A REPORT ON THE DEVELOPMENT OF

AN INSTRUCTIONAL UNIT ENTITLED

"DESIGNING BOOK PAGES"

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by

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ABSTRACT

The purpose of this study was to develop a self-instructional learning activities package about book design, and to test it on a group of vocational students, in order to identify problem areas in the development of this type of instructional material and to construct a model for systemic development.

The unit consists of a booklet containing about forty pages of information interspersed with review questions and practice exercises. It was tested on two classes at the College of Trades and Technology in St. John's, Newfoundland. The formative evaluation was performed by the Commercial Art class of 1983, the summative evaluation by the Printing Class of 1985.

The students wrote a pre-test before studying the material and a post-test afterwards. In the course of the formative evaluation, the unit, was revised and retested when the survey of student attitudes and an item analysis indicated that parts of it were confusing to the students.

Statistical analyses of the pre-test, post-test and retest scores were attempted, but were inconclusive because of the small number of students involved.

The developer concluded that the self-study method works well for imparting cognitive skills, but that the learning of psychomotor skills is dependent upon the live presence of a skilled expert.

The instructional unit has been used as a model for the revision of the entire sixty-six module Printing curriculum at the College of Trades and Technology.

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Chapter 1

INTRODUCTION

This report is about the development of a learning activities package for individualized instruction. Individualized learning packages comprise one delivery method in the Competency-Based Instruction system (often called "C.B.I."), a system that is becoming widely accepted in vocational education circles. The writer's intent was to explore the philosophy and methodology of Competency-Based Instruction, with particular attention to the individualized instruction delivery system, and to construct a systemic developmental technique.

The project undertaken was to develop and test one unit of instruction for the Printing program at the College of Trades and Technology in St. John's, and to use this unit as a model for the revision of the entire Printing curriculum. The unit was selected for development because it was one of a series of design modules on the Printing "Record of Achievement" (also called a "Dacum" chart), and one for which no development had yet been attempted.

"Printing" is the title of a ten-month vocational program that enrolls young people aged seventeen and up, and gives them a hands-on exposure to each step in the process of producing printed materials. Two major technical revolutions have swept the printing industry since the College first opened its doors in 1963. The first was already underway at that time — printers had already begun to switch from letterpress printing with its raised metal type formes to offset-lithographic printing, where the image is photographically reproduced on a flat metal plate and transferred to the paper via a flexible rubber "offset" blanket. The second revolution was

breath-taking in its speed and scope — the application of the computer to producing letter images on photographic paper swept North America in a matter of months in the early 1970's. These two major developments in the industry were assimilated into the printing curriculum with excellent results.

One side effect of the printing revolution was the felt need for design education in the curriculum. For hundreds of years most printers had practiced "thinking in metal," assembling words and pages in three-dimensional type. This method has worked very well for the practical printer, despite the apparent disadvantage of working with reversed letter forms. The printer, in fact, early in his training learned to read upside-down, and could move individual characters, whole lines of type, and blocks of lines around on the "imposing stone" with great dexterity. When a type forme was assembled, for instance a title page, the printer would look at it critically and decide: "Too much space here, this is too high, and this too small," and slide the components around until his practiced eye was satisfied with the effect.

The advent of photographic reproduction and electronic image assembly has created a problem for the old-style printer. Today, when the typesetter touches the keyboard the characters that appear on the video screen are standard computer images, all of uniform size. It requires some imagination to picture that a headline will be 36 points (½ inch) high, and the next line will be one-third as high, but a full two inches lower on the page. New electronic composing machines are now reaching the market that produce proportional images on the video screen. The operator of such a machine still needs a knowledge of typesetting standards and "style" in order to enter typesetting parameters into the computer terminal.

Today, the typesetter needs training in "layout," the art of pencilling a design for a printed page. Layout has traditionally been the province of the commercial artist rather than of the practical printer. It is this demand that the Layout section of the Printing course attempts to fill. The instructional unit "Designing Book

Pages'' was designed to familiarize the student with book pages: sizes, proportions, the amount of type on a page, and the design constraints of printing and binding processes.

Chapter 2

NEEDS ASSESSMENT

Competency-Based Instruction

William E. Blank compares Competency-Based and traditional training pro-grams as differing in "at least four primary ways: *What* it is trainees learn, *how* they learn each task, *when* they proceed from task to task, and finally, how we determine *if* students learned each task" (1982, p.4). Blank's table of these characteristics is partially reproduced below:

Characteristic	Competency-Based Programs
1. *WHAT* Students Learn	Are based *solely* on specific, precisely stated student outcomes (usually called competencies or tasks) that have been recently verified as being essential for successful employment in the occupation for which the student is being trained. These competencies are made available to all concerned and describe *exactly* what the student will be able to *do* upon completing the training program.
2. *HOW* Students Learn	Provide trainees with high quality, carefully designed, student-centered learning activities, media and materials designed to help them master each task. Materials are organized so that each individual trainee can stop, slow down, speed up or repeat instruction as needed to learn effectively. An integral part of this instruction is periodic feedback throughout the learning process with opportunities for trainees to correct their performance as they go.
3. WHEN Students Proceed from Task to Task	Provide each trainee with enough time (within reason) to *fully* master one task before being allowed or forced to move on to the next.
4. *IF* Students Learned Each Task	Require each individual trainee to perform each task to a high level of proficiency in a joblike setting before receiving credit for attaining each task. Performance is compared to a preset, fixed standard.

At the time of developing this project, the writer was already working with the Competency-Based system because the Newfoundland Department of Career Development and the College of Trades and Technology were committed to the system, and had been for some time. In 1972, when the writer joined the staff of the College, he kept hearing the word "Dacum" whenever instructors exchanged shop talk. At that time it was not easy to get a satisfactory explanation of the term. The explanation was eventually found in the book *"Canada Newstart Program,"* by R. E. Adams, a book that has become the "Bible" of Competency-Based curriculum developers in Atlantic Canada.

The Competency-Based movement has spawned a number of variations, differing slightly in their approach to curriculum design and delivery. Blank mentions DACUM (*D*eveloping *A* Curricul*UM*) as an example of a competency based system, developed in Canada, that involves skilled workers from an occupation in curriculum development (1982, p.90).

Adams (1973) defines DACUM as:

A single-sheet skill profile that serves as both a curriculum plan and an evaluation instrument for occupational training programs.

It is graphic in nature, presenting definitions of the skills of an entire occupation on this single sheet of paper . . .

It is an analysis of an occupation rather than a curriculum evolving from an analysis. The occupation is subdivided into General Areas of Competence. Each is then analyzed to identify each skill it contains. The result is independent specification of each of the skills (behaviours) that collectively enable an individual to perform competently in the occupation. These skills are defined quite simply and are structured independently in small blocks on the chart. Each can serve as an independent goal for learning achievement (p.24).

A "DACUM" chart is reproduced in Appendix B.

The term "DACUM" is widely used in Canada, often interchangeably with "C.B.I." But there are regional variations. Holland College of Prince Edward Island uses the term "S.T.E.P." — Self-Training and Evaluation Program — to identify its unique approach, which is similar to DACUM in concept. The difference between STEP and DACUM appears to be one of degree of individualization. When

the writer visited Holland College in 1977, he met College personnel who insisted on the title "resource person" rather than "teacher" or "instructor." Some personnel were quick to point out that they never give lectures nor administer examinations. Delivery was by self-instructional methods, and evaluation was based on observed performance, conducted by the interview method after the student had first rated him/herself. The writer noted that some resource people seemed to spend eight hours a day lecturing, but to individual students rather than to groups or classes.

The writer was told that each new student set his/her own goals in consultation with a staff resource person. He was shown a large DACUM chart that was used for the separate occupations "Commercial Designer," "Sign Painter," and "Illustrator," simply by colouring different modules on the chart. Nobody, he was told, had ever completed everything on the chart. It was an "open-ended" program.

When administrators of the vocational system in Newfoundland decided to adopt features of DACUM and STEP in 1972, there were many reservations expressed by vocational instructors in the province, particularly about the concept of students setting their own goals and evaluating themselves. Although some personnel of the College of Trades were glowing in their praise of the creativity and flexibility of Holland College programs, others observed that a more structured approach might be more effective in Newfoundland.

The result was "S.P.I." (Self-Paced Instruction). Whereas Holland College, as a new institution, had opened its doors as a radically different institution with a total commitment to "STEP," Newfoundland vocational authorities, with seventeen existing institutions to administer, opted for evolution rather than revolution. As a first step, all vocational schools adopted a "Record of Achievement" (DACUM chart) for the Stenography program in 1972, and began the slow process of staff retraining. At first all institutions continued instruction by the lecture

method, but student evaluation was performed in terms of task performance or mastery, using a DACUM rating scale, and grades were no longer recorded as percentage marks.

During the 1972-73 academic year at the College of Trades and Technology a new course named "Stenographer-Upgrading" was designed. It was primarily planned to cater to former stenographers seeking to re-enter the work force, and it was a pilot project in DACUM development. This course was completed and enrolled its first students in the spring of 1973. It is a true DACUM program, with pre-testing, student-selected goals, self-instructional learning packages, frequent student-instructor interviews, and continuous intake/exit, and is considered to be very successful in achieving its goals.

The lessons learned in developing this project proved to be of great value a few years later when the College's Business Education Department staff developed Competency-Based programs for all one-year courses offered by the department. The Stenography program was reorganized and learning activity packages were prepared for each module on the new chart. The Clerk-Accountant and Clerk-Typist programs received the same treatment. These one-year programs are now operated year-round on a staggered intake, continuous exit basis.

Newfoundland's SPI programs differ from STEP in one important way. Whereas STEP encourages students to set their own goals and terminate their training when they have achieved these goals, a student in a SPI program must complete every module on the chart to a pre-set level to complete the program. The flexibility of SPI is a matter of time, not of program content nor student competence. That is, a student graduates when s/he has satisfactorily mastered every module on his/her chart, whether that is done in nine months or twelve. By comparison, in traditional training programs, all students graduate in ten months with varying levels of competence.

Skill Mastery

Central to all forms of Competency-Based Instruction is the concept of "mastering" a skill or a body of knowledge. Adams (1973) provides the reader with a flow chart graphically depicting the student's progress through a program (see Appendix C). The arrows on the chart indicate that a number of different learning activities should be available to the student, and the student may have to review the learning materials and request and receive assistance a number of times before s/he masters the skill. Exit to the next module or from the program does not take place until the skill has been mastered to the student's and the instructor's satisfaction (pp. 30,31).

Blank (1982) writes that "Requiring each trainee to demonstrate mastery of each task before successfully completing a training program is probably the most significant difference between the Competency-Based and the more traditional approach to training" (p. 158).

Grant (1979) suggests that "From the institutional point of view, the major impact of adopting a competence-based approach is to shift more of an institution's resources from the best to the average and below-average students . . . a higher proportion of the faculty will spend more time teaching these students basic skills and helping them achieve specified outcomes than in traditional schools" (p. 11).

Learning Activities Packages

A DACUM committee, comprised of experts in an occupation, designs a DACUM chart, then disperses. Adams specifies that the instructor may be allowed to observe this process, but should not be a participant. However, after the committee has left, the instructor must begin the chore of designing suitable learning activities to assure that the students will master the skills defined by the committee.

Adams (1973) lists the traditional lecture and demonstration methods as

effective learning media, although he suggests them as efficient alternatives to be used when a group of students are seen to have the same difficulty with the same tasks (p.31). He writes at length about a concept he calls "Learning Activity Batteries" or "LAB's" (p.153), which correspond to "resource boxes" in current C.B.I. jargon. Adams lists textbooks, journal articles, instruction manuals, and filmstrips among the materials kept in the LAB. Later, curriculum developers introduced the Learning Activities Package as the key to all other materials in the LAB or resource box.

Blank (1982) comments that "One approach that has proven very effective is the use of learning packages as the primary means of delivering instruction on each task. A learning package is simply a well-designed and carefully developed learning aid that gives students detailed instruction to guide them through the learning process and provide them with appropriate learning materials when and how long needed, which results in each student having as much time on a task as needed to reach mastery " (p.194).

The learning activities package does not replace a textbook, but it will direct the student to use textbooks, and other resources such as films, videotapes, filmstrips, operators' manuals, instruction sheets and even catalogues to acquire the technical information s/he needs to know before undertaking "hands-on" laboratory activities.

There are, understandably, many variations in learning activities package design. Academic subjects such as English and mathematics have different requirements than vocational subjects. The learning activities for bookkeeping can be performed with pencil and paper, at a desk, but a student who wants to learn to operate a circular saw obviously will have to learn cognitive skills (e.g. a set of safety rules) in addition to psychomotor skills (actually pushing materials through the moving saw blade). Although affective skills do not receive a great deal of attention in vocational education, they are nonetheless a vital component of every task (e.g.

safety consciousness, craftsmanship). All three sets of skills must be addressed in the learning activities, in an appropriate sequence.

Perry (1982) lists the following characteristics of a learning activities package:

- A LAP is a well-coordinated instructional module which is written in goal-oriented terms.
- A LAP deals with just one central concept or unit of instruction.
- A LAP allows students to work at their own pace.
- A LAP is generally teacher constructed, but may sometimes be purchased commercially.
- The scope of a LAP may vary.
- The LAP releases the instructor from many routine tasks related to assigning work and allows the instructor to work individually with students who may be experiencing difficulty.
- A LAP can either supplement or constitute an actual lesson within a competency sequence.
- LAPs are specially sequenced.

(p.102).

Competency-Based Instruction at the College of Trades and Technology

Business education instructors were pioneers in Competency-Based Instruction in Newfoundland, but they were not alone in the field. Other programs such as Commercial Cooking, Beauty Culture, and Heavy Duty Equipment Repair, were close behind the business educators in developing DACUM charts and conducting seminars for instructor training. Because these programs involved the development of psychomotor skills, they were not as easily converted to individualization, and instructors began to ask administrators for advice that the administrators often were not qualified to give.

It should be pointed out here that some of the programs that were first con-

verted to Competency-Based Instruction had been commercially marketed as correspondence courses for a number of years. Some early developers of programs in electronics, accounting, and commercial art, to name a few, drew heavily on materials from such institutions as National Radio Institute and International Correspondence Schools. Developers who could not obtain materials from these sources were forced to be more creative.

