers state that the wide use of the "French" books is attested by a combined sale of over two million copies.

In the field of athletics Professor French was an authority on college sports and from many years back he was a member and chairman of the Ohio State Athletic Board. Since 1912 be was the University representative on the "Big Ten" Conference. He was Chairman of the Committee on Committees and Eligibility Committee of the National Collegiate Athletic Association.

Greatness of vision and the power to make his vision a reality again asserted itself in his love for athletics and his Alma Mater as he watched the increasing crowds at the old Ohio field. Professor French's vision of 50,000 to watch Ohio State play football was presented in a speech which he delivered in 1915, and this "started the ball rolling" on the vision of a stadium. With his energetic organizing ability as chairman of the Board which financed and built the great structure, the vision became a reality in a bowl-type stadium, the nation's first double-decked football stadium located on a 92-acre plot along the Olentangy River. And so Professor French became known at Ohio State as "the father of the stadium".

Professor French's hobbies were many and included collections of etchings, bookplates, stamps, puzzles, and old glass. His collection of etchings is widely known and has been exhibited many times. The Second French Empire was favored as his most prized period.

Professor French's varied interests carried with them truly professional skills. As a young man he studied art and painted in both water and oils. He was qualified in both pure and applied design to an exceptional degree and designed and made jewelry and silverware.

His interest then turned to black-and-white design and he attained distinction as an etcher, specializing in bookplates. His professional status is attested by the fact

(Continued on page 10)

BASIC MODELS AS AN EFFECTIVE AID IN TEACHING DESCRIPTIVE GEOMETRY

by

CHARLES ELMER ROWE
Assistant Dean of Engineering and Professor of Drawing
The University of Texas

Some instructors may ask the question: To what extent should models be used in teaching descriptive geometry? Possibly, others may believe that the imagination of the average student can be developed sufficiently to enable him to see every spatial relationship without the use of any models.

Our experience seem to show conclusively that any demonstration can be performed more effectively by the use of a model, and that by this means a subject which was formerly considered drab and difficult can be transformed into an interesting one which students enjoy studying. For a considerable number of the class, the use of a model may bridge the gap between not being able to visualize a problem at all and being able to obtain a clear mental picture of it.

Unfortunately, most of the weaker students have not been trained to visualize or to do analytical thinking. They have to be shown. A pictorial drawing is helpful. An improvised set-up of pencils, triangles, etc. may be used, but the instructor may need more than one pair of hands. The effective method is to vitalize a full discussion of the analysis and solution of the problem by the use of a model, which will interest the students and enable them to follow the discussion. This procedure probably will enable the students to visualize their specific problem. In other words, they will be guided into the process of thinking in space. Models are valuable not only for teaching the weaker students, but also for teaching the whole class, even the brightest members, who may appreciate them most of all.

The use of a good set of basic models produces a highly beneficial effect on the teaching staff, especially the recruits, by giving them a mastery of the subject, and its presentation, that could hardly be attained otherwise. Study of a model tends to get a person's mind away from drawing board constructions into real spatial relationships. A critical examination of a model may reveal interesting facts which even an experienced teacher may have overlooked. In some cases a new and better method of solving a problem has been discovered by working with a model, visualizing all the relationships, and making sound deductions.

The model shown in Figs. 1* and 2* is designed to demonstrate the fundamental concepts and relationships of principal views, auxiliary views, and oblique views, and the orientation of these views. The block, which has a hole in each of 17 faces, also shows two or more of each of the seven typical positions of a plane. The arrows, A and B, represent two mutually perpendicular directions of sight for views which may be drawn adjacent to each other. The manikin attached to the moving arrow B, which can make 17 circuits around the block, represents the observer looking through a small square picture plane on which he may draw a new view. Arrow B revolves in its support so that for any view the manikin's body remains in a standing (vertical) position, and two edges of the square plane remain horizontal so that the name of the view can be read by him. Seeing an auxiliary or an oblique view on a drawing as the manikin sees it is called orientation.

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* The illustrations for this article are reproduced by permission from the bulletin, Basic Models for Engineering Drawing and Descriptive Geometry by C. E. Rowe, obtainable from the Bureau of Engineering Research, 104 Engineering Building, Austin 12, Texas. A single copy to an institution gratis, additional copies 50 cents each, postpaid.

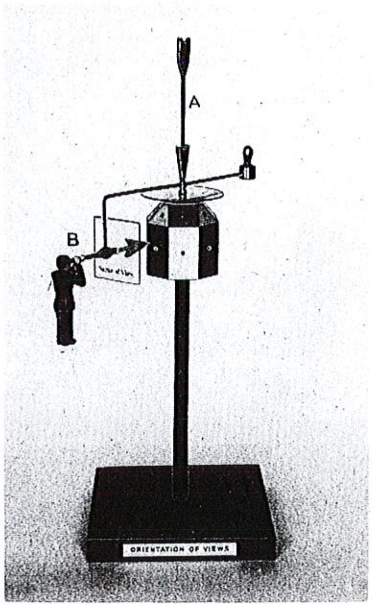


Fig. 1. Orientation and Direction of Sight for Auxiliary Elevation

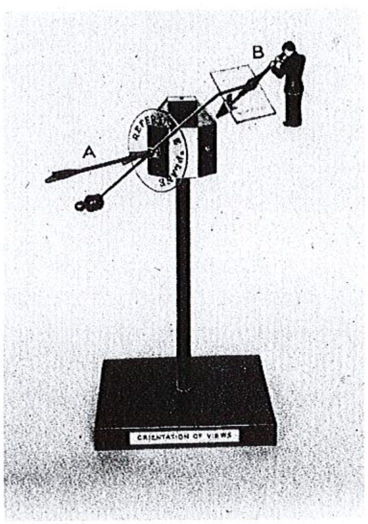


Fig. 2. Orientation and Direction of Sight for Oblique View

Figure 1 shows the location of arrow A for a top view. The manikin can go entirely around the block, and any view he obtains can be drawn adjacent to the top view. The height dimensions remain constant, and can be measured downward from a horizontal reference plane attached to arrow A. This, of course, is the demonstration for auxiliary elevations, and the manikin moves from the front to the position shown in Fig. 1.

To proceed from this auxiliary elevation to an oblique view, the positions of arrows A and B are interchanged in Fig. 2. Then the manikin can move from the top to any position for an oblique view. The dimensions in the top view which are to be used in making the oblique view are those which can be measured from the reference plane.

For a second oblique view, the positions of the arrows can be interchanged again, and the manikin can make a new circuit. Obviously, the whole demonstration can start with arrow A in position for a front view giving right-auxiliary and left-auxiliary views, or with arrow A in position for a side view giving front-auxiliary and rear-auxiliary views to be followed by oblique views.

Students get a "kick" from this demonstration. An instructor can learn a lot more than can be explained in this article by making a complete study of the operation of this model. They don't get too old to learn.

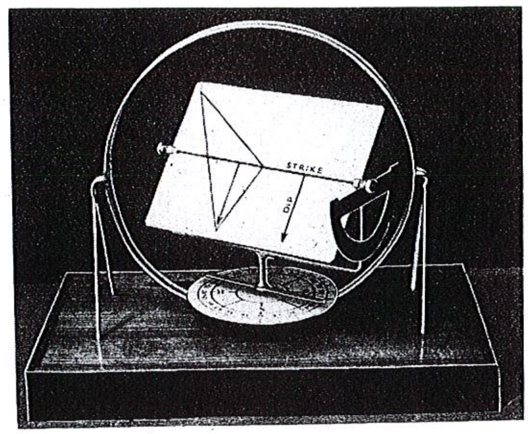


Fig. 3. Visualization and Strike and Dip of a Plane

The Strike and Dip Model, Fig. 3, is used not only to give the student a clear conception of the strike and dip of a plane, but also to demonstrate to him the visualization of a plane. This model is intended primarily for the "direct method" in which planes are not shown by their traces. The white rectangular plane revolves about a vertical axis, to which a pointer is attached and revolves above a fixed compass disk, on which the bearing of the strike-line can be read. The plane also revolves about the strike-line as a horizontal axis. The dip of the plane can be read on the protractor at the right end of the axis. By the use of this model any position of a plane can be set up for the class. The process of visualizing a plane can be so well established that the student can visualize any plane regardless of the data by which it is established. Since a plane is given in many cases as a triangle (or by three points) a colored triangle is drawn on both sides of the white plane. There is a frontal double ring which may hold a wire in contact with the plane to show a frontal line of the oblique plane.