In the autumn of 1983 the administration of the College of Trades and Technology held a week-long seminar at which the philosophy of Competency-Based Instruction was reviewed, and some administrative problems were addressed. It was decided that the College was ultimately committed to individualization of all one-year "pre-employment" programs, and the following levels of progressive Competency-Based development were specified:

Level 1: A record of achievement has been completed for the program, and implemented. Instructional staff have received training in competency-based evaluation.

Level 2: A classroom resource centre has been started, and some learning activities packages have been completed. Some individualization of instruction has been instituted.

Level 3: There is a learning activities package in the classroom resource centre for each module on the record of achievement chart. Students are now learning at their own rate, and lectures have been discontinued.

Level 4: The process of individualization of instruction has been completed. Students are accepted on a staggered intake basis, and leave the program whenever they have completed it (continuous exit).

The "Printing" Program

The Printing course at the College of Trades and Technology reached the first level described above in 1973, a few months after the writer began his employment there. A Record of Achievement (or "DACUM chart") was designed, and

used as a course outline and a supplementary report card, but the students continued to attend lectures and write formal examinations for several years, and percentage grades rather than competency-based evaluations were recorded by the Registrar's office.

The second level of development was reached in 1977, when the writer received federal government funding to prepare a re-training program for unemployed printers. Several learning activities packages in basic photo-mechanical skills were common to the re-training program and the existing pre-employment program. The "Printing" Record of Achievement was re-designed at this time to reflect changes in printing technology, and the common learning activities packages were incorporated into the program. The writer was surprised at this stage to learn that he was the only graphic arts

A PRINTING STUDENT WITH A LEARNING ACTIVITIES PACKAGE. IN BACKGROUND, RESOURCE BOXES IN CLASSROOM RESOURCE CENTRE.

instructor in Canada who was developing a curriculum in the competency-based technology. Instructors teaching in some fields have been able to adopt whole programs or large sections of programs, or to work jointly with other instructors in the same field to jointly develop learning activities packages. In contrast, the writer has had to develop his own program in its entirety.

In 1983 the Printing program consisted of a chart with one hundred four

modules, based largely on the Holland College open-ended "STEP" philosophy. The student was required to complete the basic modules in every training band, and to choose an area of specialization from one of three: Design & Typesetting, Photo-mechanical Techniques, or Presswork and Finishing Procedures. The student was expected to complete every module in his/her area of specialization. About fifty learning activities packages had been completed, mainly in specialized techniques. The level of development was very uneven. The most basic skill modules were main-ly taught by the lecture/demonstration method.

The training band for which the least amount of work had been completed was "Layout and Design." It was decided that from this training block the module "Design Book Pages" would be a good one for development because no work had been done on it yet: no objectives or learning activities had been defined, and no tests designed.

Is this Skill Needed?

Does a printing student need to know how to design a book? To answer this question the writer reviewed the minutes of an ad hoc advisory committee,which was formed in 1977 to oversee the re-training project mentioned earlier. The module "Design Book Pages" was inserted on the pre-employment Record of Achievement chart on the recommendation of this committee. The committee was composed of two commercial printing shop managers, one newspaper foreman, and the super-visors of the printing shops at Confederation Building and Memorial University. The members of the committee had mentioned that the printing industry in New-foundland had a shortage of workers trained in book design and production, and that the need was great because book printing was a growing segment of the market.

The commercial printers stated that the apprenticeship system had once pro-vided excellent training for the trade, but that this was no longer so. The reasons

they suggested were the changes in technology, which rendered the knowledge of older craftspeople obsolescent, and the sharply reduced intake of new apprentices in the 1950's, which had coincided with the arrival of the new technology.

The re-training program was later discussed with the executive of the printers' union, after a Printing (Upgrading) Record of Achievement had been designed. These experienced craftspeople expressed interest in the program as a "refresher" course because, they said, none of them had received any formal training, and most union members were working at only one narrowly specialized skill. They expressed a need for broader training as a form of job security.

The book design module did not belong in the re-training program, which was to deal with photo-mechanical techniques. However, it was incorporated in the revised pre-employment Record of Achievement as a result of these suggestions. No further development had been done on it.

Survey of Available Materials

As we mentioned earlier, a good learning activities package does not have to contain all of the information the student needs to acquire, rather it should be a guide to the learning process, directing the student to read appropriate texts, and practice appropriate laboratory activities to acquire the information and technical skills described in the objectives.

The writer conducted a survey of learning materials about book design in the College of Trades Library, Memorial University Library, and in the catalogues of the College of Trades Audio-Visual Centre. A year later, during the Summative Evaluation process, the research was continued in the library of the Graphic Arts Technical Foundation in Pittsburgh, Pa. Approximately forty books were examined. Only a few of them contained any information on the subject.

Most of the books examined could be divided into two categories: the out-dated text and the art text. Outdated texts were published twenty five or more years ago, and dealt with the process of typesetting with three-dimensional type ("hot metal composition"). These books were all out of print, and the writer questioned whether the information they contained was valid today.

The other category mentioned, the "art" text, was directed at the art student who needed to learn a little about the printing trade. There were a number of recent volumes in this category, but all tended to concentrate on the art of designing adver-tisements, and to say little about the design and proportions of the book page.

The writer did find a few books that contained information he felt was suitable for printing students:

(1)   *General printing* by Cleeton, Pitkin, and Cornwell (1963). This book was in use at the College of Trades until 1973. Now out of print, it gives a very detailed and well-illustrated account of the obsolescent crafts of hand-setting type and operating the hand-fed platen press. It has an excellent section on designing book pages, but in the language of the hot metal typesetter, which the modern student would find confusing.

(2)   *Printing layout and design* by Delmar Publishers (1955). Also out of print, this book is written for the art student or the practical printer. A very comprehensive text, it covers all aspects of practical layout and book design, including several solutions to planning margins. This book has excellent work assignments to give the student practice in app-plying the principles taught. One feature of the book that is not reassuring is the ar-chaic illustration. For instance, it has an ad layout for Hudson cars, a make that disap-peared from the market in 1958.

(3)   *Printing technology* by J. M. Adams and D. D. Faux (1982), is an up-to-date printing text that includes a chapter on layout. One paragraph only covers book page design.

(4)   *Designing with type* by James Craig (1971) is a current text on typography that includes a number of excellent diagrams of page layouts. However only three paragraphs of the text deal with the subject, and no dimensions or proportions are given.

(5)   *Copy preparation for printing* by John F. Cabibi (1973) has a chapter titled "Typographic formulas" that is very useful. The book is primarily about preparing mechanical art for printing, and much of the material in it is already dated.

(6)   *Graphic designers production handbook* by Norman Sanders (1982) is an excellent resource book for a graphic designer, but rather advanced for the printing student.

After completing this research, the writer decided that no one text was satisfactory for the needs of the Printing course. He decided to develop a self-contained learning activities package that would include all of the information he

felt a Printing student would need to design book pages. The project was developed, and the week it was being tested a new book arrived in the College of Trades Library:

(7)   *Graphic layout and design* by Gerald Silver (1981) is a revised, updated version of "Printing layout and design," previously noted as No. 2. Printed in album format, in paperback binding, it sells for approximately twenty dollars, and would make an excellent text for the whole Layout training block of the Printing course. The book's only shortcooming is that it has no metric measurements.

Had this text been available earlier, the learning activities package could have been designed differently. If the students had access to this book, they could simply be directed to complete certain layout exercises in the book. However, since the prepared learning activities package was now duplicated and already in use, the testing continued as scheduled.

Chapter 3

LEARNER ANALYSIS

Introduction

.This unit of instruction was specifically developed for the students of the Printing course at the College of Trades and Technology in St. John's, Newfoundland. There are usually fourteen students in this class, drawn from all over the province, but up to half of them are from the St. John's area. On the average, over a ten year period, half of the students were female. The unit was designed to be tested on two classes, Printing and Commercial Art, because it contains material common to both programs.

Age

The College of Trades and Technology is a post-secondary institution. The minimum educational requirement for entry to the Printing and Commecial Art classes in 1983 was Grade 10 pass, but most students were high school graduates, thus the minimum age of the group was seventeen years. Six of the Printing students and six Commercial Art students were sponsored by Canada Manpower. Legislation specifies that Manpower clients must be eighteen years old and out of school for at least one year. One student was twenty seven years old. The average age of the group was approximately nineteen years.

Achievement

No entrance testing is done by the College or by Canada Manpower, but the

examination results recorded in the College English, Mathematics and Science classes indicate that the majority of the Printing and Commercial Art students are physically and mentally mature, and typical of young adults enrolled in one-year vocational programs.

Vocational students as a group differ from university students. The majority are generally not academically inclined, and do not read or write well. In the test group, all of the Printing students were high school graduates, but none had been honour students. In contrast, five of the Commercial Art students had completed one or two years of university.

Attitudes

The Printing students at the College of Trades generally have a positive attitude toward the program, and toward the competency-based approach to learning. Because the College accepts one in three applicants for this program, there is a certain status in having been admitted. Also, in comparison with high school students, who are required by law to attend school (up to a certain age), the Printing students have chosen the program, and may leave whenever they wish to. Those who become bored with the program, three or four students a year, usually drop out early.

The Commercial Art program appears to have an elite status. There are usually about one hundred applications for the fifteen places in this course. All students must submit a portfolio to prove their talent and suitability for training, successful applicants tend to have high marks in high school, and their peers often praise their handiwork. The Manpower students in the class, however, are often high school dropouts, but are required to submit the portfolio. The recorded grades for English, Mathematics and Science courses in the Printing and Commercial Art programs indicate that the mean scores of the groups are fairly close over a five year period.

The Commercial Art instructor expressed the opinion that few of his students have a valid conception of the work of the professional commercial artist, but tend to think of themselves as "fine artists" rather than as problem solvers or crafts-people. Very few students drop out of the program — usually no more than one or two per year.

These comments are based on ten years of observation and discussions with other teachers at the College. No survey of attitudes was conducted, but students in both classes write an evaluation of their programs for their English class each year, and the developer had access to these evaluations. A random sampling of the evaluations indicated that both classes had a positive attitude toward their programs. The two classes share the same English, Mathematics and Science courses, but the English course for Commercial Art students includes some work in writing advertising copy.

The Printing course is competency-based, using a combination of lectures, demonstrations, and individualized learning activities packages. Evaluation is based on skill mastery. The Commercial Art course is a traditional program with lecture/demonstration delivery methods, and evaluation by conventional written examinations and percentage grades for both theory and practical assessments.

Chapter 4

TASK ANALYSIS

To prepare the task analysis, the developer acquired a number of 3"x 5" file cards, and wrote on each card one piece of information he felt the student would need to learn in order to perform the task of designing a book. The cards were arranged into categories, each category a sub-task to be learned. Then, each sub-task category was subdivided into smaller task units. The cards were re-arranged several times, some cards were added to improve the sequence, some were deleted as redundant or irrelevant, and some cards combined, until it was felt that a satisfactory learning sequence had been arrived at. A series of charts depicting the final sequence is reproduced in Appendix D.

Assumptions and Entry Behaviour

It was planned to use two groups of students for the test, both of them involved in design, but from different perspectives. The developer therefore attempted to produce an instructional unit that would be within the interest scope of both groups. This meant that two sets of entry behaviour would have to be accommodated.

The developer assumed that the unit would be studied during the second semester, and that the following knowledge was common to both groups of students:

1. Students would have a basic understanding of the photo-offset printing process.

Printing students would have had hands-on experience in printing and binding

booklets and programs. Commercial Art students, because of their physical location on the same corridor and sharing the use of some equipment, would have acquired some knowledge of printing through observation.

2. Students would have some skill in basic drafting. Printing students would have acquired minimal skills in this area through completing earlier "Layout" modules on their record of achievement chart. Commercial Art students were expected to have acquired a high level of layout skill by the time they attempted the instructional unit.

3. Students would be proficient in measuring distances in inches and in millimetres, and in calculating proportions. Students would also be familiar with the pica system used in measuring printers' type.

Designing Behavioural Objectives

Bloom (1966) divided behaviour into three categories: cognitive, affective and psychomotor, and concentrated his efforts on the cognitive domain. Of the psychomotor, he wrote: "A third domain is the manipulative or motor-skill area . . . we find so little done about it in secondary schools or colleges, that we do not believe the development of a classification of these objectives would be very useful at present" (p.7). To one who has been exposed to the history of the development of Competency-Based Instruction (including DACUM, STEP, TRAC, and SPI) in the community colleges and vocational institutions of North America during the past fifteen years, this is an astonishing statement until one is reminded that Bloom was a pioneer, and that he was inviting comment from his readers on this subject.

Today, educators tend to regard vocational education as having an advantage in the area of designing behavioural objectives because its emphasis on psychomotor and work-related cognitive skills makes its objectives easier to state and measure.

Vargas (1973) states that "Specific objectives perform three functions:

They help the teacher select appropriate learning experiences, they communicate to others (particularly the student) what is expected, and they give both student and teacher standards for evaluating progress'' (p.24).

Mager (1962) writes that ''The most important characteristic of a useful objective is that it identifies the kind of performance that will be accepted as evidence that the learner has achieved the objective'' (p.13).

Wentling (1980) states that in evaluating the mastery of psychomotor performance objectives, ''unlike the measurement of either cognitive or attitudinal competencies, the measurement of performance requires that a given job situation be simulated both in terms of the testing conditions and operations performed'' (p.95).

Gagne and Briggs (1974) further refine the process of writing behavioural objectives: ''An objective is precisely described when it communicates to another person what he would have to do to observe that a stated lesson purpose has in fact been accomplished'' (p.85).

Gagne and Briggs state that the selection of ''action'' verbs for objectives is extremely important, and that certain verbs have special applications to specified human capabilities. For example, the verbs ''discriminates'' and ''identifies'' relate to cognitive skills, whereas ''executes'' relates to motor skills and ''chooses'' to affective skills.

But Gagne and Briggs' greatest contribution to the art of writing objectives may be in their attention to the verbs used in the ''objective case'' to qualify the main action verb. The observing and measuring of performance is enhanced when the action verb is qualified by an objective clause such as ''by listing . . . with pencil and paper,'' or ''by calculating . . .'' Objectives stated in this manner should communicate to the teacher, the student, and the examiner/observer what the student is expected to do, and how s/he will demonstrate mastery of the skill.