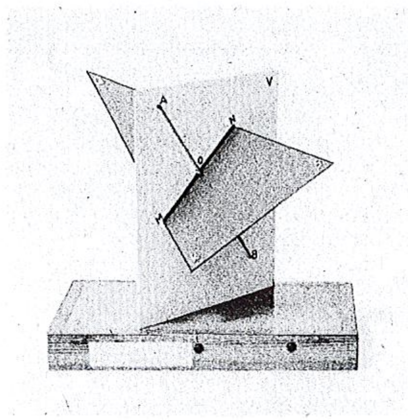


Fig. 4. Point at which a Line Pierces a Plane

To find the point at which a line pierces a plane is one of the most important fundamental problems of descriptive geometry, and one of the most difficult for the average student to master. In Fig. 4 the point O at which the line AB pierces the oblique plane QRS is determined by passing a vertical plane through the line AB. The vertical plane cuts QRS in the line MN which intersects AB at O, the piercing point. The student should be taught to visualize this operation every time he finds a piercing point by this method, and he should be required to make the edge view of the cutting plane. Otherwise, the drawing board construction is so brief that it may be used without being understood.

The use of this model is an effective aid in explaining this solution. Obviously, the model may be held so that the wooden base is in a frontal or a profile position, thereby placing the cutting plane in an orthofrontal or orthoprofile position.

Two desirable methods of finding the common perpendicular between two skew lines can be demonstrated clearly by the use of the model shown in Fig. 5. The common perpendicular is a steel rod which fits snugly into holes in two hardwood rods AB and CD. The rod CD is split and riveted together at G so that the rear half EF can be revolved so as to be parallel to AB.

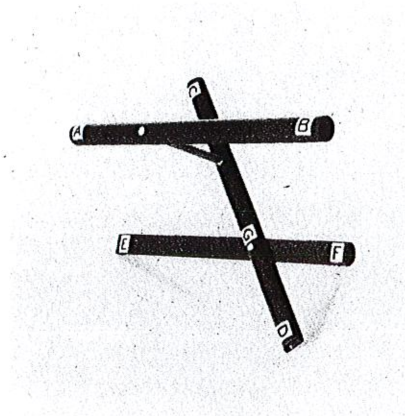


Fig. 5. Common Perpendicular by the Edge View Method

For visualizing the two given skew lines the model is set up in space so as to show the relative position of the lines, with CD and EF appearing as a single rod. Then, one method of finding the common perpendicular is to obtain a normal view and an end view of either AB or CD. The application of the principle of perpendicular lines is carefully explained with reference to the model. The solution is drawn out on the board and the model is placed in position over the normal view and over the end view.

For a second solution a plane CDEF is set up parallel to AB by making EF parallel to AB. The model has been used earlier in the course to show how to pass a plane parallel to AB through CD. The demonstration for finding the common perpendicular continues by obtaining an edge view and a normal view of the plane CDEF using both the model and a blackboard drawing.

(Continued on page 28)

(Continued from page 5)

that twice he won the National Prize for the best bookplate of the year. Heraldry on bookplates led to a study of that subject and he became a recognized authority to such an extent that he was selected to write the articles on heraldry and seals for the "Dictionary of the Arts" (1943).

Designs in metal such as the Lame medals and many others, as well as numerous bronze memorial tablets, indicate the versatility of his artistic qualifications.

In breadth of interest Professor French truly exemplified a gentleman of culture. He was widely read and widely travelled, having visited the famous places of Europe, the Orient, Mexico, Canada, and all parts of his own United States. The extent of his friendships with the great and the near great was as inclusive as his travels. It was natural then that his conversation on so many subjects was both interesting and accurate. His study and research made him qualified to meet the many demands for authoritative and interesting talks on etchings, bookplates, heraldry, Oriental art, story of the alphabet, lettering, paper making, and other subjects.

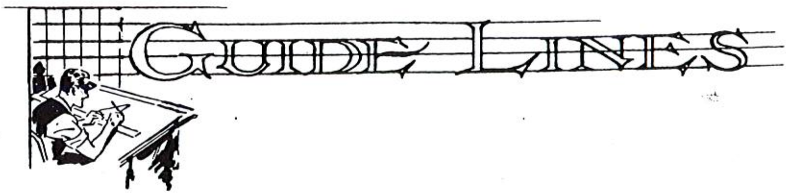
In 1942 Professor French retired from his administrative and teaching duties but he continued active in his many interests and was at work on the revisions of two books at the time of his death.

As would be expected he was an active member of many social and professional societies and was the recipient of many honors. Of the citations and awards, the ones of highest recognition and most pleasing to him came in 1943 when he was honored with two Lame Medals. One of these was by the S. P. E. E. for meritorious achievement in engineering education, and the other by the Ohio State University for outstanding contributions to the engineering profession. He was the only man ever to receive both awards. And of particular note is the fact that he designed the medals some fifteen years ago.

His society memberships included the Faculty Club, the Rotary Club, the Engineers' Club, and the famous Kit-Kat Club of Columbus, the Newcomers Society of England, and the American Bookplate Society. He was Trustee and Vice President of the Columbus Gallery of Fine Arts for many years. His college fraternity was Phi Gamma Delta, and he was a member of five honorary fraternities, Phi Beta Kappa, Tau Beta Pi, Tau Signa Delta, Sigma Xi, and Epsilon Pi Tau. He was a member of the American Society of Mechanical Engineers, the Society for the Promotion of Engineering Education, a Fellow of the American Society for the Advancement of Science and for several years member of the A. S. M. E. Standards Committee and Chairman of the American Standards Association's Committee on Drawing and Drafting Room Practice.

The Division of Engineering Drawing of the Society for the Promotion of Engineering Education was another of Professor French's visions which he brought to a reality. As one of the organizers and the first president of the division, he has been a familiar figure at the meetings of S. P. E. E. for many years. His presence will be missed, but the inspiration of his life interest will continue as a guide for the future of the Drawing Division.

Professor French's friends were many and varied from the lowly to the great and famous, but all were friends and all will miss his genial personality and companionship. But ever again and again with memories will come the thought that "Lives of great men all remind us" and with it the inspiration presented by this leader - Thomas Ewing French.



NOTATION AND NOMENCLATURE FOR DESCRIPTIVE GEOMETRY

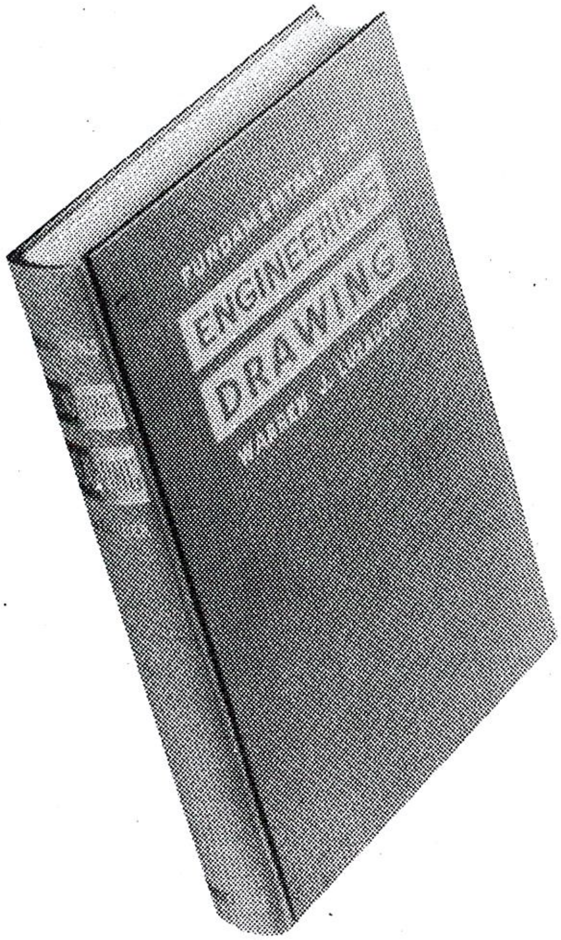
In accordance with the authorization of the Drawing Division in Cincinnati last June, Chairman Justus Rising of Purdue University has appointed the following committee to study this important subject.

Professor F. M. Porter, University of Illinois - Chairman
Professor H. C. T. Eggers, University of Minnesota
Professor F. M. Warner, University of Washington
Professor W. E. Street, Agricultural and Mechanical College of Texas
Professor J. H. Porsch, Purdue University

Book	INTERSECTIONS			CHARACTERISTIC NOTATION USED FOR REPRESENTING VARIOUS MAGNITUDES														
	Ground Line	Line and Principal Plane	Plane and Principal Plane	Point					Line					Plane				
				Space	Top	Front	Side	Other	Space	Top	Front	Side	Other	Space	Top	Front	Side	Other
1	XY	PP	Tr	A	a	a′			AB	ab	a′b′			T	T t	T t′		
2	X	Tr	Tr	a	a^h	a^v			A	A^h	A^v			4	4^h	4^v		
3	G.L.	Tr	Tr	a	a^h	a^v	a^p		A	A^h	A^v	A^p		N	HN	VN	PN	
4		Tr	Tr	A	A_h	A_v	A_s	A_u	AB	A_hB_h	A_vB_v	A_sB_s	A_uB_u	Q	QH	QV	QS	QU
5	G.L.	Tr	Tr	A	a	a′	a_1'		A-B	ab	a′b′	$a_1'b_1'$		R	HR	VR		
6	AB	PP	Tr	M	m	m′			MN	mn	m′n′			T	T t	T t′		
7	AB	PP	Tr	M	m	m′	m″		MN	mn	m′n′	m″n″		T	HT	VT	PT	
8	FL_{1-2}		Tr	a	a_1	a_2		a_3	a-b	a_1b_1	a_2b_2		a_3b_3	Q	TQ_1	TQ_2		TQ_3
9	HV	Tr	Tr	A	A_h	A_v	A_p		AB	A_hB_h	A_vB_v	A_pB_p		R	R R_h	R R_v		
10	G.L.	Tr	Tr	a	a^h	a^v			ab	a^hb^h	a^vb^v			S	HS	VS		
11	G.L.	PP	Tr	A	a	a′			MN	mn	m′n′			R	R r	R r′		
12				B	B_T	B_F			BC	B_TC_T	B_FC_F			QRS	$Q_TR_TS_T$	$Q_FR_FS_F$		
13	G.L.	PP	Tr	A	a	a′	a_2	a_3	AB	ab	a′b′	a_2b_2	a_3b_3	S	s s	s′ s′	s_2 s_2	s_3 s_3
14	G.L.	Tr	Tr	a	a^h	a^v	a^p	a_1^v	AB	a^hb^h	a^vb^v	a^pb^p	$a_1^vb_1^v$	Q	HQ	VQ	PQ	V_1Q
15	VH	Tr	Tr	Q	Q^H	Q^V	Q^P	Q^{IV}	t	t^H	t^V	t^P		Σ	HΣ	VΣ	PΣ	
16	XY	Tr	Tr	A	a	a′		A_1	AB	ab	a′b′			LMN	HT	VT		
17	AB	Tr	Tr	A	a	a′	A	$a''_1 a_2$	MN	mn	m′n′	MN	m_2n_2	tTt′	T t	T t′		
18	G.L.	Tr	Tr	a	a^h	a^v	a^p		A	A^h	A^v	A^p		Q	HQ	VQ	PQ	
19	XY	Tr	Tr	A	a	a′			AB	ab	a′b′			LMN	LM	LN		
20	G.L.			A	a	a′	a″	a_2	AB	ab	a′b′	a″b″	a_2b_2	ABC	abc	a′b′c′	a″b″c″	
21	G.L.	PP	Tr	A	a	a′	a″		AB	ab	a′b′	a″b″		T	T t	T t′	t″ t″	
22	X	PP	Tr	a	a^h	a^f	a^s	a′	ab	a^hb^h	a^fb^f	a^sb^s		Q	HQ	FQ	SQ	
23	G.L.	PP	Tr	A	a	a′	a_1	a_2	AB	ab	a′b′	a_1b_1	a_2b_2	T	T t	T t′	T t_1	t_2 t_2
24	G.L.		Tr	M	m_1	m′	mp^v		MN	m_1n_1	$m_1'n'$	mp^v-np^v		S	S s_1	S s′		
25	G.L.	Tr	Tr	A	a^H	a^V	a^P	a^Q	AB	a^Hb^H	a^Vb^V	a^Pb^P	a^Qb^Q	T	HT	VT	PT	QT
26	G.L.	Tr	Tr	A	a	a′	a″	a_3'	A-B	ab	a′b′	a″b″	$a_3'b_3'$	KRK′	R K	R K′		
27	G.L.	PP	Tr	A	a^h	a^v	a^p	a^q	AB	a^hb^h	a^vb^v	a^pb^p	a^qb^q	T	HT	VT	PT	QT
28	G.L.	Tr	Tr	A	a	a′			AB	ab	a′b′			RSR′	S R	S R′		
29	G.L.	Tr PP	Tr	a	a″	a′			ab	a″b″	a′b′			T	HT	VT		
30	HA	Tr	Tr	a	a^h	a^v	a^p	a^{VI}	ab	a^hb^h	a^vb^v	a^pb^p		Z	Z Z^h	Z Z^v	Z′ Z″	

Courtesy Professor F. M. Porter and Ginn and Company

(Continued on page 22)



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SPECIALIZED COLLEGE TRAINING FOR RCA DRAFTING DETAILERS

by

J. NORMAN ARNOLD
Associate Professor of General Engineering
Purdue University

FRANCES M. TALLMADGE
Resident Representative of Purdue
Radio Corporation of America

The Radio Corporation of America, like other industries under pressure because of war production, found itself faced with a potential shortage of draftsmen. To meet this need the RCA Engineering Drafting Aides Program was organized. Since the drafting supervisors had employed a number of women, and had found that many of them developed into excellent detailers, it was natural to seek women for this new training program. The course was planned to give adequate background so that is would be possible for the trainees to advance on the basis of continuing experience. The course was given at Purdue University under the direction of the Department of General Engineering which is headed by Professor C. W. Beese. It was sponsored by the Engineering Department, Radio Corporation of America; General Personnel Administration, Radio Corporation of America, facilitated the development and handled the operation of the program.

SELECTION

To assure the selection of girls who could carry the training program and become detailers, selection was based on several factors. Applicants were to be of college age and have a high school education, preferably including some work in mechanical drawing or freehand art work. Background in physics, mathematics or shop work was also favored. In addition to a review of the applicant's academic background, full consideration was given to work experience. Publicity was first released within the RCA plants and employees were given first consideration. Three tests were administered to each applicant as a selection device. One of these was a general intelligence test, one was a test of shop arithmetic, and the third was a drafting aptitude or spatial relations test. Minimum standards on these three tests were set up on the basis of published norms for other groups. With this selection basis it was possible to choose a group that was above the average college level in intelligence and had the ability to carry this particular type of program.

During the course the Drafting Aides received $44 per month plus room, board and tuition. They were housed in University dormitories and had all the privileges of regular Purdue students. Their books were furnished by the Company; the Aides bought their own drawing instruments.

THE CURRICULUM

The curriculum for the training program was planned by members of the faculty of Purdue University in cooperation with RCA engineers and drafting supervisors, and was coordinated by the Training Education Section of the Company. Although the major portion of the time was devoted to drafting, the scope of the training was broadened by adding courses which were related to drafting work and also would provide background necessary for simple design.

The program of study for the Drafting Aides included:

Subject	Hours per Week	Duration in Weeks
Electronics	2 Lec	First 12
Materials & Processes	2 Lec	Last 12
Shop Work	6 Lab	24
Mathematics	3 Rec	24
Mechanics	3 Rec	24
Drafting	2 Lec-Rec 18 Lab	24
	34	

Obviously only very elementary electrical principles could be covered in the Electronics course, which was given during the first twelve weeks in a total instruction time of 24 hours. The principal purpose of the course was to acquaint the girls with some of the electrical terms and devices that they might meet on the job.

During the last twelve weeks a course in Materials and Processes replaced Electronics in the schedule. This course included discussions of processes such as annealing, welding and casting, and consideration of such qualities as hardness, ductility and tensile strength. The manufacture of various materials such as steel, copper and rubber was presented by means of motion pictures.

In the Shop course some pencil and paper problems related to shop work were assigned, but a major portion of the class time was spent in operating lathes, milling machines and punch presses, as well as in sheet metal, electrical assembly and production inspection. The purpose of this general course was to give the Aides an appreciation of processes and operations as they relate to design.

For Mathematics and Mechanics courses the students were sectioned into three classes at the end of six weeks. Sectioning was done on the basis of ability as shown by tests and classroom experience. The more advanced class studied analytic geometry during the last two months. The other two classes studied arithmetic, trigonometry and algebra; the problems presented related to work in the plant insofar as possible.

The major portion of the Mechanics course was devoted to statics. Problems on gear ratio, mechanical advantage, friction, centroids and moment of inertia were included.

Various means were employed for coordinating the foregoing courses with each other and with the Drafting course. For example, the solution of triangles occurred in Mechanics as well as in Mathematics class, and the solution of a component force problem was involved in one drafting problem. Instruction in trigonometry and the use of the slide rule was given in Mathematics class and its use was required in the solution of mechanics problems. A sheet metal job constructed in Shop was first used as a drafting problem. Some shop demonstrations were coordinated with related drafting problems.

DRAFTING COURSE

Sixty percent of the student's class time was spent in Drafting class. This was divided into six three-hour laboratory periods per week plus two lecture or recitation periods, making a total of twenty hours per week. For the laboratory work all students met at the same time in a large drafting classroom having a capacity of ninety. The entire group was divided into three classes of twenty-two to twenty-four students each. No attempt was made initially to section on the basis of ability. Every four weeks the three instructors changed classes so that each instructor was with each class during four of the first twelve weeks.