The developer applied these techniques in writing the performance objectives which follow. The next stage of developing the unit was the design of the pre- and

post-test. Several questions were designed to test the student's achievement of each behavioural objective. Instructional material could then be assembled, and learning activities selected, to ensure that the student would be exposed to an appropriate learning experience to achieve each objective.

Behavioural Objectives

After completing the learning activities package, the student should be able to:

1. Demonstrate an understanding of pleasing proportions in book page design by calculating the type measure and depth for a given page size, and preparing a page layout with appropriate margins.

2. Demonstrate good layout practice by preparing a neat and accurate pencil layout of two adjacent printed pages with progressive margins. The type measure and size, line spacing and type area depth should be indicated with properly spaced parallel lines.

3. Demonstrate professional techniques for integrating illustrations and photographs into the printed page by drawing accurate outlines on page layouts, both in the "bleed" and "run of page" or "inset" styles.

4. Identify the side-stitched, saddle-stitched, plastic-ring, loose-leaf, and perfect binding methods by labelling a set of diagrams on a written test paper, and list any design problems created by each of these methods.

5. Given a saddle-stitched booklet, identify the page numbers that will be printed side-by-side, by preparing a page chart.

6. Given a set of specifications for a booklet, demonstrate a knowledge of book printing and folding techniques by preparing a book "dummy" and page chart.

Chapter 5

RATIONALE FOR CHOICE OF MEDIA

Background

The purpose of this project, as has been stated earlier, was to explore the philosophy and methodology of Competency-Based Instruction and to construct a systemic developmental technique for individualized learning activities packages.

Before selecting the medium for the project, the developer interviewed several instructors who were working with Competency-Based Instruction and asked them the following questions:

> What delivery systems (media) are currently being used for C.B.I.?
>
> Which medium appears to produce the best results?
>
> How is each medium used by the student?
>
> What are the advantages and disadvantages of each medium?

This survey revealed that, at the College of Trades and Technology, Competency-Based Instruction is currently being delivered by the following media:

1. Print media prepared by the instructors themselves, and reproduced by Xerox or offset duplicating.

2. Print media, commercially prepared, such as textbooks and "packaged" learning modules.

3. Audio programs, such as self-instructional packages in shorthand or type-setting.

4. Filmstrips and slide/tape programs, both commercially produced and instructor-developed.

5. Videotaped programs, both commercially produced and instructor-developed.

6. Interactive video (laser disc) programs, commercially produced.

7. Group lectures and demonstrations.

Although every one of the media listed above had its proponents, the developer found that the print medium was common to most C.B.I. courses. There were commercially-prepared materials of high quality available for most courses, but most instructional developers had adopted the duplicated booklet as the basic package that directed the student's learning activities. Most commercially-prepared filmstrip and slide/tape programs came with supplementary print materials, such as instructor's notes, review questions, and sometimes the full audio script of the program. Those programs that did not include such supplementary materials were not as highly-rated by the instructors. With the exception of the Computer Data-Entry program, no instructors at the College were using computer-assisted instruction.

Self-Paced Instruction (SPI) courses in the Business Education Department utilize a number of different media, but there is a duplicated learning activities package booklet for every module in every course. A student in one of these courses is directed by an instructor to begin work on a certain module on his/her chart. S/he goes to the classroom resource centre and finds a resource box labelled with a code number and module title. S/he takes a copy of the learning activities package from the resource box, takes it to his/her desk, and begins to study. S/he may be directed to go to the Audio-Visual Centre to view a videotape or work through a slide/tape presentation on bookkeeping or shorthand transcription, or to sit at the desk and do exercises from a textbook or from the learning activities package (booklet) itself.

The developer noticed that many of the learning activities packages were self-contained. He was told that students prefer it this way, compared with separate manuals, because of the advantage of finding all the information in one place. The

instructors preferred the self-contained activities package for many applications where no one textbook or manual seemed to adequately cover current local practice, or where the textbook drill and practice exercises were considered inadequate.

Survey of Attitudes Toward Media

The developer did not conduct a formal survey of student attitudes toward media because, with the small numbers involved, he was concerned that some sensitization might occur that would influence the results of the testing. He did, however, conduct an informal survey and record the results. The Commercial Art teacher did the same. The survey indicated that 75% of the Printing students felt most comfortable with the print medium, while 25% had no opinion. The students initially expressed a preference for audio-visual media, but after some discussion decided that they saw audio-visual as a supplementary resource, to be used in conjunction with print materials and shop demonstrations, and not as a replacement. Students said that audio-visual programs have to be viewed in the Audio-Visual Centre, but a book can be taken home for study. One filmstrip series the students gave a high rating had the text of each filmstrip reproduced in a supplementary handbook. Some students had Xeroxed these handbooks and shared them with their classmates, to be used in "cramming" for the weekly test period. Further questioning revealed that the classmates who received the Xerox copies did not then bother to view the filmstrip.

Survey of Availability of Media

As mentioned earlier, the print medium is common to most Competency-Based and Self-Paced programs at the College. The College has several hundred

audio-visual programs on file in a central Audio-Visual Alternate Learning Centre, and students can go there during office hours and view any program. Some programs are borrowed by instructors, and shown to a whole class at the same time. For instance, a class of motor mechanic apprentices will be shown a film about carburetion, or a class of beauticians will see a videotape on hair colouring.

Students in Self-Paced programs are encouraged to drop into the Centre to view programs individually or in small groups. The staff of the Centre are concerned that few students take advantage of the service. The answer may lie in the nature of College scheduling. Class schedules are planned for a 33-35 hour week with no more than two free periods, and unless an instructor directs a student to go to the centre, the student will find it inconvenient to go there. Some instructors in Competency-Based programs say that audio-visual media lose their effectiveness when viewed by individual students, because class discussion enhances the learning process. This is not practical with Self-Paced courses, because only one or two students may be working at a module at any one time, and the instructor is not able to guide the discussion. Holland College solves this problem by placing audio-visual programs and viewing/listening equipment in every classroom resource centre, where the instructor is available to guide and assist. The College of Trades has begun to adopt this policy, subject to budget limitations for new equipment, wherever a substantial portion of a program is available in one audio-visual medium. At the time of the development of this project, that policy had not yet been adopted.

The College has a very sophisticated automated duplicating/collating installation, and several Xerox machines are scattered throughout the three College campuses. For this reason, the print medium appears to be convenient and practical for most applications.

Cost Considerations

The developer investigated the relative cost of different media, and concluded that the difference in cost between video, slide/tape, and print media was negligible. This conclusion was based on the cost of materials only, because there is no charge for the use of College equipment or for the assistance of College staff.

A videotape would actually be the cheapest to produce, approximately $50.00 for graphics and videotape for one copy. A slide/tape presentation would cost approximately $65.00 for graphics, film and processing, and audio tape, again for one copy. Graphics and duplicating cost for thirty copies of a 50-page booklet would cost approximately $80.00. For future use, the cost would be $2.50 per booklet when 1-10 copies are produced by the Xerox method for individual students. Some Xeroxing would have to be done to complement videotape or slide/tape productions, to provide students with review questions and work assignments.

Selection of Media

The developer chose the booklet medium for several reasons:

1. The duplicated booklet is the most common method of producing instructional materials for individualized instruction.

2. Efficient and low-cost duplicating equipment is available.

3. Students had expressed their desire to do independent study-at-home, which would be impractical with other media.

However, once the development process got underway, the problems of demonstrating a process by static drawings proved to be a definite constraint. The developer then investigated videotape and computer graphics as alternative methods, but concluded that the facilities were not available to utilize these methods. The College had some videotape equipment, but no studio or editing equipment. Memorial University Learning Resources Division had a videotaping

and editing laboratory, but no facilities for animation or graphics. Producing the sound track and copying graphics would be impractical under these conditions. The idea of an interactive computer program was discarded because the College had no microcomputers for student use at that time.

The test proceeded with the original plan of using a duplicated booklet as the most practical method available.

Chapter 6

DEVELOPMENT PROCEDURES AND FORMATIVE EVALUATION

Initial Production

The initial production of the instructional unit "Designing Book Pages" was completed in the spring of 1983.

The developer decided upon the following format for the Learning Activities Package:

Rationale   Tells the student why this task is worth learning.

Objectives   These describe what the student must be able to perform to complete the package.

Learning Activities These tell the student what to read, and what to do to learn the skill/task. Also list assignments to be turned in, tests to be written, and describe how the student will be evaluated.

Learning Materials In lieu of a satisfactory text on the subject, the developer inserted his own materials here. Another method would be to recommend that the student read several sections of a workbook and complete the assignments at the end of each section, view a slide/tape presentation, etc., if these resources were available.

Review Questions   Did the student learn what s/he was supposed to learn? At the end of each section of information, the developer inserted a page of Review Questions or an Apply Your Knowledge page. If the student can answer these questions

or make these calculations, s/he will be ready for the Post-test and the all-important Work Assignment.

Work Assignment   This was intended to test the student's skill mastery, by giving him/her a practical layout assignment to complete.

The written Pre-test and Post-test for the module were used to prepare the Review Questions. The Learning Materials were written to provide the answers to the Review Questions.

At this stage the developer was hoping to make a statistical comparison between two groups of students: the Commercial Art students using the booklet as an individualized instructional medium while the other group, the Printing students, would receive the same information via the traditional lecture and classroom assignment method. This comparison was later abandoned because of the small numbers of students available, but the concept of designing a self-explanatory booklet, testing it on students who had no previous experience with individualized instruction, and withholding any instructor intervention except when requested was considered a worthwhile experiment in its own right.

Having targeted the Commercial Art students as the test group, the developer gathered information from books in the College of Trades and Memorial University libraries. The information was edited to include the minimum of information that the developer felt a novice book designer would need to know about:

> Book and pamphlet binding methods
>
> Current book printing processes
>
> Common paper sizes and book page sizes
>
> How to insert illustrations on a page

This the developer considered to be essential background knowledge. The graphics used to illustrate this section of the booklet consisted of cartoon-style illustrations, based on a drawing style that he had been using for three years in learning activities packages about press and bindery techniques.

The graphics were not planned to be mere ornamentation, but were intended to convey a sense of scale to the various printing methods, so that the learner could visualize that a web offset machine, for instance, is a giant printing press operated by several workers, while one-up and two-up printing is done on small machines like the presses in the Printing lab.

The third section of the booklet was to be about standard page sizes. The developer introduced metric measurements here for two reasons. First, the Government of Canada was committed to metric conversion in the 1970's, and the Canadian paper industry officially converted to metric in 1979. Secondly, the European metric method of designating page sizes is very simple, whereas the American method is a hodge-podge of traditional sizes and very difficult to teach. The developer's research revealed that no one except the Canadian civil service appears to be actually using the new metric designations. The Canadian system retains the four most common American sheet sizes, but alters them slightly to produce a four-standard sheet system compared with the European two-standard sheet system. He decided to explain the European system in the booklet, and then to introduce the four standard Canadian sizes in a repetitive format.

Five of the six behavioural objectives for the project specified layout skills that the student was expected to master. The developer prepared a series of diagrams to explain these activities to the student. This section was revised upon the advice of the Content and Media Specialist, and later completely redesigned after its initial testing on the students.

A five-page test was designed to serve as pre-test and post-test to the unit. It consisted of thirty-two multiple-choice and fill-the-blanks questions and an exercise in assigning page numbers (see Appendix F).

Evaluation by Content Specialist and Media Specialist

The content specialist for the unit was William McLoughlin, Commercial Art Instructor at the College of Trades and Technology. Because of his long experience in commercial art and publishing, he also served as media specialist.

The function of the content specialist was to evaluate the content of the unit and to verify the accuracy of the information it contained. Mr. McLoughlin indicated that the content of the booklet was accurate, but he had two reservations. First, the section about metric page sizes was, in his opinion, confusing, because the European A and B sheets are not available in Canada. Second, he felt that there was insufficient drill and practice to reinforce the sections about calculating page proportions and margins.

The developer added a page in front of the metric section explaining that the European page system was included for comparison only. He also added several questions to the review question pages in order to provide more drill and practice.

In the role of media specialist, Mr. McLoughlin approved the overall style of the instructional unit. He made several suggestions on tightening up the presentation that were incorporated at this stage, before the unit was tested on the students.

Evaluation by Learning Specialist

Everett Cross, M.Ed., Staff Development Officer at the College of Trades and Technology acted as the learning specialist. His function was to determine if the language and format of the unit were suitable for vocational students. Mr. Cross had ten years experience as a Motor Vehicle Repair (Mechanical) Instructor at the College, and two years as Career Counsellor before accepting his present position.

Mr. Cross recommended several changes. The rationale, he suggested, should be more concise, and should do more to motivate the student to learn the skills of book designing. He also felt that the learning activities should be tightened up to be more consistent with the objectives.

Evaluation by the Learners

As has been mentioned earlier, because of the specialized nature of the instructional unit, it was of interest to two small groups of students only, namely the Printing and Commercial Art classes at the College of Trades and Technology, a total of thirty students. The developer felt that this number was marginally adequate for a statistical comparison of two delivery methods.

During the time that the developer was preparing the booklet the Printing class dwindled from fourteen to ten students. When the editing process was completed, the Commercial Art class was affected by an outbreak of influenza, so the testing of the package was delayed for two weeks. When most of the students were in attendance, the test went ahead. The number of students available to write the pre-test at 10:00 a.m. on a Monday was twelve: seven Commercial Art students and five Printing students. Another two Commercial Art students and four Printing students arrived later to study the material and write the post-test. The comparative test was later discarded as impractical because of the small numbers involved. This report will deal only with the performance of the Commercial Art students.

Seven Commercial Art students wrote the pre-test on a Monday morning. That afternoon there were nine students present. The booklets were distributed, an explanation of the individualized instruction system was given, and the students were asked to read and work through the learning package on their own. The developer suggested that they could come to his office if they had any questions about the booklet, but only one student requested information. The Commercial Art instructor was present, but felt that he should not intervene in the experience. About one hour later it was observed that the students had put the booklets aside and turned to independent sketching. When questioned, they said that they understood the material, but did not understand what was expected of them. The work assignment at the back of the booklet was pointed out, and they were asked to

attempt it, but when left alone they returned to their sketching. Only one student completed the assignment, to a very low standard.