At the end of twelve weeks the students were regrouped, placing in one drafting section the faster and more capable students. This group spent about twenty hours on pictorial drawing including oblique, perspective and trimetric. This time was distributed over several weeks and was taken from time scheduled for detail and assembly drawing. The other sections made two or three perspectives but no oblique or trimetric drawings.

OUTLINE OF RCA DRAFTING COURSE

No. of Problems Assigned	Average No. of Problems Solved	Approximate Time Hours	Approximate Time Weeks	Problem Description
7	7	9	1-3,8	Lettering practice sheets
19	10	16	1	Sketching
11	6	16	2	Introduction to instrument drawing
6	4	22	3	Sections
5	4	23	4,5	Auxiliary detail drawing
6	4	43	5,9,15	Ink tracing
6	5	25	6	Isometric detail drawings
8	5	16	7	Flat patterns and intersections
6	4	14	8	Schematic and wiring diagrams
10	7	33	9,10	Mating parts and limit dimensions
2	2	11	11	Casting design
6	3	15	12	Welded parts
4	3	21	13	Ceramic drawing
6	4	70	14-16	Assembly drawing from details
3	1	33	16	Exploded isometric assembly
6	3	16	17	Perspective drawing
2	1.5	27	18-19	Details and assembly from layout
2	1.5	25	19-21	Chassis drawing (sheet metal)
12	10	25	22,23	Revisions, changes
3	2	14	24	Outline drawings from models
		6		Class excused two periods early
130	87	480		

Purdue University General Engineering Department motion pictures were used to introduce several topics: "Capital Letters", "Sketching", "Applied Geometry", "Use of T-square and Triangles", "Sectional Views" and "Auxiliary Views". The lettering practice was distributed over the first three weeks, except for a practice sheet using Wrico guides and one using the Leroy lettering instrument in the eighth week. The Wrico guides were used on two or three drawings, also. Although sketching is indicated only for the first week, preliminary freehand sketches were required for many problems later in the course.

Most of the problems were presented to the students in the form of mimeographed or printed instruction sheets; for a few problems the instructions were written on the board. In addition to RCA problem material a similar industrial drafting program and the Purdue Navy V-12 drawing course were sources for some problems. In general the problems were presented to the students in a form different from the type of solution expected (i.e. if a detail drawing was to be executed by the students, the problem was presented as a pictorial drawing; pictorial drawing problems were presented as multi-view drawings). RCA blueprints of the details were presented for several assembly drawing problems.

RCA drafting practices were introduced early in the course. Some difficulty was experienced in this because practices vary among the drafting rooms to which the girls are assigned. These variations arise partly from inherent differences in RCA products --- tubes, phonographs, radio receivers and small parts; and because of the differences between equipment development drawing and product drawing.

THE CONTRIBUTION OF RCA

The Company contributed to the effectiveness of the teaching program in several ways. Each trainee received an RCA Manual of Drafting and Shop Practice; a number of the drafting problems required reference to this manual. More than two-thirds of the drawings were made on paper and cloth having the official company title block, revision strip and tolerance notes. There was a complete set of RCA purchase specifications and standardizing notices for reference in the drafting laboratory as there is in the plant drafting rooms. The Company also furnished a large number of blueprints and sample parts which were the source of many problems.

The instructional staff visited the Indianapolis plant before the program started. During the program the chief drafting instructor visited three of the plants, discussing with the drafting supervisors concerned the possibilities for harmonizing course material and job requirements. A number of Company representatives visited on the campus at intervals during the program. They included four drafting supervisors, a drafting practice coordinator, a process engineer, the Manager of Manufacturing, the Assistant Chief Engineer and members of the Training and Education Section. Through these visits and the talks to the Aides, a feeling of company loyalty and a professional interest in drafting work developed in the group. Each of the girls made an all-day trip to the Indianapolis plant, spending some time in the drafting room and visiting other engineering sections and the factory. This was done to further link training with an understanding of the job.

PLACEMENT

At the end of the six-month training program the Aides were given job assignments in the engineering departments of four of the manufacturing plants of the RCA Victor Division of the Radio Corporation of America. The majority of the girls were assigned to the mechanical sections of the drafting department, a few work on electrical drafting and a few work with plant layout, industrial engineering and standardizing departments. They are classified as draftsmen-detailers.

As an aid in making this placement as valid as possible the drafting instructors checked a rating scale for each Aide. The scale included evaluation of the quality of the work done in various phases of drafting such as tracing, lettering, wiring diagrams, detailing and pictorial drawing, as well as a rating on neatness and accuracy of the work and characteristics such as industry, resourcefulness and speed. Comments were added on many sheets. Such ratings from two instructors in addition to the grade averages in all courses gave some objective evidence on which placement could be made for the best utilization of special abilities.

EVALUATION

Seventy-seven Drafting Aides enrolled in the course. Of this number sixty-four received a certificate of completion. Of the thirteen who have withdrawn, five did so because of dissatisfaction with the program, especially its technical aspects; two left because of poor academic work; two because of protracted illness and four for personal reasons. The ages ranged from seventeen to twenty-eight, with the majority seventeen or eighteen years old. Thirty-one of the total seventy-seven had worked in the RCA plant previous to applying for the program. Except for three who had had a year of college work, the remainder came directly from high school. The fact that the Aides were young and most of them were away from home for the first time made the problems of adjustment major ones.

At the conclusion of the program, but with no evaluation of success on the job, we offer these observations on the academic aspects:

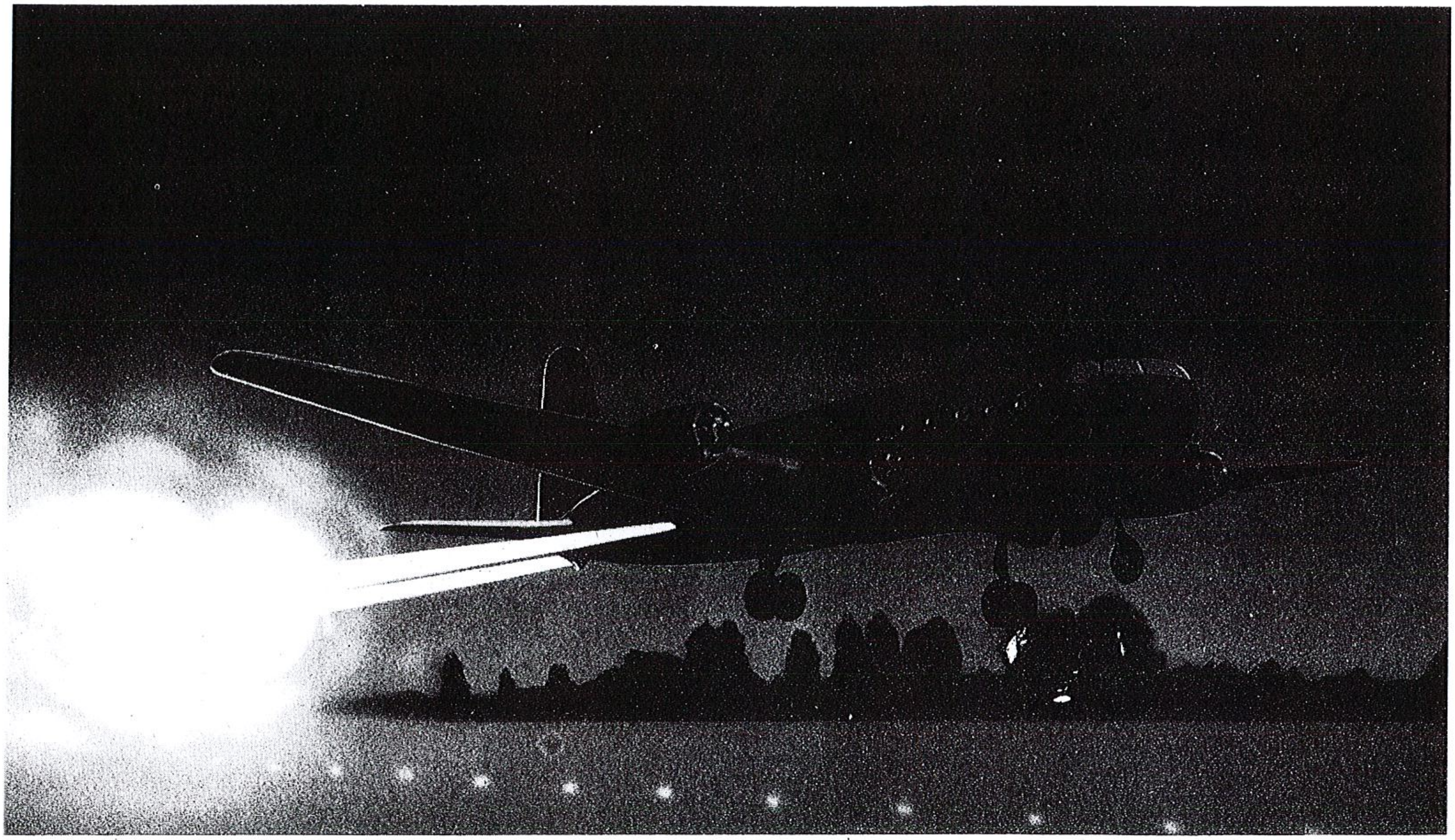
1. A prerequisite of a stronger background in mathematics, or concentration of the mathematics in the first half of the course might have given more support to other elements of the curriculum.