The following day the post-test was administered. A comparison of test scores indicated that the mean pre-test score was 31%, mean post-test score 69%, a gain of 38%. However, since only seven students wrote both pre- and post-test, these figures cannot be considered meaningful.

The students were asked to fill out a Student Attitude Form at the conclusion of the post-test. These are summarized in Table I:

TABLE 1
STUDENT ATTITUDE SURVEY

Question	Response 1	2	3	4
1. Was the booklet well-designed?		9		
2. Was the lesson difficult?	1		7	1
3. Was the lesson interesting?	4	3	2	
4. Did you learn very much in the lesson?	1	6	2	
5. Was the lesson too long?	5	4		
6. Did you like the self-study approach?	3	4	2	
7. Was the booklet clearly written?	1	8		
8. Were there too many questions?	1	7	1	
9. Were the questions difficult?	2	8		
10. Was the work assignment difficult?	5	2	2	

Key to response: (1) very unfavourable (2) ambivalent
(3) favourable (4) very favourable

Mean response = 1.86

When the developer conducted an item analysis on the post-test results, he noted that the whole group had scored low marks on questions 1-10, which tested objective number 1. He also noted that the main thrust of the instructional unit was meant to be mastery of certain layout skills, but only one of the students had even attempted the layout assignment. The unit had failed to accomplish what it had been designed to do.

Revising the Unit

Blank (1982) has written that "many studies reported . . . compared 'conventional' instruction methods with the 'individualized' approach and found neither approach superior to the other . . . [these studies have] one thing in common: a less than carefully designed and implemented approach to the individualized method" (p.24).

The developer reviewed the content and learning specialists' comments, and the student attitude forms. He concluded that the unit was not communicating to the students what was required of them, and decided to redesign the section of the booklet relating to objective number one and to modify the work assignment and some of the test questions.

To emphasize the portion of the booklet relating to the design function, two pages were expanded to six, and a new cartoon character was introduced. That is, the female student depicted on the cover, sitting at a drawing board, was drawn in several poses to illustrate that a design problem was being presented, as compared to the printing information section the student had just completed. This section was introduced with a title page carrying the words "Picture yourself as a designer who has been asked to illustrate a book . . ." The review questions at the end of this section were rewritten as two separate exercises.

The following week the revised booklet was given to the Commercial Art students and they spent another hour reviewing it. They then completed the work assignment and wrote the revised post-test. This time twelve students were present. The seven who had written the pre-test now scored a mean 85%. The other five students, three of whom had not seen the instructional unit before, averaged 83%.

The developer examined the layouts turned in by the Commercial Art students, but was not satisfied with any of them. On the Competency-Based Instruction Evaluation scale of 0 to 3, all of the drawings submitted had to be rated "0":

"Has some ability, but cannot perform this skill satisfactorily for participation in a work environment."

The developer concluded that the package had worked well in communicating cognitive skills, but that it needed further refinement to achieve the goal of skill "mastery."

However, the developer noted that the Printing students across the corridor had achieved satisfactory skill mastery when attempting the same work assignment from the same written instructions, during a regular shop period. The fastest Printing students had completed the assignment in forty-five minutes; the slowest needed as much as ninety minutes. All students had asked questions, and every student had required some individual assistance to complete the assignment. The evaluations recorded on the Printers' Record of Achievement charts had consisted of "1's" and "2's," indicating that the supervision given ranged from "constant " to "periodic." This equalled or exceeded the performance level required for this module. (A copy of the evaluation chart for this work assignment is reproduced in Appendix E).

The main difference between the treatment of the two groups of students was that the Commercial Art students had been left to work on their own from written instructions, while the Printing students had been given the same written instructions, but had received individual attention from the instructor, who had explained, interpreted and demonstrated the instructions for them. The mean scores for the written cognitive test for both classes were almost identical when the revised package was re-tested (84%-85%), but the printers had mastered the layout skill, the commercial artists had not.

The developer reminded himself that the Printing students were in the ninth month of a competency-based program, and were very aware of the concept of "mastering" a skill, however incomplete and uneven the development of the program was at this stage. The Commercial Art students, on the other hand, had not

used a learning activities package before, and were not oriented to skill mastery. He arrived at two conclusions:

1. Successful teaching of manipulative skills will require the live presence of an experienced supervisor to interpret the written instructions in the work assignment.

2. Students in a traditional program will require considerable orientation to achieve satisfactory results when first-subjected to individualized instruction and skill mastery.

The project was shelved at this time because there were no more clients to test it on. The developer planned to re-run the experiment in the 1983-84 College year.

Chapter 7

SUMMATIVE EVALUATION

Procedure

The summative evaluation was conducted in the spring of 1985, two years after the formative evaluation. It was not possible to test the instructional unit during the 1983-84 College year for two reasons: the Commercial Art class had been moved to the Topsail Road Campus and a new instructor hired, and the Printing program was being completely revised.

One outcome of the Printing program revision was that the module "Design Book Pages" was dropped from the Record of Achievement chart in 1983-84. However, when all of the learning activities packages for the revised program had been completed, it was possible to reintroduce the book design package in 1984-85 as an "advanced" activity for those students who, having completed the module "Mark copy for typesetting" to a level of "I," wished to work for a higher level of achievement.

In late-April of 1985 nine Printing students wrote the pre-test. By this time the revision of the program was complete, and the classroom resource centre had reached the "Level 3" criteria specified by the College administration: there was a learning activities package for each module on the record of achievement chart, students were learning at their own rate and lectures had been discontinued. There was no plan to go the fourth level of completely self-paced instruction, because it is impractical to schedule a one-instructor class for staggered intake and continuous exit.

Nine students wrote the pre-test. The following Monday, three students were given the learning activities package and advised to work through it. Four other students also worked through the package, in pairs, over the next two weeks, all working under the instructor's supervision. The post-test was administered during a regular weekly test period when all seven had completed the work assignment. The other two students had left early to look for work.

Results

The pre-test scores ranged from 35% to 63%, for a mean of 54%. Post-test scores ranged from 67% to 97% for a mean of 85%, indicating an average gain of 31%. The mean post-test score was identical with the mean scores of the Commercial Art and Printing students who studied the revised learning activities package in 1983.

TABLE 2

COMPARISON OF PRE-TEST–POST-TEST GAIN SCORES ON REVISED UNIT
FOR EXPERIMENTAL GROUPS 1983 & 1985

GROUP	N	Md	SD	t	LAYOUT EVAL.
Commercial Art Students, 1983	7	18.1	47.89	-3.200*	0 Satisf.
Printing Students, 1985	7	8.1	19.70		7 Satisf.

*p < .05

N = Number of students in group
Md = Mean of difference between pretest and posttest scores
SD = Standard of deviation
t = A test of the significance

It should be noted that parts of the instructional unit had been inserted into several revised learning activities packages, so that the Printing students had up to eight months exposure to standard paper sizes, paper cutting and folding techniques, and book printing by the time they wrote the pre-test.

The work assignment was completed by all seven students to the developer's satisfaction. Performance evaluations of "2" and "3" were awarded. A "2" rating indicates that the student is capable of performing the skill with periodic assistance

and supervision. Two students received "3" ratings, indicating that they completed the layout with a minimum of assistance, as competently as an experienced layout artist in a printing shop. Both of these students had completed Commercial Art evening courses through the College's Extension Division.

The developer noted that all students required some individual attention to complete the work assignment. He has found that it is an unusual student who can perform a manipulative skill entirely by following written instructions. When students do not ask the instructor for assistance, they can usually be observed questioning another student who has already completed the task. In this instance the developer took some pains to anticipate the students' problems and to be available to answer questions.

Conclusion

The developer concluded from the results of the evaluation that the revised instructional unit was successful.

An analysis of the individual test items showed that the behavioural objectives for the cognitive skills in the unit had been met by most students writing the post-test. Two of the students did not reach the College's standard passmark of 80% for Competency-Based programs, but were allowed to re-write the test a week later, under College rules, and exceeded the 80% mark on the second test. The developer is satisfied that the instructional unit is self-explanatory and capable of being understood by most vocational students.

The developer is also satisfied that the unit was a qualified success in achieving student mastery of psychomotor skills. The qualification is that an instructor or demonstrator should be present, to give advice and direction to the students undertaking the work assignment, in a role similar to that of a working supervisor in a commercial printing shop.

Chapter 8

SUMMARY, RECOMMENDATIONS, IMPLEMENTATION

Summary

The instructional unit "Designing Book Pages" was developed to fill a need in the existing curriculum of the Printing course at the College of Trades and Technology in St. John's, Newfoundland, and to explore the system for developing competency-based instructional materials.

An extensive survey by the developer showed that suitable self-instructional materials do not exist to meet the needs of vocational Printing students in designing for book production.

Having established a need for a self-instructional learning activities package on designing book pages, the developer commenced to produce an instructional unit that would be self-explanatory when used by high school graduates enrolled in a vocational school program.

A learner analysis was conducted, and the behavioural objectives for the unit were selected on the basis of observed needs. The print medium was selected because of its low cost and convenience.

The unit was reviewed by a content/media specialist and a learning specialist. They approved the content, structure and quality of presentation, and made suggestions for improvement, which were incorporated at this stage.

The unit was tested in May of 1983 on a class that had no previous exposure to Competency-Based or individualized instruction. A total of nine students were exposed to the material. A comparison of pre-test and post-test scores indicated a

measurable gain in acquisition of cognitive skills. However, none of the students mastered the manipulative skill of drafting a two-page book spread with well-proportioned margins. In fact, only one student even attempted the work assignment that tested this skill. The students were neutral in their reactions to the self-instructional delivery method.

Acting upon a student attitude survey and an item analysis, the developer redesigned a portion of the unit and re-tested it a week later. This time the results showed greater improvement.

The revised unit was incorporated into the Printing curriculum, and was sub-jected to summative evaluation two years later. This time the results indicated student mastery of page design skills providing an instructor is on hand, actively assisting the students in the layout exercise, which is a manipulative skill.

The developer is satisfied that the instructional unit has been successful, and has used it as a model for development of individualized learning packages.

Recommendations

The developer's aim in producing this instructional unit was to create a model for further development of individualized instruction. The following observations can be applied to all learning activities packages:

1. Instructions in learning activities packages should be simply worded, and addressed directly to the student (e.g.: "you will . . .").

2. Post-test questions for the package should be directly related to the behavioural objectives.

3. Each objective should be matched by a relevant section of the instructional material.

4. When the student is expected to memorize a list or apply a principle, adequate drill and practice should be provided in the instructional unit.

5. There should be at least one review question in the package for each objective and post-test question. The post-test should pose no surprises for the student.

6. Work assignments which call for the student to perform a psychomotor skill should be simply worded. The student should be periodically reminded in the instructions to ask the instructor for equipment and advice.

Implementation

In the autumn of 1983 the Department Heads Committee of the College of Trades and Technology held a seminar on Competency-Based Instruction, and approved a College policy for the administration of C.B.I. programs. One policy decision was that a student, in order to receive a certificate for a C.B.I. program, must complete every module on the Record of Achievement chart for the program, to a pre-determined level of competency. The Printing program had been using a large chart with one hundred four modules, and an open-ended philosophy that adapted the chart to the student's abilities and/or ambitions. This philosophy was now abandoned, and a new, smaller chart was designed that an average student could comfortably complete in a ten month program.

There are sixty-six modules on the Printing record of achievement approved in 1984. In the course of revising the program, the developer was able to apply the lessons learned in developing this instructional unit. By April of 1985 there was a learning activities package for every module on the new chart.

There is no module "Designing Book Pages" on the revised Printing chart, but this learning activities package has been adopted as an advanced-level activity in a module titled: "Mark Copy for Typesetting." Parts of the learning activities package have also been used to create several new packages. More important, the developer's experience in developing and testing this instructional unit has been invaluable in the production and revision of sixty-six new and revised learning packages.

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APPENDIX A

Glossary of C.B.I. Terms

GLOSSARY OF COMPETENCY-BASED INSTRUCTION TERMS

Band, Training Sometimes called a "Training Block." A grouping of related tasks in an occupation. One horizontal line of skill modules on a DACUM chart.

ASSEMBLY ARTIST (Paste-up)	Paste up pimp & boy covers etc	2	Read crical insert corrections or paste ups	2	Paste up book pages news pages	Use india ink to draw business forms	Repro layouts	Cut & paste artwork

Competency-Based Program ("CBI") A program in which the desired learning outcomes are specified in advance by industry. Student evaluation is done by comparing student performance with a pre-set standard of competence.

DACUM "Developing A CurriculUM" A method of developing a curriculum. The DACUM method is a variation of CBI, in which experts from an occupation form the curriculum committee. Sometimes interpreted as "Developing Abilities through CurriculUM". (Nova Scotia and New Brunswick).

DACUM Chart A single-sheet skill profile that serves as both a curriculum plan and evaluation instrument for occupational training programs. The DACUM Chart is designed by the DACUM committee.

Delivery System A method by which training programs are delivered to students or trainees. It can be group oriented, individualized or semi-individualized.

Journeyman (alt.: "journeyperson"). A tradesperson who is qualified to perform the skills of a trade. In a "designated trade" (controlled by the Apprenticeship Act): a holder of a certificate of qualification.

Learning Activities Package (LAP) Individualized learning packages, commonly in booklet form, which students can use on their own and which include a performance objective, a variety of recommended learning activities and a testing mechanism. The activities apply to one skill module on a DACUM chart.

Module. One skill unit listed on a DACUM chart (or Record of Achievement). See sample at right.

A-1	2
Use metric & English measurements	

Record of Achievement A "DACUM" chart or skill profile. (Nfld.) See samples pages 49 and 50.

Resource Box A cardboard, plastic or metal container, containing copies of a learning activities package and supplementary learning resource materials pertaining to a module.

Self-Paced Instruction A variation of Competency-Based Instruction in which the program is completely individualized, and the student progresses at his/her own rate to complete the program. Although the time element is relatively flexible, the student must complete the total program to pre-set standards in order to "graduate" with a Certificate of Vocational Education. (Nfld.)