2. Several small drafting classrooms seem to have advantages over one large room.

3. More might have been accomplished by having less hours per week of drafting instruction and by continuing the course over a longer period.

4. The efforts to coordinate instruction in the several courses made a unified and concentration program. More cooperation of this kind, not only on such a specialized program, but also in regular engineering courses would seem to provide advantages.

The true value of the program will be apparent only as the girls prove themselves on the job. Current indications suggest that a number of them will do outstanding work; all are well able to do simple detailing. Since they have been trained in RCA techniques they should adapt rapidly. The close cooperation between college and industry represented by this program marks another training milestone in the meeting of critical war needs.



POWER FOR THE TAKE-OFF

War with its necessity to utilize our resources to the utmost has revolutionized our ideas of what can be air-transported. The one limitation, ability to get the plane off the ground, is being challenged by experiments in rocket-propulsion.

EXTRA PROPULSION IS NEEDED WHEN LOADS GET HEAVY

● It would seem that echoing through the heart of things and men is the need for greater economy, the need for getting more things done with lesser and lesser expenditure of energy and power. Perhaps we dimly realize that this is the shape of things to come, that thus alone can we prepare for and solve the vast problems of the future. With this thought in mind, it is no play of fancy that finds a message for educators in the fact aeronautical engineers are experimenting with rocket propulsion for getting more and more heavily laden planes off the ground.

For a more complex world faces the youngsters whom educators are now trying to fit for the future. Nations once separated by vast distances in time are now next door neighbors. Wider frontiers of knowledge must be explored if we are to live in harmony with these nations. Youngsters must be more broadly educated if they are to discharge their duties as citizens in the United States of tomorrow and rise to a satisfactory level of achievement.

How get them "into the air" with this heavier burden of education? How make sure they will face the future with courage, confidence, enthusiasm and undeviating standards? How make sure they will forge ahead, not shirking, blundering or failing at the very start?

Here are questions not answered by windy generalities but by sensitive and intelligent realization of a youngster's problems. He needs something that will create and reinforce belief in himself, something that will make him dream . . . and live out and up to his dreams. "We are what we think we are," and the necessity is to make the lad think big enough. When, for example, a boy first comes to class in mechanical drafting he is confronting the unknown. Shrewd instructors realize that in the opportunity thus presented, everything depends on the introduction . . . whether the lad's interest is captured, or blunted; whether his creative powers are aroused, or left dormant; whether the spark of achievement that slumbers in the breast of all is fanned into an all-consuming flame, or left slumbering.

To say that at such a time it does not matter what *kind* of drawing instruments the boy uses, to say that any but the most carefully selected and highest quality instruments he can afford will do, is to pass up an opportunity for positively influencing the boy the like of which may never be seen again. Here is one of the influences the wise educator can enlist to gain the extra power all boys need for the take-off.

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EVERYTHING FOR DRAFTING AND SURVEYING

AN ISOMETRIC APPROACH TO DESCRIPTIVE GEOMETRY

by

B. M. ALDRICH, Assistant Professor of Mechanical Engineering
Oklahoma Agricultural and Mechanical College

The theory of Descriptive Geometry finds extensive practical application in such endeavors as ship design; lofting, piping layout; sheet metal work; shades and shadows; architectural display; airplane design; bevel gear design; guide pulley layout; carpentry; mining; drainage; surveying; and many other fields of engineering. What other subject in engineering has a broader direct application?

In the author's opinion, Descriptive Geometry, as a study, supplies the young student with his first introduction to the real essence of engineering. Problems must be solved in a logical step by step process. And the fact that many problems have more than one solution challenges the students abilities in the use of originality and ingenuity. Successful mastery of the fundamentals and their application to problems requires systematic and logical thinking habits and demands explicit accuracy. Certainly there is a need for this type of training in Engineering.

Mastery of the subject is difficult for many students, a difficulty which seems not to lie entirely within the subject matter itself, but more particularly in the special type of preparatory training required. A review of the records of fifteen hundred students who enrolled in Descriptive Geometry at Oklahoma A. & M. College showed approximately 30% failures. In the opinion of the author, this percentage of failures could be materially reduced if greater care is exercised on the part of the instructor; presenting the subject in such a way that it may be more effectively absorbed by the majority of the students. The instructor often fails to supply sufficient aid to enable students to carry over from theory to application. Instructors recognize it themselves, and indirectly admit as much in advocating frequent changes in course material and the method of presentation as well as by the large number of texts written and published on the subject.

Adding to this dilema, it has been found that students have developed habits of static thinking, and seem to lack ability in kinetic thinking, a condition which is indicated by the difficulty they experience in the study of subjects dealing with relative motions; cyclic gear trains and similar relationships. Cultivation and assimilation of the processes of kinetic thinking, as is necessary in Descriptive Geometry, comes natural to some students, for others it is extremely difficult and some entirely unable to develop this ability regardless of the time and effort expended. This difference in native ability seems to classify Descriptive Geometry students into three groups, (a) those who can grasp subject with comparative ease, (b) those who can grasp it with considerable difficulty, and (c) those who are unable to do much with it. In the latter group and to a considerable extent in the middle group, a wide breach appears between the understanding of theory and the ability to make proper application of the theory, a breach for which the students seem unable to supply a mental bridge.

As a possible partial solution to the problem, three proposals are offered, namely:

(1) An Isometric Approach to Descriptive Geometry.

(2) A Change in the Order of Presentation.

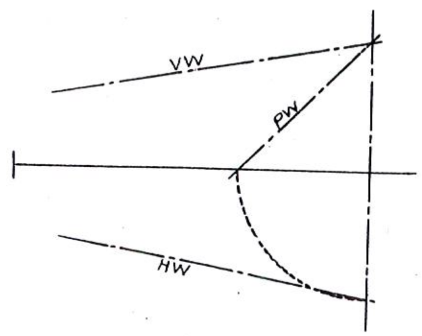
(3) Use of Extensive Drills.

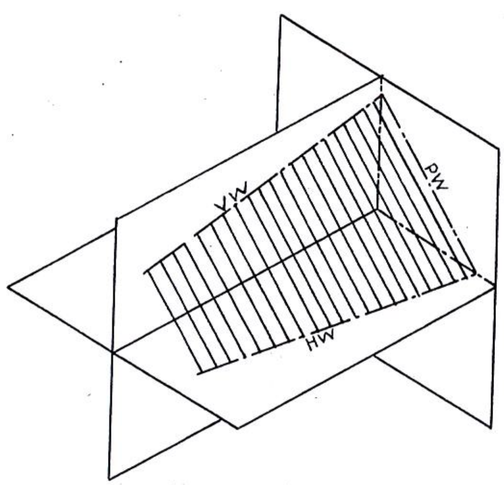
(1) "An Isometric Approach to Descriptive Geometry" is a pictorial and visual presentation of the subject, a method which, in the author's opinion, functions to narrow the breach between the understanding of the theory and its application, and which lends material assistance to the students in formulating a clear mental picture of the problem and the subsequent planor transposition.

In this approach Isometric drawings are made of type problems illustrating the fundamentals of Descriptive Geometry in their space relationships. These drawings are exhibited in large chart form and are used in conjunction with the subsequent planor or flat solution of the problems. By this means the student has an opportunity to establish a clear mental picture in three dimensions before making the necessary planor (or two dimensional) transposition. During a lecture, reference is continually made to the isometric pictorial drawing as the same problem is sketched in the planor (or two dimensional) and explained. Transposition is thus made step by step and line by line, carefully correlating the three dimensional and two dimensional drawings. By using care in the choice and location of lines, points and planes, nearly all the fundamentals of Descriptive Geometry can be clearly and effectively shown in the use of isometric drawings.