S.T.E.P. (Self Training and Evaluation Program) A variation of Competency-Based Instruction developed along DACUM principles. The student sets his/her own goals, in consultation with a "resource person" (instructor), and undertakes a self-study program which may involve some training time in industry. Evaluation is performed by student/instructor interview, and is recorded in performance (or "skill mastery") terms. (Prince Edward Island)

Traditional Delivery System A system used to deliver training in which the instructor teaches a group by lecture, demonstration and observation of student performance at a group-set pace.

APPENDIX B

Sample "Record of Achievement"
("DACUM" Chart)

Printing

Student's Name _____

EVALUATION KEY

3 Can perform this task satisfactorily without assistance and/or supervision.

2 Can perform this task satisfactorily but requires periodic assistance and/or supervision.

1 Can perform most of this task satisfactorily, but requires more time, assistance, and/or supervision to complete the entire task.

TRAINING TIME

Weeks	From	To

Skill Area			
BASIC SKILLS	Use metric & English measurements	Use typesetters measurements	Identify & select common hand tools
DESIGN FOR PRINTING (Layout)	Use basic drafting instruments	Identify various type styles & sizes	Draw layouts for simple cover designs, ads, etc.
PHOTOTYPESETTING	Complete typesetting course	Operate photocomposing machine to set headlines	Make borders, perform kerning adjustments on headline machine
ASSEMBLY ARTIST (Paste-up)	Paste up simple ads, covers, etc.	Read proof, insert corrections on paste ups	Paste up book cages, news pages
PROCESS CAMERA OPERATION & DARKROOM PROCEDURES	Prepare film negatives & positives by contact printing	Operate process camera to make line negatives	Operate process camera to make halftone negatives
FILM ASSEMBLY (Stripping) & PLATEMAKING	Prepare flats for simple forms 10-15 plates	Make corrections on line negatives by scribing & cutting in	Prepare flats for combination plates (line & halftone)
PRESSWORK (Offset Lithography)	Operate offset press A B Dick & Multi 1250	Clean & lubricate & wash up offset press	Do instant printing
FINISHING PROCEDURES			
RELATED SKILLS			

Perform manual bindery operations	Operate Xerox machine	Maintain a clean well organized work area	Adhere to Health & Safety
Draw layouts for business stationery	Mark copy to be typeset		
Clean & maintain automatic processor	Typeset matter straight	Set type flush left, flush right & centred	Perform machine editing functions & manage files
Use rules to place borders, forms	Prepare paste up for printing	Crop & scale montage etc. attached	
Prepare prints to put on montage		Use densitometer to calculate halftone exposure	Expose & process film
Strip negatives to print on pages 2 up & 4 up	Expose & develop subtractive & additive plates	Expose & develop aluminum plates	Gum & develop plate, fix & wing & store

APPENDIX C

Learning-Evaluation Model
for Trainee Using DACUM Process

from Adams (1973)

LEARNING-EVALUATION MODEL for TRAINEE USING DACUM PROCESS

ENTERS

(1) REVIEWS DEFINED BEHAVIOURS

(2) INSTR. EVALUATES ENTRY SKILL

(3) EVALUATES OWN ENTRY SKILL

(4) MODIFIES ENTRY EVALUATION

(5) SELECTS DEFINED BEHAVIOUR AS A NEW GOAL

(6) INSTRUCTOR OBSERVES PERFORMANCE

(7) ATTEMPTS TASK

(8) INSTRUCTOR RATES PERFORMANCE

(9) RATES OWN PERFORMANCE

(10)

(11) RECEIVES ASSISTANCE AND ADVICE

(12) REVIEWS LITERATURE

(13) REVIEWS & USES MANUALS

(14) VIEWS FILMS & OTHER RESOURCES

(15) OBSERVES DEMONSTRATIONS

(16) RECEIVES INSTRUCTION

(17) INSTRUCTOR TEMPORARILY SATISFIED WITH PERFORMANCE LEVEL ? — YES / NO

(18) TEMPORARILY SATISFIED WITH OWN PERFORMANCE LEVEL ? — YES / NO

(19) SETS GOAL ASIDE

(20) [ENOUGH] GOALS COMPLETELY SATISFIED — YES / NO

EXITS

APPENDIX D

Task Analysis Charts

TASK ANALYSIS

DESIGNING BOOK PAGES

LEARN DEFINITIONS	REVIEW BOOK PRINTING	LEARN PAGE SIZES	DESIGN PAGE(S)	COMPLETE WORK ASSIGNMENT
—Define: booklet, page, leaf, etc.	—Review binding methods	—Learn European metric "A" & "B" system	—Design single page	—Lay out a 2-page spread
—Define parts of page	—Review printing/ duplicating methods	—Learn Canadian "soft" metric conversion	—Design 2-page spread	—Prepare 2-page spread with illustrations
		—Learn page proportions	—Apply "paging" methods	
			—Design chapter headings, insert illustrations	

DEFINITIONS

BOOK

- Booklet/brochure/ pamphlet
- Leaf
- Page
- Signature

PAGE

- Parts of book page
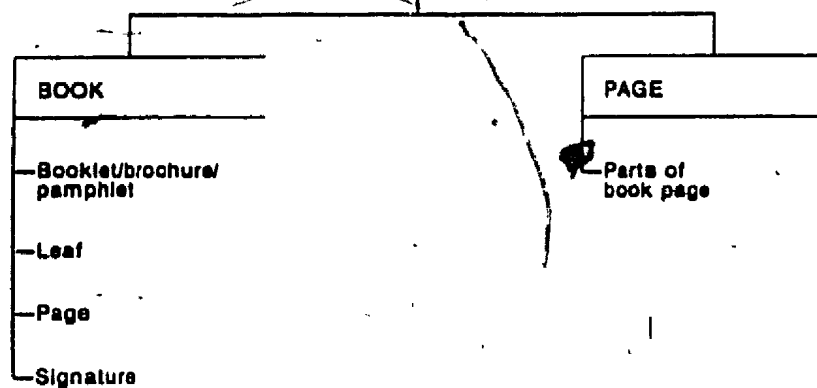
REVIEW / OVERVIEW OF BOOK PRODUCTION

BINDING METHODS

- Saddle-stitch
- Side-stitch
- Plastic ring binding
- Loose-leaf binding
- "Perfect" (paperback) binding
- Case binding

PRINTING METHODS

- Single page
  - Duplicating
  - Printing
  - Binding single page
- Two-up (small press)
  - Manual assembly
  - Automatic collating
- Big sheet (big press)
  - Multiple page (print-fold-collate)
- Web offset (v. lge. runs)

PAGE SIZES

EUROPEAN METRIC SYSTEM

—"Golden rectangle" ÷ 1 sq. metre = "A" sheet

—Folding/cutting system A0—A1—A2 etc.

—Alternate "B" sheet

CANADIAN "SOFT" METRIC CONVERSION

—Letter paper becomes "P" sheet

—Alternates:
"Q" (legal)
"R" (art board)
"S" (book paper)

BOOK PAGE PROPORTIONS

—"Golden" rectangle 1:1.414

—"Printers" rectangle

—"Regular" rectangle

—"Letter" size

—Square page

DESIGNING A PAGE

SINGLE PAGE

—Planning margins

—Type measure & depth

—Preparing sample page

—Pencilled parallel lines

—Paste up type samples

—Paste up "greeking"

TWO-PAGE SPREAD

—"Progressive" margins

—Arith. method

—Geom. method

PAGING METHODS

—Saddle-stitched "plus-one"

—Proof: "diagonal"

—"Gathered" books "1st + last"

—Preparing "folding dummy"

DESIGNING THE PAGE

—Designing a chapter hdg.

—Inserting illustrations

—Inset

—Bleed

—Initials

—Captions

APPENDIX E

Evaluation Chart for
"Design book pages"

EVALUATION CRITERIA — Layout for "Design book pages"

	0	1	2	3
NEATNESS Layout centred on sheet, pages butted to fold line, neatly rendered in pencil	very sloppy work	untidy, but acceptable	neat work	very neat work
CALCULATIONS Student applied arithmetic principles, calculated type measure and back margins	did not calculate, did not apply	calculated, but did not apply	applied instructions but not accurately	applied instructions accurately
GEOMETRY Student drew accurate construction lines construction lines, and used them	not attempted	attempted, but did not apply geom. principles	applied principles, with some inaccuracy	applied principles accurately
INSERTION OF ILLUSTRATIONS Inserted illustrations accurately, retaining proportions	not attempted	attempted, but out of proportion	illustrations diagrammed inaccurately	illustrations diagrammed accurately
FOLDING DUMMY Student prepared dummy, folded accurately, and numbered accurately	not attempted	attempted, but not understood	prepared inaccurate dummy	prepared a .curate dummy

TOTAL POINTS

AVERAGE (Total ÷ 5)

APPENDIX F

Pre-test/Post-test
Pre-test/Post-test Key

Pre-test and Post-test

Design Book Pages

Date_____19____   Student_____

The pages diagrammed at the
right are to be 125x177mm
(30 x 42 picas).

Progressive book margins will
be used (3:5 side margin ratio).

←— 125mm —→ ←— 125mm —→
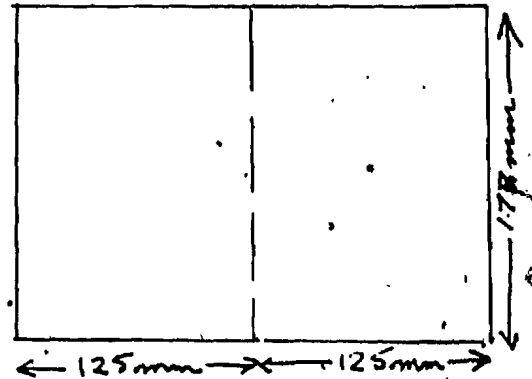
1. For average copy, the ideal type measure for this page
    size will be _____ picas.

2. Back margin will be _____ picas.

3. Head margin will be _____ picas.

4. Fore margin will be _____ picas.

5. Foot margin will be _____ picas.

6. The depth of the type area on this page will be _____ picas.

----

7. A page measuring 10x15cm has the proportions _____:_____.
    It is called a _____ rectangle.

8. A page measuring 15x20cm has the proportions _____:_____.
    It is called a _____ rectangle.

9. A page measuring 105mmx148mm has the proportions____:_____.
    It is called a _____ rectangle.

10. A Canadian letterhead measures _____ x _____ mm.
    Its metric designation is the _____ page .

Answer each question below by selecting the <u>best</u> answer and writir. the appropriate letter on the line provided.

11. On the page diagrammed at the right, the illustration is called a _____ illustration.
    A. runaround
    B. bleed
    C. inset
    D. raised

12. The initial on the page at right is called a_____ initial.
    A. raised
    B. dropped
    C. inset
    D. indented

13. To follow standard procedure, the caption at the right should be re-set_____.
    A. the exact width of the photo.
    B. to make 3 lines of identical width.
    C. left unchanged, it's o.k.

Final mounting of transmitter depends on car. Here, mounting bracket was bolted under the dashboard, in front of air-conditioning ducts and out of sight.

14. To follow standard procedure, the caption at the right should be
    A. centred under the photo.
    B. centred over the photo
    C. letterspaced to the width of the photo.
    D. re-written and re-set to fill the width of the photo.

Senator Roth

_____ 15. When planning a booklet, a designer takes several
sheets of blank paper, folds them, and numbers each
page. This is called a
A. dummy
B. folio
C. paging chart
D. greeking

_____ 16. The printer's term for a page number is
A. dummy
B. folio
C. running head
D. foot

BINDING METHODS.

Match the illustrations
at the right with the
descriptions below by
placing the appropriate
letter on the line
provided.

_____ 17. Saddle-stitched

_____ 18. Side-stitched

_____ 19. Plastic ring
binding

_____ 20. loose-leaf

_____ 21. "perfect" binding

_____ 22. case binding
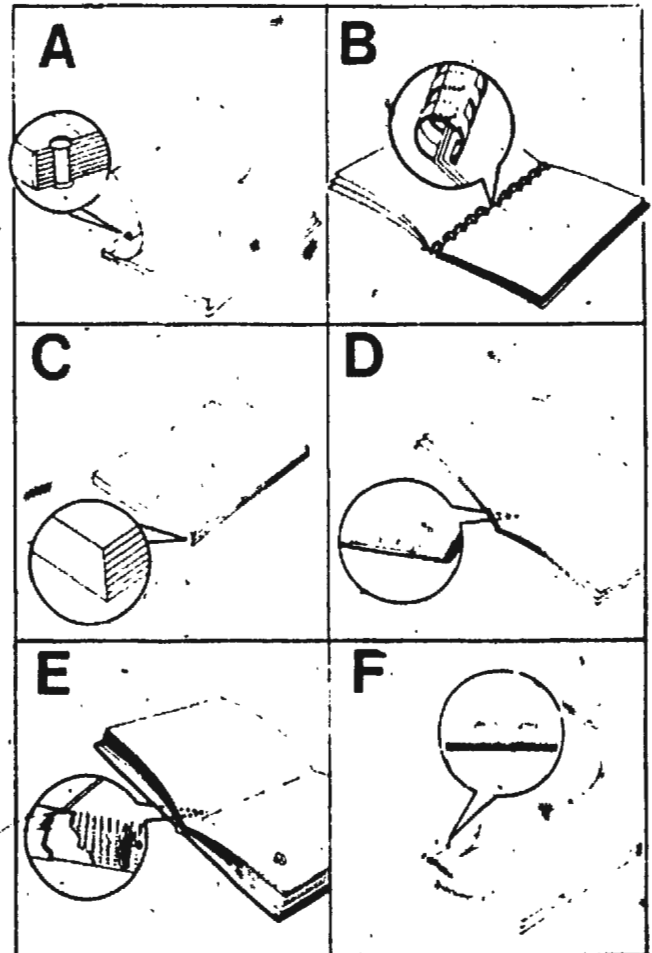
Fill the blanks:

23. The _____ binding method is the most durable, and most expensive.

24. The _____ binding method needs wide back margins because the fastening hides part of the page.

25. The _____ binding method fastens page leaves to the spine with hot glue.

26. The _____ binding method allows the book to lie flat when opened, but the slotted holes along the back margin may destroy part of the printing.

27. The _____ binding method is fast and economical for binding booklets, but the booklet is limited to approx. 6mm·(¼") thickness.

28. The _____ binding method allows pages to be added or removed, but only with a special binding machine.

29. The _____ binding method allows pages to be added or removed by the user without special equipment.

A booklet is to be printed "2-up," folded and saddle-stitched. It will have 32 pages.

30. Pages 7 and ____ will print together.

31. Pages 12 and ____ will print together.

32. Pages ____ and ____ will occupy the centrefold.

33. In the space provided below, use the "diagonal method" to prepare a paging chart for a 32-page booklet that will be printed "2-up."

ANSWERS

1. 21 picas
2. 3½ picas
3. 4½ picas
4. 5½ picas
5. 7½ picas.
6. 30 picas (or 29)
7. 1:1.5   regular rectangle
8. 1:1.333   printer's rectangle
9. 1:1.414   golden rectangle
10. 215 x 280mm.   P4 page.
11. bleed
12. raised
13. A
14. A
15. A
16. B
17. D
18. F.
19. B
20. A
21. C
22. E
23. case-
24. side-stitched
25. "perfect"
26. plastic ring
27. saddle-stitched
28. plastic ring
29. loose-leaf
30. 25
31. 21
32. 16 and 17

33.

32	1
2	31
30	3
4	29
28	5
6	27
26	7
8	25
24	9
10	23
22	11
12	21
20	13
14	19
18	15
16	17

APPENDIX G

Experts' Report Forms
and Student Attitude Survey Form

#	Item	Low anchor	Scale	High anchor
1.	Organization of materials	Very poor	1 2 3 4 ⑤	Excellent
2.	Length of program	Much too short	1 2 ③ 4 5	Much too long
3.	Clarity of presentation	Obscure	1 2 3 4 ⑤	Very clear
4.	Appropriateness of instructional format	Inappropriate	1 2 3 4 ⑤	Very appropriate
5.	Accuracy of content	Many inaccuracies	1 2 3 4 ⑤	Extremely accurate
6.	Technical quality	Poorly executed	1 2 3 ④ 5	Very well executed
7.	Level of language — appropriateness	Too technical for ave. Voc. student	1 2 3 ④ 5	Most Voc. students will understand
8.	Objectives — clarity	Poorly stated	1 2 3 4 ⑤	Very well stated
9.	Objectives — appropriateness	Poorly designed for high-school grads	1 2 3 4 ⑤	Well designed for high-school grads
10.	Level of difficulty	Much too difficult for high-school grads	1 2 3 ④ 5	No problem for high-school grads
11.	Is sufficient practice provided?	More practice desirable	1 2 ③ 4 5	Practice adequate
12.	Is feedback adequate?	Inadequate	1 2 3 ④ 5	Excellent
13.	Are instructional activities appropriate?	Inappropriate	1 2 3 4 ⑤	Very appropriate
14.	Are instructional activities effective	Will not be effective	1 2 3 4 ⑤	Will be very effective
15.	Are tests appropriate to the objectives?	Do not match objectives	1 2 3 4 ⑤	Very well matched
16.	Style of presentation	I don't like approach	1 2 3 4 ⑤	I like approach
17.	Sequence of presentation	Needs consid. revision	1 2 3 4 ⑤	No need for change
18.	Is the packaging practical?	Impractical	1 2 3 4 ⑤	Very practical
19.	Does the packaging appear to be costly?	Much too expensive	1 2 3 4 ⑤	Inexpensive
20.	Is there a need for this package?	No apparent need	1 2 3 4 ⑤	Will fill a felt need
21.	Will other teachers accept the package?	No demand	1 2 3 4 ⑤	Will be well received
22.	Will teachers actually use it?	None will use	1 2 3 4 ⑤	Most teachers of design will use
23.	Will the students accept it?	No, won't be accepted	1 2 3 ④ 5	Yes, will be well received
24.	Overall effectiveness	Very ineffective	1 2 3 4 ⑤	Very effective

COMMENTS

EXPERT'S EVALUATION — LEARNING SPECIALIST

1. Organization of materials	Very poor	1 2 3 ④ 5	Excellent
2. Length of program	Much too short	1 2 ③ 4 5	Much too long
3. Clarity of presentation	Obscure	1 2 ③ 4 5	Very clear
4. Appropriateness of instructional format	Inappropriate	1 2 3 ④ 5	Very appropriate
5. Accuracy of content	Many inaccuracies	1 2 3 4 5	Extremely accurate
6. Technical quality	Poorly executed	1 2 3 ④ 5	Very well executed
7. Level of language — appropriateness	Too technical for ave. Voc. student	1 2 3 4 ⑤	Most Voc. students will understand
8. Objectives — clarity	Poorly stated	1 2 ③ 4 5	Very well stated
9. Objectives — appropriateness	Poorly designed for high-school grads	1 2 ③ 4 5	Well designed for high-school grads
10. Level of difficulty	Much too difficult for high-school grads.	1 2 3 ④ 5	No problem for high-school grads
11. Is sufficient practice provided?	More practice desirable	1 2 3 4 ⑤	Practice adequate
12. Is feedback adequate?	Inadequate	1 2 3 4 ⑤	Excellent
13. Are instructional activities appropriate?	Inappropriate	1 2 ③ 4 5	Very appropriate
14. Are instructional activities effective	Will not be effective	1 2 ③ 4 5	Will be very effective
15. Are tests appropriate to the objectives?	Do not match objectives	1 2 3 ④ 5	Very well matched
16. Style of presentation	I don't like approach	1 2 3 ④ 5	I like approach
17. Sequence of presentation	Needs consid. revision	1 2 3 4 5	No need for change
18. Is the packaging practical?	Impractical	1 2 3 ④ 5	Very practical
19. Does the packaging appear to be costly?	Much too expensive	1 2 ③ 4 5	Inexpensive
20. Is there a need for this package?	No apparent need	1 2 3 ④ 5	Will fill a felt need
21. Will other teachers accept the package?	No demand	1 2 3 ④ 5	Will be well received
22. Will teachers actually use it?	None will use	1 2 3 ④ 5	Most teachers of design will use
23. Will the students accept it?	No, won't be accepted	1 2 3 ④ 5	Yes, will be well received
24. Overall effectiveness	Very ineffective	1 2 3 ④ 5	Very effective

COMMENTS

Attached

Everett Cross   11-5-83

FORMATIVE EVALUATION — STUDENT ATTITUDES

Student _____ Grade_____ Date _____ 198_____

Before writing the Post-Test, rate the booklet you've just completed by checking ☑ the answer that best represents the way you feel:

1. I think the booklet was
   - ☐ poorly designed and printed
   - ☐ O.K.
   - ☐ of very high quality

2. I think the lesson was
   - ☐ not hard
   - ☐ too hard
   - ☐ too easy
   - ☐ too childish

3. I think the lesson was
   - ☐ fun
   - ☐ interesting
   - ☐ O.K.
   - ☐ dull

4. I learned
   - ☐ nothing new
   - ☐ a little
   - ☐ some
   - ☐ a lot

5. The lesson was
   - ☐ about the right length
   - ☐ too long
   - ☐ too short

6.
   - ☐ I liked working through the lesson on my own
   - ☐ I don't care one way or the other
   - ☐ I didn't like learning this way

7.
   - ☐ The booklet made it clear what I had to learn
   - ☐ It was fairly clear
   - ☐ It didn't tell me what I was supposed to learn

8.
   - ☐ There were too many questions in this lesson
   - ☐ It was O.K.
   - ☐ There should have been more questions

9.
   - ☐ The tests in the lesson were O.K.
   - ☐ The tests covered things that weren't in the lesson
   - ☐ The tests didn't ask everything I knew

10.
    - ☐ The Work Assignment was easy
    - ☐ The Work Assignment was not too hard
    - ☐ I didn't understand the Work Assignment
    - ☐ I didn't do the Work Assignment,

    because_____

    _____

    _____

APPENDIX H

Instructional Package

The College of Trades and Technology

PRINTING CLASS

LAYOUT

Learning Activities Package No. I-8

Design
book
pages

Rationale

A customer sends a printer a stack of typewritten pages, a "manuscript", and expects the printer to produce a well-designed, professional-looking book or booklet.

But, what is meant by well-designed?
How much of a page should be occupied by type?

THE MANUSCRIPT

How should illustrations be handled?
How much space should be allowed for chapter headings?
Where do the page numbers ("folios") belong?

In the pressroom, the printer may prefer to print several pages on one large sheet of paper, and fold it to make a book "signature." Which page goes where?
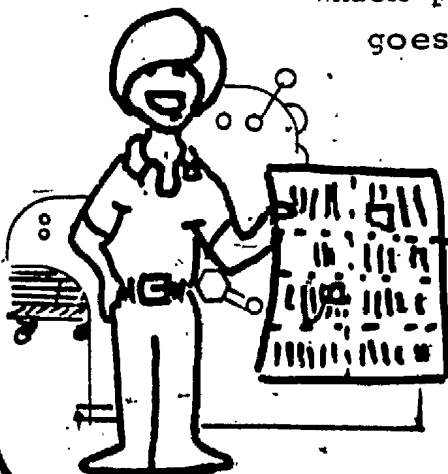
For that matter, what size should a page be? Are there any standard sizes?

These are some of the questions you will explore in this module.

Objectives

After completing this learning package, you should be able to:

1. Demonstrate an understanding of pleasing proportions in book page design by calculating the type measure and depth for a given page size, and preparing a page layout with appropriate margins.

2. Demonstrate good layout practice by preparing a neat and accurate pencil layout of two adjacent printed pages with progressive margins. The type measure and size, line spacing and type area depth should be indicated with properly spaced parallel lines.

3. Demonstrate professional techniques for integrating illustrations and photographs into the printed page by drawing accurate outlines on page layouts, both in the "bleed" and "run of page" or "inset" styles.

4. Identify the side-stitched, saddle-stitched, plastic-ring, loose-leaf, and perfect binding methods by labelling a set of diagrams on a written test paper, and list any design problems created by each of these methods.

5. Given a saddle-stitched booklet, identify the page numbers that will be printed side-by-side, by preparing a page chart.

6. Given a set of specifications for a booklet, demonstrate a knowledge of book printing and folding techniques by preparing a book "dummy" and page chart.

This "Individualized Learning Package," or "module," is designed for independent study.

REVIEW:
: The first section of the module consists of information about printing, binding, and papers that you have already encountered in other parts of your printing course.

Read these pages carefully, and answer the review questions as you go.

DESIGN INFORMATION:
: The second section includes specific information about book page design. Again, you should read the pages carefully, and answer the review questions as you go.

LAYOUT PRACTICE:
: The most important part of this module is the work assignment at the back.

After you have studied the learning materials and answered the review questions, you should prepare the layouts specified in the work ass'ts. and bring them to your instructor for constructive criticism. When he is satisfied with your efforts he will enter a rating for this assignment on your Record of Achievement.

THEORY TEST:
: Theory Test #B-5 has been compiled from the Review Question pages of this module. Be sure you understand all of the review questions and the answers before you write the theory test. Your instructor will be pleased to discuss the questions with you.

Definitions

BOOK — a bound set of printed sheets of paper, usually between covers.

BOOKLET
BROCHURE
PAMPHLET } a printed work stitched or pasted together, but not permanently bound.

ONE LEAF (TWO PAGES)

A LEAF — a sheet of paper, bound into a book or pamphlet (or booklet or brochure).

A PAGE — one side of a leaf (i.e. one printed surface).

A SIGNATURE — a large printed sheet that, when folded, forms four, or a multiple of four, pages of a book (or booklet etc.).
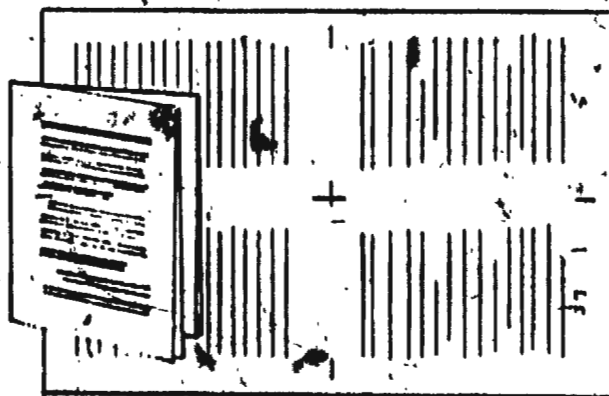
AN 8-PAGE SIGNATURE (4 PAGES EACH SIDE).