May we illustrate the method:

A PLANE "W" SHOWN IN THE FLAT AND IN ISOMETRIC





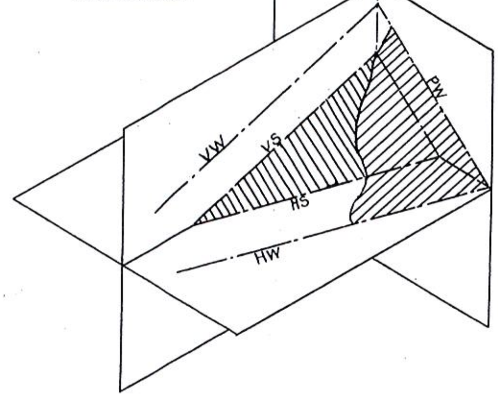
(2). The Order of Presentation: Students seem to readily grasp the solution of certain types of problems and become hopelessly confused in trying to solve other types of problems which seem equally simple to the instructor. Examination of the causes of this condition raises the question of proper order in which the fundamentals should be presented. Relative to this subject the author would like to make two suggestions.

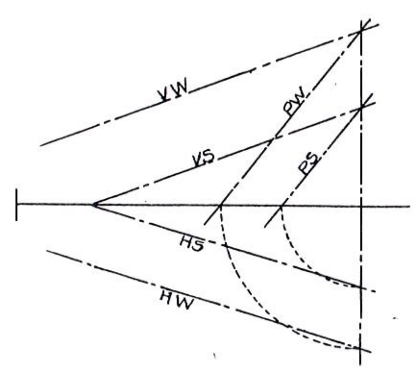
First: In regard to the order in presentation of the elements of Descriptive Geometry. It is the custom of most texts on the subject to deal first with points, then lines and planes, and a combination of these entities. A more logical order and one which can be tied more definitely to something tangible would seem to be, to deal first with planes, then lines, points and the combinations. A plane in space can be tied to its traces in the principal planes of projection while lines and points are dependent on abstract projectors for tying into the principal planes of projection. Dealing with planes first, the lines and points can be introduced by placing them in the planes, an arrangement the author has found to be more easily mastered by the student.

Second: In regard to the order of presentation of the fundamental problems of Descriptive Geometry. A little study of the subject reveals certain type problems to be Single-Step-Problems. These are easily mastered and should be presented first in the course. Their solution involves but one step.

TYPICAL ONE-STEP-PROBLEMS

TO DRAW LINES PARALLEL





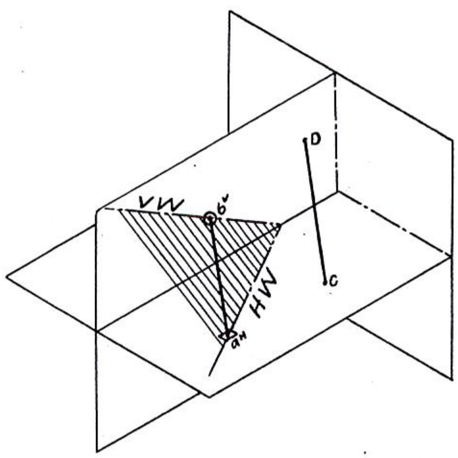
Other fundamental problems in this group are:

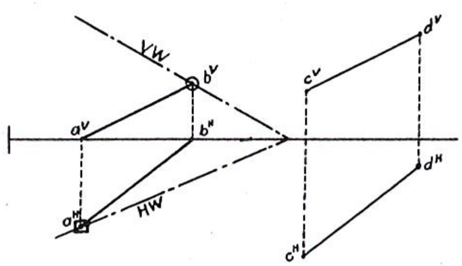
1. To Find Piercing Points of a Line.
2. To Assume a Line in a Plane.
3. To Draw Lines Parallel.
4. To Draw a Line Perpendicular to a Plane.
5. To Find the Line Of Intersection of Two Planes.
6. To Draw Lines Intersecting in Space.
7. To Draw a Plane Perpendicular to a Line.
8. To Find the Bearing of a Line.
9. To Find the P-Trace of a Plane.
10. To Locate the Missing Projection of a Point in a Plane.
11. Etc.,

Next in order follow the Two-Step-Problems. The solution of these problems involves an intermediate step which must be supplied by the student, either from memory, observation or analysis. These problems are much more troublesome and their solution requires considerable more effort.

TYPICAL TWO-STEP PROBLEMS

TO DRAW A LINE PARALLEL TO AN OBLIQUE PLANE





Other fundamental problems of this group are:

1. To Pass a Plane Through a Line.

2. To Pass a Plane Through a Point.

3. To Project a Line On An Oblique Plane.

4. To Pass a Plane Parallel to a Given Line.

5. To Find the Angle of an Oblique Plane with the Horizontal or Vertical Plane.

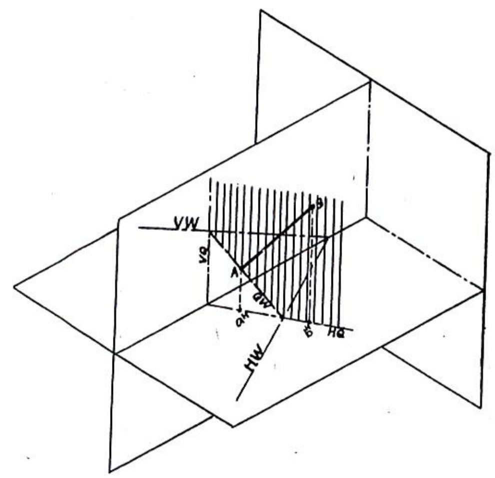
3. To Find the Q-Trace of an Oblique Plane.

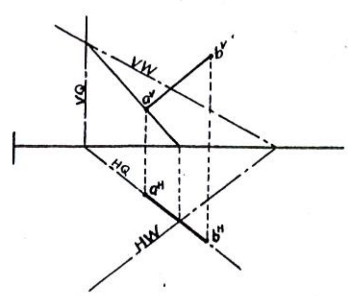
7. Etc.,

After the student has become familiar with the fundamental processes of one and two-step problems, Three-Step-Problems are introduced. The solution of these problems involves three steps and the student finds need to supply two intermediate steps from memory, observation or analysis. Problems of this group are considerably more difficult.

TYPICAL THREE-STEP-PROBLEMS

TO FIND THE PIERCING POINT OF A LINE AND AN OBLIQUE PLANE





Other fundamental problems of this group are:

1. To Draw a Plane Through a Point and Parallel to Two Given Lines.

2. To Find the True Length of a Line by Using a Q-Plane.

3. To Find the True Angle between Two Intersecting Lines.

4. To Draw a Plane Figure in an Oblique about a Point in That Plane.

5. To Pass a Plane Thru a Line and At a Given Angle to H. (or V).

6. To Draw a Line In an Oblique Plane At a Given Angle to H and V.

7. Etc.,

(Continued on page 29)

2. Making of visual aids.
3. Class room methods in Engineering Drawing and Descriptive Geometry (recitation, lecture, laboratory, mass lectures).
4. Problems - Source, presentation - prepared work sheets.
5. How to meet the objectives of speed and skill.
6. Demonstration classes in Engineering Drawing and Descriptive Geometry.
7. Effective teaching of dimensioning.
8. Methods for teaching lettering.
9. Orthodox vs direct method for Descriptive Geometry.
10. How to teach drawing so that it functions at college level instead of trade school level.

III-D-1 Organization and Administration

a. Organization and administration of a drawing department.
b. Qualifications and training of teachers; teacher student relation.
c. Grades and records.
d. Evaluation of work for credit.

III-D-2 Physical Plant

a. Drawing room design (equipment and supplies).
b. Use of special equipment.

III-E Examinations and Tests of Achievement

III-F Standards

1. Standards for drafting and drafting room practice.
2. Maintenance of standards in advanced drawing courses.
3. New techniques especially in aircraft drawing.
4. Reproduction processes.

III-G Advanced and Special Courses

1. Production illustration.
2. Graphics courses beyond the freshman year.
3. Special courses for girls for industry.
4. Correspondence courses (radio).
5. Technical drawing courses.
6. Special courses.

Final plans and selection of speakers will be made February 10 and 11, 1945 in Chicago.

Inquiries reveal that dormitory facilities at Washington University will probably be available at $1.00 per night with two in a room and that meals will run about $.60 on the average. It is probable that rooms will be available for those bringing their wives.

This is a school for all Drawing teachers and affords an opportunity for future planning.

(Continued from page 11)

As stated in the November issue of the Journal, Professor F. M. Porter of the University of Illinois made a study of Notations used in thirty Descriptive Geometry Textbooks in 1930 and this analysis was published by Ginn and Company. The results are reproduced here for Drawing teachers benefit. Send your suggestions to Professor Porter.

Some of the reasons collected in favor of a "standard" system of Nomenclature by Professor Porter include: First, to facilitate reference work for students and faculty whether it be for special work, broadening of their knowledge of the field, becoming acquainted with many texts, or exploring sources of problem material. In all these instances, it is discouraging to be forced to learn a new language with each book opened. Second, to permit use of standard achievement tests in descriptive geometry. The present heterogeneous method of marking drawings blocks the use of these tests.