Anatomy
of a
book
page

"HEAD" OF PAGE   "RUNNING HEADLINE"

"TEXT"
(BODY TYPE)

"BACK" (BINDING EDGE)

"FORE" EDGE

"FOLIO"
(PAGE NUMBER

"FOOT" OF PAGE
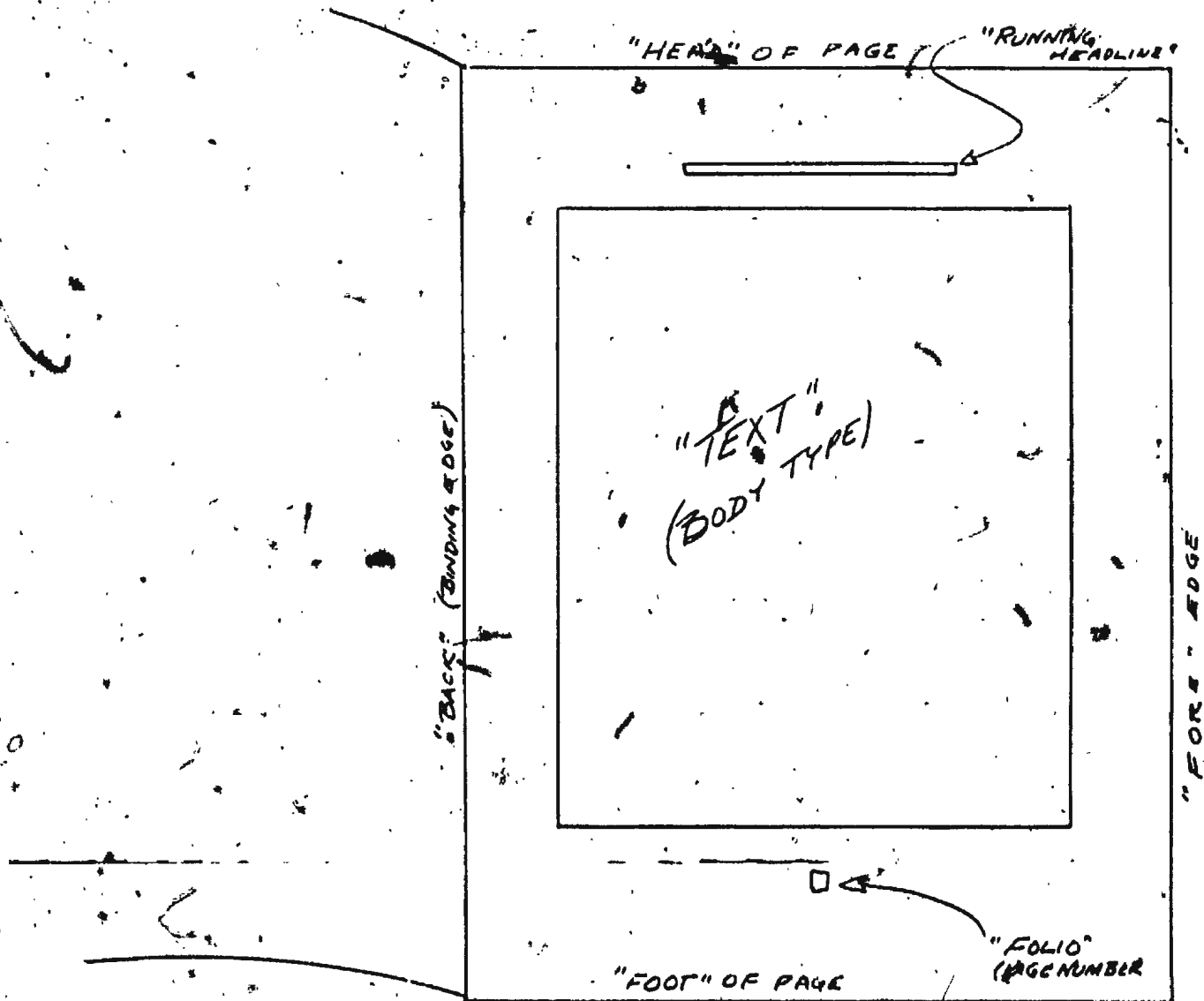
☐ Binding
☐ Printing
☐ Page sizes

— a Review

How will it be bound?
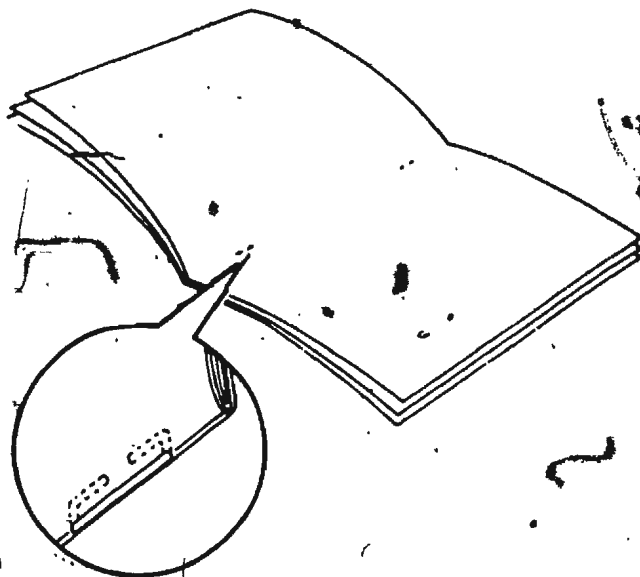
SADDLE-STITCHED BOOKLETS are turned out by the tens of thousands from printing shops of all sizes, because this is the simplest method of binding. Small booklets are opened to the centre and laid on the "saddle" of a stitching machine. Wire stitches (you may have called them "staples") are pushed through the centre of the booklet, and clinched to make them lie flat. The edges of the booklet are usually trimmed on a paper cutter to give a neat finish.

ADVANTAGES:

- A fast, economical binding method.
- Can be automated for high speed, large volume production.

DISADVANTAGES:

- Limited to approximately ¼" thickness.
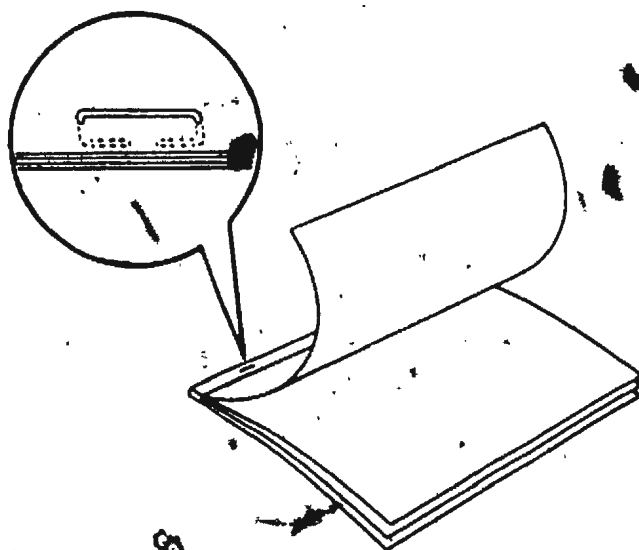
SIDE-STITCHED BOOKLETS are less common today, but can usually be produced on the same standard wire stitching machine that is used for saddle stitching. For books of more than ¼" thickness, single sheets or folded signatures are "gathered," covers are added, and wire stitches are placed close to one edge. A folded cover may be glued to the "spine" (binding edge), or two covers may be used, and the spine covered with cloth tape.

ADVANTAGES

- Fast, economical binding for short runs.
- Can handle up to 3/4" thickness, depending on the capacity of the wire stitching machine.

DISADVANTAGES

- Book will *not* lie flat when open.

SPECIAL DESIGN CONSIDERATIONS

Type, illustrations, photographs placed near the binding edge will be hidden by the stitching.

PLASTIC RING BINDING is a popular way to bind short run booklets such as reports that have been printed on single pages.

Slotted holes are punched along one edge of the leaves and the covers. A machine (sometimes the same machine that makes the holes) opens a plastic "comb" so that the leaves can be inserted in the rings on the comb. When all the leaves and covers have been inserted, the comb is released and the binding is finished.

ADVANTAGES

- Lies flat when opened (great advantage for cookbooks, music books, and lab manuals).
- Simple binding process, does not require a high level of operator skill.

DISADVANTAGES

- Binding rings are expensive.
- Slow binding process.

SPECIAL DESIGN CONSIDERATIONS

Photographs, diagrams, etc. should not be placed near the binding edge because of the space consumed by the slotted binding holes and binding rings.
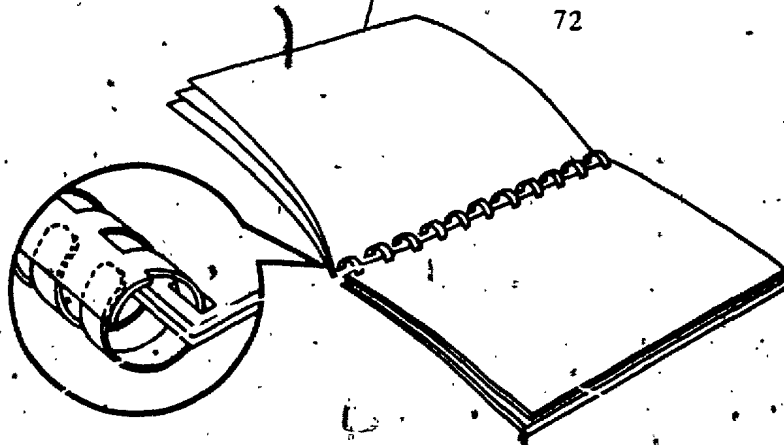
LOOSE LEAF BINDING is done by drilling holes near the binding edge of the leaves, and fastening them with special screws, or placing them in a ring binder or special cover.

ADVANTAGES

- Sheets can be easily added or removed at any time (good for price lists and catalogues).
- Simple equipment — a paper punch or drill is all that's required.

DISADVANTAGES

- Sheets can be lost or mislaid easily.

SPECIAL DESIGN CONSIDERATIONS
Watch those holes!
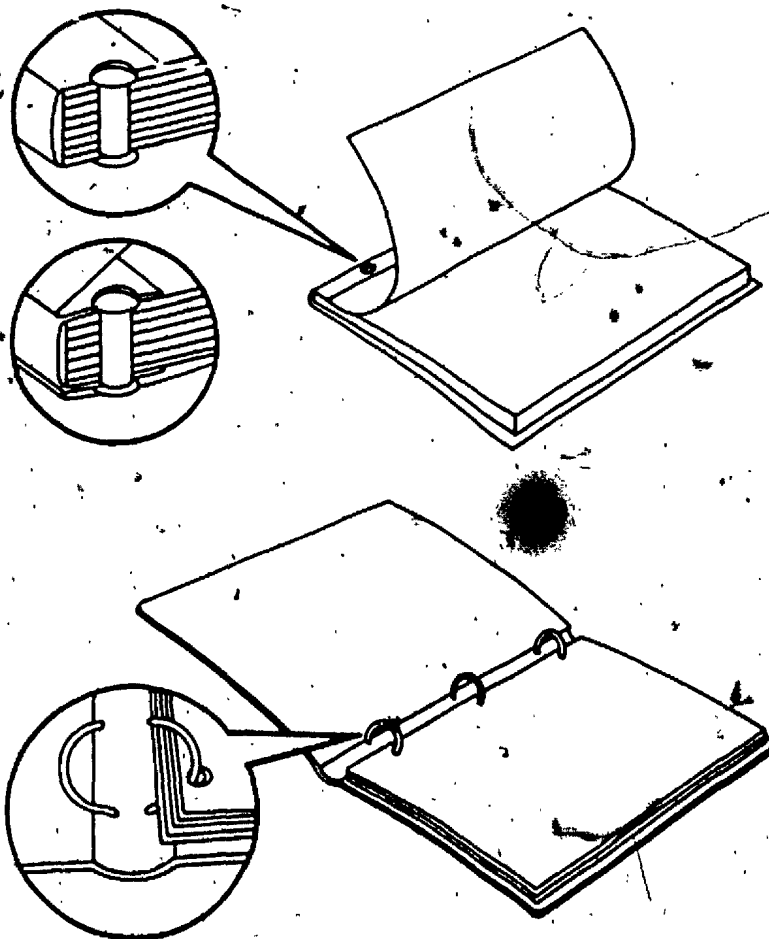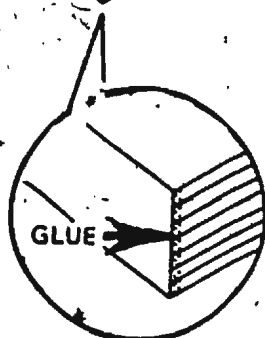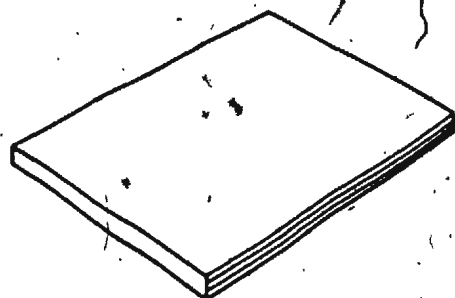
PERFECT BINDING is becoming increasingly popular. Single pages or folded signatures are assembled and fed into a special binding machine, while a cover is fed into the machine separately. The machine cuts and roughens the binding edges, applies hot glue, and folds the cover around the pages, creating a "perfected" book or booklet instantly.

ADVANTAGES
- Fast, economical binding method.
- Book lies flat when opened.
- Can be automated for high speed — large volume production (e.g. telephone books).

DISADVANTAGES
- Very expensive equipment, usually available only in large printing plants.

SPECIAL DESIGN CONSIDERATIONS

Binding machine rough-saws 2-3mm of spine before applying hot glue. Be careful of illustrations, etc., printed close to binding edge.
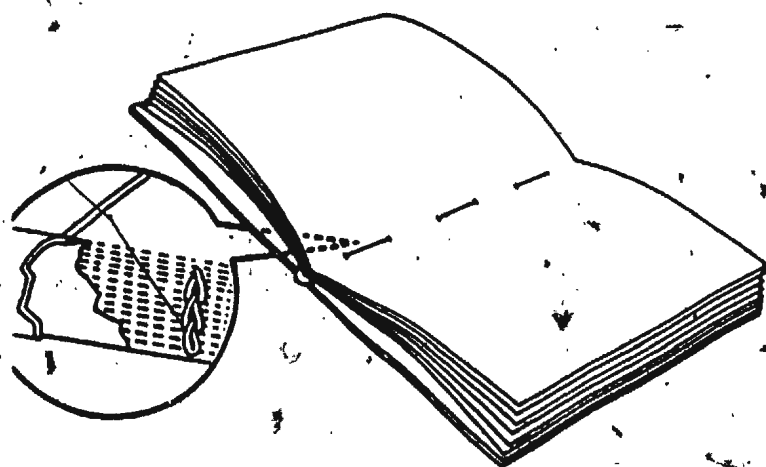
CASE BINDING is the name for the traditional method of sewing and/or glueing pages together and applying a hard cover (a "case"). This is the best and most expensive method of binding a book.

ADVANTAGES
- Very durable.
- Book lies flat when opened.

DISADVANTAGES
- Very expensive, highly specialized machines needed.

Review Questions

BINDING METHODS

A. Saddle-stitched
B. Side-stitched
C. Perfect Binding
D. Case Binding
E. Loose Leaf Binder
F. Plastic Ring Binding

Answer each question below by choosing one of the binding methods listed above, and writing the correct letter on the line provided:

_____ 1. Pages are fastened together by wire stitches (staple) through the spine.

_____ 2. This method allows leaves to be added or removed easily by the user, with no special equipment.

_____ 3. Leaves can be added or removed, but only with a special binding machine.

_____ 4. Leaves are fastened to the spine with hot glue.

_____ 5. Leaves are fastened together by wire stitches close to the back edge.

_____ 6. Produces the most durable book, but is the most expensive binding method.

_____ 7. Slotted holes are punched along back edge of leaves to fit over plastic rings.

_____ 8. An economical method for binding pamphlets, but thickness is limited to about ¼".

(Check your answers on the back page of this module)

HOW WILL IT BE PRINTED?