PROJECTIONS

The editor appreciates the help of Dr. Carl L. Svensen, Professor Ralph S. Paffenbarger, Professor Justus Rising, Professor H. C. Spencer, the McGraw Hill Book Company and all others that have directly or indirectly so freely contributed ideas, time and material for the preparation of the tribute to Professor Thomas Ewing French, "In Appreciation of an Inspirational Leader in Engineering Drawing."

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Dr. Clair V. Mann, Chairman of the Committee to Formulate National Efficiency Tests in Engineering Drawing, has resigned due to circumstances beyond his control. This is regretable, for he has spent much time and effort in getting this project well under way. These tests are needed in the Drawing field.

Dr. Maurice R. Graney of Purdue University will carry on in Dr. Mann's place. Dr. Graney has conducted Drawing test work for several years at Purdue. He will need the support and cooperation of the Drawing Division so that this project may be carried forward to a successful completion.

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Professor F. G. Higbee, Head of the Engineering Drawing Department of the University of Iowa and Professor H. M. McCully, Head of the Engineering Drawing Department of the Carnegie Institute of Technology, both long time personal friends of Professor Thomas Ewing French attended the services in his memory at Columbus, Ohio in November, 1944. Professor Higbee writes that the floral tribute of the Drawing Division was "very beautiful". Professor Rising received the following note of appreciation from Miss Janet French, Professor French's daughter:

"May I thank you for the vases of chrysanthemums from the Drawing Division of S. P. E. E. They were so beautiful."

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Professor Justus Rising, Chairman of the Drawing Division, graciously and thoughtfully assumed responsibility for the floral tribute to Professor French and he is appreciative of the prompt approval by members of the Executive Committee of the division, both past and present.

St. Louis is a central location for the 1945 Drawing Summer School. Dean Langsdorf of Washington University reports that the campus is a delightful place in summer because they are situated about 5 miles from down town, on high ground near Forest Park, which is the 1904 St. Louis World's Fair Grounds. Added attractions during the summer are the Municipal Symphony, the civic opera, the excursion boat on the Mississippi, professional baseball, inspection trips, etc. Not to mention the Zoo with the educated "Chimps" whose antics might serve as an antidote to the professors if they become serious. Everything thus far points to a summer school which ought to satisfy the cultural as well as the professional needs of the Drawing Division. From a news letter by Chairman Justus Rising.

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Lt. (jg) Ray Cherry, Assistant Professor of Mechanical Engineering of the Oklahoma Agricultural and Mechanical College is on leave of absence for Naval duty. After enlistment, he reported at Hollywood Beach, Florida, July 31, 1944.

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Professor Ralph T. Northrup of Wayne University, Detroit has recently been promoted to Full Professor and Head of the Engineering Drawing Department. He has been directing the drawing work at Wayne for several years. He is now planning a special course in graphics for graduate engineers, foreman and supervisors for industries in that area.

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Professor Lawrence D. Jones, a member of the Engineering Drawing Staff and Secretary of the College of Engineering has been serving as Coordinator for the Army Specialized Training Program at Ohio State University.

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The Engineering Drawing Journal is happy to announce that Professor F. A. Smutz has returned to the staff of Kansas State College after an illness of eight months. Professor Smutz served as circulation manager of the Journal during the years 1941-43. We wish that he may continue in the best of health.

At the Annual Meeting of the National Council of State Boards of Engineering Examiners held at Lexington, Kentucky on October 30 and 31, Dr. Carl L. Svensen was appointed as representative of the National Council on the Engineers' Council for Professional Development. He was also appointed chairman of the Committee on Finances of the National Council of State Boards.

On November 21st at the Municipal Auditorium at Topeka, Kansas, Dr. Svensen addressed a combined meeting of the Kansas County Engineers and County Commissioners on the registration of Professional Engineers and what it means to the public and to the engineers. He spoke as the representative of the National Society of Professional Engineers.

At the tenth anniversary meeting of the National Society of Professional Engineers held at the Commodore Hotel in New York, Dr. Svensen was one of the principal speakers. His address was on "Legal Qualifications and The Future of the Professional Engineer". He represented the National Council of State Boards of Engineering Examiners, of which he is the immediate past president.

Dr. Svensen presided as Chairman on November 15th at the Post War Planning Conference for Controlled Surveying and Mapping sponsored by the Engineering Department of the University of Texas, The Engineering Department of the A. & M. College, and the General Land Office of the State of Texas, held in Austin.

One of the Committees of the New Division of Instructional Methods of the S. P. E. E. is a Committee on Examinations. Dr. Svensen has been appointed chairman of this committee. Dr. Clair V. Mann of the Drawing Division is a member of this committee.

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Ensign Walter Kings, Instructor in Mechanical Engineering at the Oklahoma Agricultural and Mechanical College is on leave of absence for Naval duty. He reported to Tuscon, Arizona July 15, 1944. He finished his training in September and sailed from San Francisco for his assignment in the Southwest Pacific.

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Professor Peter L. Tea of the Engineering Drawing staff of the College of the City of New York writes that he is glad to get the Drawing Journal.

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Major Boynton M. Green, Ordnance Department of the United States Army writes, "For nearly three years I have been on active duty in the Army and I discontinued the Journal because I simply did not have time to read all the technical material I was receiving. When I get back to teaching again, whenever that is, I expect to subscribe again to the Journal which has always been very interesting and informative."

Certainly we hope Major Green will be back teaching soon and we welcome his return.

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Professor S. F. Hicks of Wayne University has recently been promoted to Assistant Professor.

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Major Hollie W. Shupe, on military leave, of the Engineering Drawing staff of Ohio State, has been awarded the Air Medal and Naval Group Citation for heroism in the South Pacific Theatre of Operation.

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High school drawing teachers plans are under way to secure more articles for the Journal from teachers in your field. Please send the editor suggested topics for discussion. Also, supply names of people that you would like to see write your suggested topics. The Drawing Journal Staff is anxious to have the benefit of your ideas and assistance. Our work is all done gratis, so start the New Year off by sending the editor your suggestions and copies of your material that is ready for publication.

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Ensign James Boggs, Instructor in Mechanical Engineering Oklahoma Agricultural and Mechanical College, who in on Naval duty leave, took his Indoctrination work at Fort Schuyler, New York. He then attended General Ordnance School in Washington, D. C. before reporting to Aviation Ordnance Officers School at Jacksonville, Florida. He reports an addition to the family, Carolyn Jan, born October 17, 1944. Congratulations!

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Professor E. J. Gutsche of Wayne University has recently been promoted to Assistant Professor of Engineering Drawing.

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Professor H. P. Fry of the Engineering Drawing Department of the University of Pennsylvania was retired July 1, 1944 after having spent 41 years teaching Engineering Drawing.

Professor C. H. Black of the Engineering Drawing Department of the Missouri School of Mines and Metallurgy is on leave this year taking advanced work at M. I. T.

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Professor Worsencroft reports that the University of Wisconsin Drawing Staff is studying and re-evaluating their drawing courses based on the needs of new developments in industry. This is an excellent project for all Drawing Departments to undertake while their teaching loads are light.

Professor Worsencroft is also developing a final examination in beginning Engineering Drawing along the lines of the new G.I. Drawing Examinations. He is eliminating the giving of several answers with the questions formed in such a way that the student must frame his own answers.

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Professor Charles D. Cooper of the Engineering Drawing staff of Ohio State University has recently been promoted from Associate Professor to the rank of Professor.

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Mr. D. S. Osborne of the Engineering Drawing staff of Wayne University is on leave of absence and is working in the Engineering Division of Fisher Body Works.

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The Engineering Drawing staff of Oklahoma Agricultural and Mechanical College is in the midst of a model building program of large scale models of intersecting forms for instructional aid in Descriptive Geometry. Model aids in Engineering Drawing are very beneficial and here is another worthwhile project for drawing staffs while they have reduced teaching loads.

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The editor has received a number of commendatory comments about the Frontispiece in the November 1944 Journal, lettered and illustrated by a former editor, Professor Fred W. Slantz. Who do you know that can and will illustrate one of these pages? There must be others that would like an opportunity to demonstrate their artistic ability.

Professor Ralph T. Northrup, Head of the Engineering Drawing Department of Wayne University spoke to the Michigan Industrial Education Society drawing teachers recently on Industrial Production Illustration at Grand Rapids.

Professor Northrup has established a new drawing course at Wayne for Art Education Majors and Physicist Technicians known as "Essentials of Graphic Illustration". It covers orthographic, isometric, oblique, dimetric, and perspective, both mechanical and freehand.

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Professor H. E. Grant of the Engineering Drawing staff of the University of Wisconsin at Milwaukee, is interested in learning whether high school, junior college and technical institute teachers of drawing would like to remain for the Post Convention Sessions of the 1945 Drawing Summer School. Please inform him of your desires.

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If your Drawing Journal is a few days late please remember that we are in the midst of a great world conflict and that we are all having trouble meeting dead lines. It takes about two months to get the Journal into your hands after it leaves the editor instead of one month as in previous years. Printers must meet any contract demands directly connected with the war effort.

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Present Drawing Summer School plans call for one hour periods with a 30 minute prepared paper, two 5 to 10 minute prepared discussions of each paper and open discussion from the floor.

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Professor Ivan L. Hill of Illinois Institute of Technology has been named chairman of a sub-committee on Visual Aids to plan an effective demonstration and exhibit of all such aids that can be secured for the 1945 Drawing Summer School. Drawing teachers send him your suggestions to the Technical Drawing Department of the Illinois Institute of Technology. They will be appreciated.

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Leading educators recommend that every teacher subscribe to two or three publications directly connected with their major teaching field. Drawing teachers have you invited your friends to subscribe to the Journal of Engineering Drawing explaining the advantages of such publications?

EXECUTIVE COMMITTEES

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

1938 - 1939 to 1944 - 1945°

(Elected at meetings shown for periods indicated)

	College Station, Texas 1938-1939	State College, Penn. 1939-1940	Berkeley, Calif. 1940-1941	Ann Arbor, Mich. 1941-1942	New York, N.Y. 1942-1943	Chicago, Ill. 1943-1944	Cincinnati, Ohio 1944-1945
Chairman	Svensen	Mann	Hoelscher	Hoelscher	Farnham	Farnham	Rising
Secretary	Spencer	Spencer	Seegrist	Seegrist	Tozer	Tozer	Hill, J.L., Jr.
Past Chrmn.	Russ	Svensen	Mann	Mann	Hoelscher	Hoelscher	Farnham
	Rising (2)	Rising (1)	Heacock (5)	Heacock (4)	Heacock (3)	Heacock (2)	Heacock (1)
	Levens (3)	Levens (2)	Levens (1)	Phelps (5)	Phelps (4)	Phelps (3)	Phelps (2)
	Thomas [a]	Thomas [a]	Spencer (2)	Spencer (1)	Willey (5)	Willey (4)	Willey (3)
	Mann (5)	Slantz [b]	Thomas (3)	Thomas (2)	Thomas (1)	Porter (5)	Porter (4)
	McCully (1)	Tobias (5)	Tobias (4)	Tobias (3)	French, R.W. (2)	[c] French, R.W. (1) Thomas (1)	Hill, I.L. (5)
Editor T-Sq. Page	Porter	Leighton	Leighton	Street	Street	Street	Grant
Publication Committee	Slantz	Slantz	Slantz, Ed. Porter, Adv. Worsencroft, Circ.	Worsencroft Porter Smutz	Worsencroft Arnold Smutz	Worsencroft Arnold Smutz	Street Arnold Wood

[a] Replacing Spencer, elected secretary. [b] Replacing Mann, elected chairman. [c] Replacing Tobias.

° See Journal of Engineering Drawing, Vol. 1, No. 3 October 1937, page 17 for prior years.

THE REPORT OF CIRCULATION MANAGER AND TREASURER OF THE

JOURNAL OF ENGINEERING DRAWING

As of June 1, 1944

FINANCIAL REPORT:

Cash Received		
On hand June 1, 1943		$ 130.26
Received from advertising		252.50
Received from subscriptions - cash or check -		325.20
stamps		.53
Total		$ 708.49
Disbursements		
Printing of magazine and freight to Manhattan		512.82
Postage on magazine and correspondence		64.09
Envelopes and stationery		34.00
Bank Charges		3.63
Binding		4.00
Total		$ 618.54
Cash on hand June 1		89.95
Bills payable (not received) Swift & Co.	$158.85	
Artcraft Co.	6.00	
Total		$ 164.85
Bills receivable		86.75
Cash received and receivable		795.24
Cash paid and due		783.39
Net Balance		$ 12.51

Signed: J. N. Wood, Acting
Circulation Manager.

(Continued from page 9)

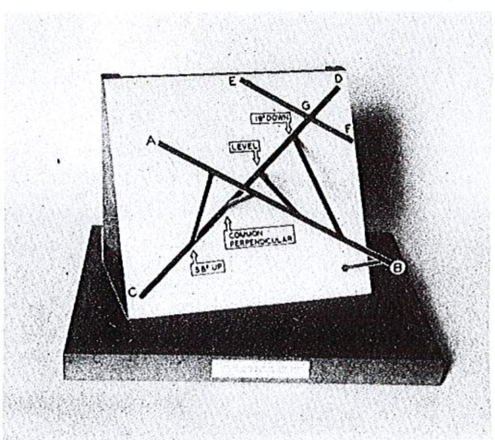


Fig. 6. Shortest Connections on Grades between Mine Workings

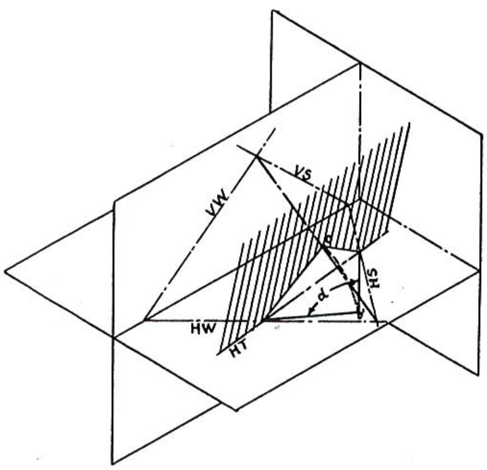
Although the second solution requires a better knowledge of "descript," it has the advantage of preparing the student for the problem of finding the shortest grade lines between mine workings, Fig. 6. In this model AB and CD represent the mine workings. The white plane passes through CD and is parallel to AB. This plane was found as explained in the foregoing paragraph. The upper edge of this plane is its strike-line. The model shows that in an auxiliary elevation which is an edge view of CDEF, the line AB appears to be parallel to the plane. In this auxiliary elevation, a normal view of the shortest line on any grade can be drawn from AB to the plane. To locate such a line which will connect AB and CD, the student looks in the direction of the required line and discovers that its end view is at the apparent crossing of AB and CD in this oblique view. The model shows that every shortest connecting line on any given grade is perpendicular to the strike-line of the plane. Therefore, all such lines may be considered to be the elements of a hyperbolic-paraboloid whose plane director is the vertical plane at the end of the model, and perpendicular to the strike-line. Two of the elements are the shortest possible line and the shortest level line (zero grade). A critical study of this model made by looking at it in many directions will reveal other interesting facts.

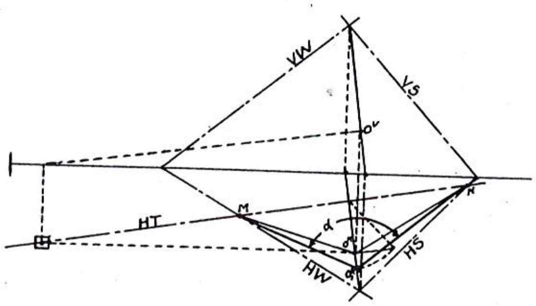
(Continued from page 19)

As the number of steps required in problem solutions increases, the problems become much more difficult to solve and students will be dropping by the wayside in their failure to reason them out.

A TYPICAL MULTI-STEP-PROBLEM

TO FIND THE ANGLE BETWEEN TWO OBLIQUE PLANES





(3.) Use of Extensive Drills. Before a student is in a position to absorb much theory in Descriptive Geometry he must become thoroughly familiar with the definition of terms and the general practice used in problem solution. Lectures given early in the course, often, are ineffective because the student has not acquired a working (and thinking) vocabulary of Descriptive Geometry language; consequently can only vaguely follow the lecture. Lectures will continue to be a comparative waste of time as long as this condition prevails.

Repetition in the definition of terms as the solution of fundamental problems produces a retentive foundation on the part of the student, early in the course which will enable him to grasp subsequent and more difficult problems. The use of frequent and extended blackboard drills serves well in this capacity as well as acquainting the student with the Spacer-Planor transposition. In this manner, results seem to be obtained more quickly than the same amount of time spent completing work sheets and plates. Penciling-out of problems by the student is very desirable and the drills function to accomplish this under the observation of the instructor.

Humanity lives, moves, visualizes, and to a large extent, thinks in terms of three dimensional space. Much of engineering work though observed and done in three dimensional space must be illustrated and recorded in two dimensional space. The mind must be trained to make this mental transition. The study of Descriptive Geometry theory seems to supply this type of mental training.

In Engineering it is necessary to stimulate, on the part of the student, the need for the development of orderliness, logic, accuracy and originality in his thinking. Descriptive Geometry requires orderliness, logic, accuracy in working habits and challenges originality in thinking. It would seem to supply much in the way of the desired early training of a prospective engineer. The author considers this subject to be a very necessary part of the engineering curriculum.