FLOOR MODEL UFFOET DUPLICATOR

BINDING METHODS

SIDE-STITCHED

PLASTIC RING BINDING

LOOSE-LEAF

"PERFECT" BINDING
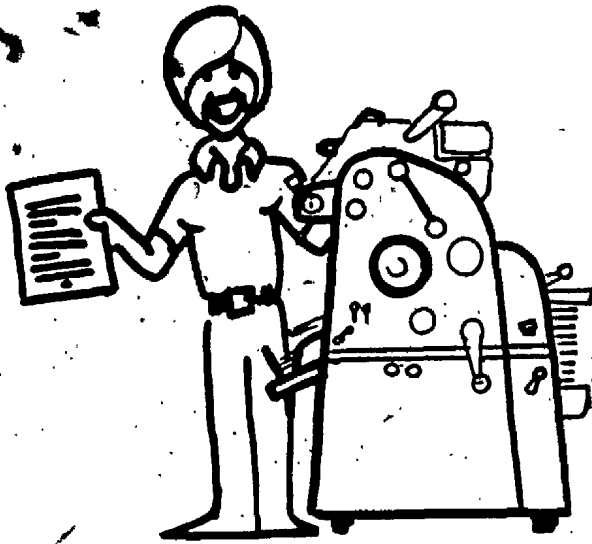
The Single-page Method

A secretary types a report on letter-sized paper. The duplicating department reproduces a few dozen copies of the pages, collates them by hand, and staples or binds them into book format.

Or, the company has a sophisticated automated offset "system" that makes its own masters, prints the pages on both sides, and collates the sheets, ready for binding.

Many commercial printers and "instant printing shops" offer this kind of automated duplicating service to their customers. It is usually reserved for short runs (e.g. up to 200 copies), but may be used to print thousands of books if automated equipment is available.
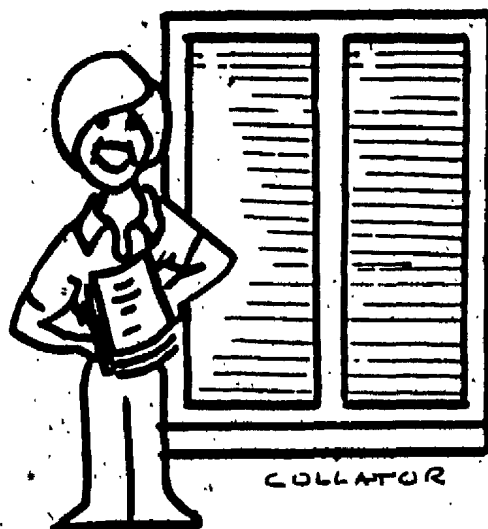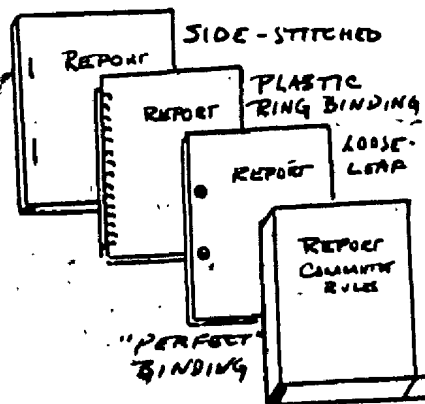
AUTOMATED OFFSET DUPLICATING
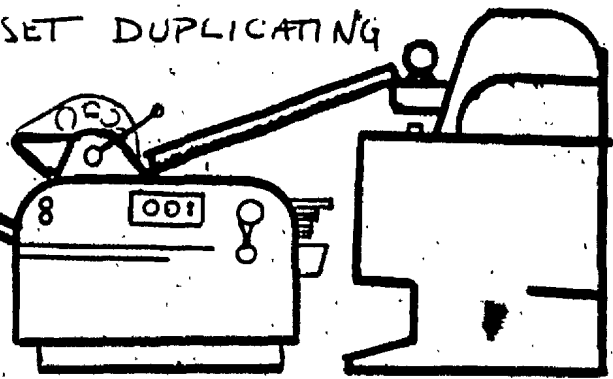
COLLATOR   OFFSET DUPLICATOR   PLATEMAKER

OFFSET PRESS — FOLDING MACHINE

HAND COLLATING
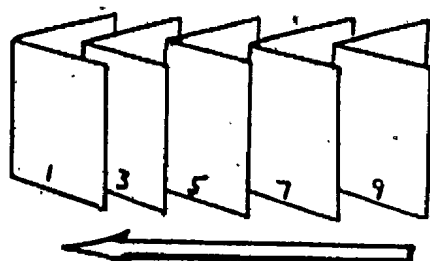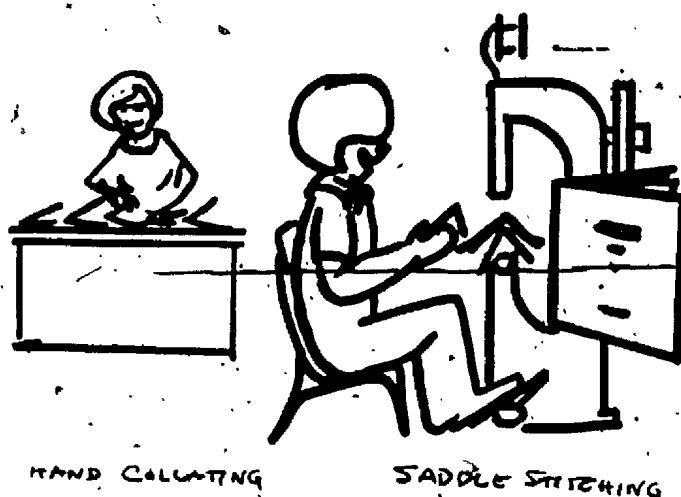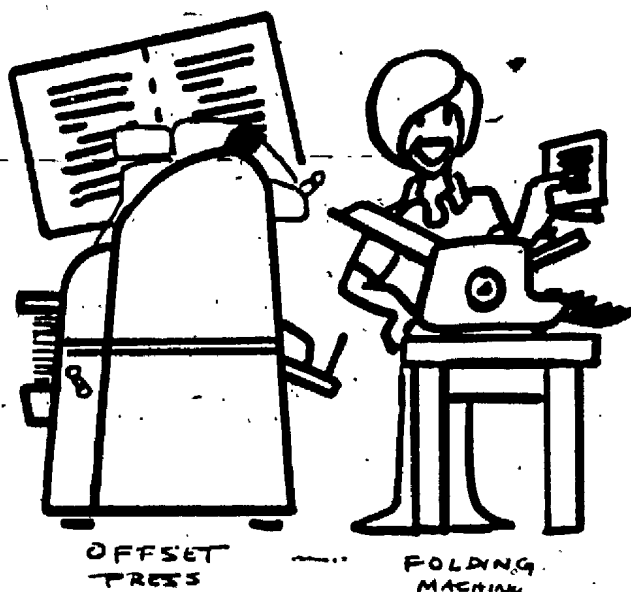
SADDLE STITCHING

"TWO-UP" PAGES ARE FOLDED AND INSERTED, THEN SADDLE-STITCHED

The "Two-up" Method

When a small commercial printer has an order for pamphlets (also known as "booklets" or "brochures") of up to ¼" thickness, he will most likely print the pages two at a time. Each two-page sheet will have two more pages printed on the other side ("backed up") and be folded to make a four-page "signature." The signatures will be inserted (the machine for this is called a "collating machine"), a folded cover will be added, and the whole assembly will be bound into a booklet, most likely by the "saddle-stitching" method.

Some printers and duplicating departments have automatic collating machines for pamphlet binding. Machines are available that will collate, saddle-stitch, and fold in one continuous operation.

FLAT SHEETS & COVERS LOAD IN DRUM

STITCHES INSERTED

SADDLE-STITCHED BOOKLETS

COLLATOR-STITCHER-FOLDER
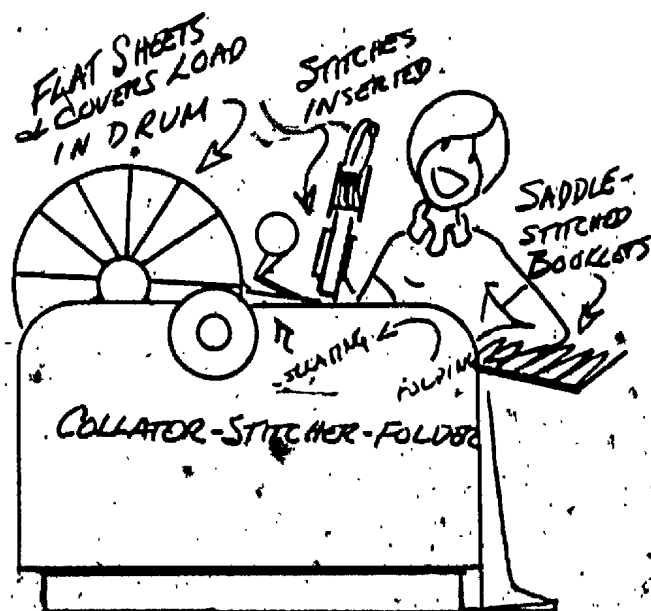
"TWO-UP" PAGES MAY ALSO BE BOUND BY:

SIDE-STITCHING

AND "PERFECT" BINDING

16-PAGE PRESS SHEET

FOLDED SIGNATURES

SHEET-FED OFFSET PRESS

RIGHT-ANGLE FOLDING MACHINE

SADDLE-STITCHED BOOKLETS

COLLATOR-STITCHER-TRIMMER

The "Big Sheet" Method

HOT-GLUED "PERFECTED" BOOKLET
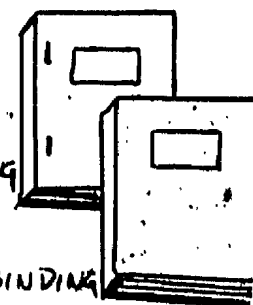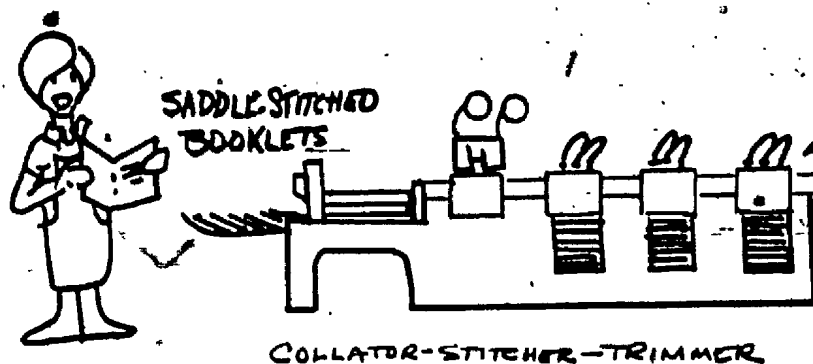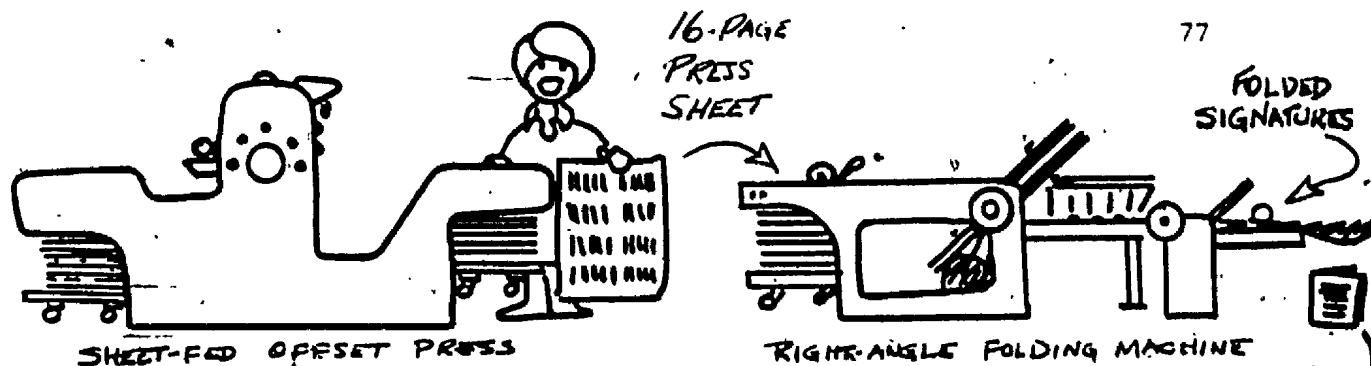
Larger printing plants that specialize in book and pamphlet printing prefer to print 4, 8, or 16 pages at a time, fold their press sheets into 8-, 16-, or 32-page signatures, and finish the pamphlets on automated bindery machines.

"PERFECT" BINDER

"GATHERING" MACHINE
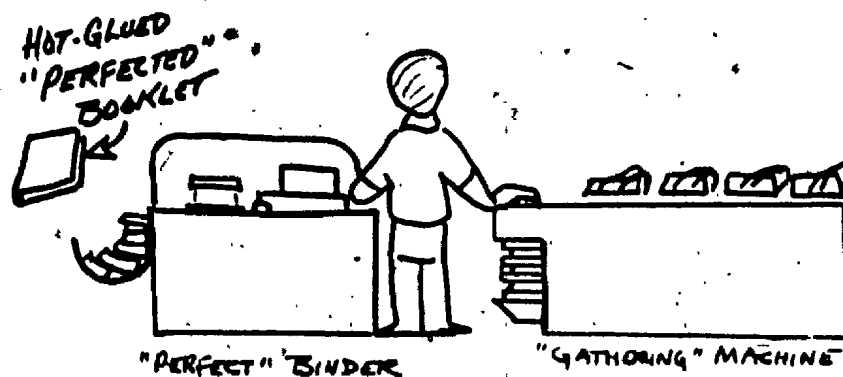
Note that large, expensive presses and folding machines are used, and the printer needs different equipment for each kind of binding.

This method is best for high-quality printing in runs of 5,000 or more.

ROLLS OF PAPER

PRINTING UNITS

FOLDING & CUT-OFF UNIT

COLLATED, FOLDED SIGNATURES

(READY FOR BINDING)
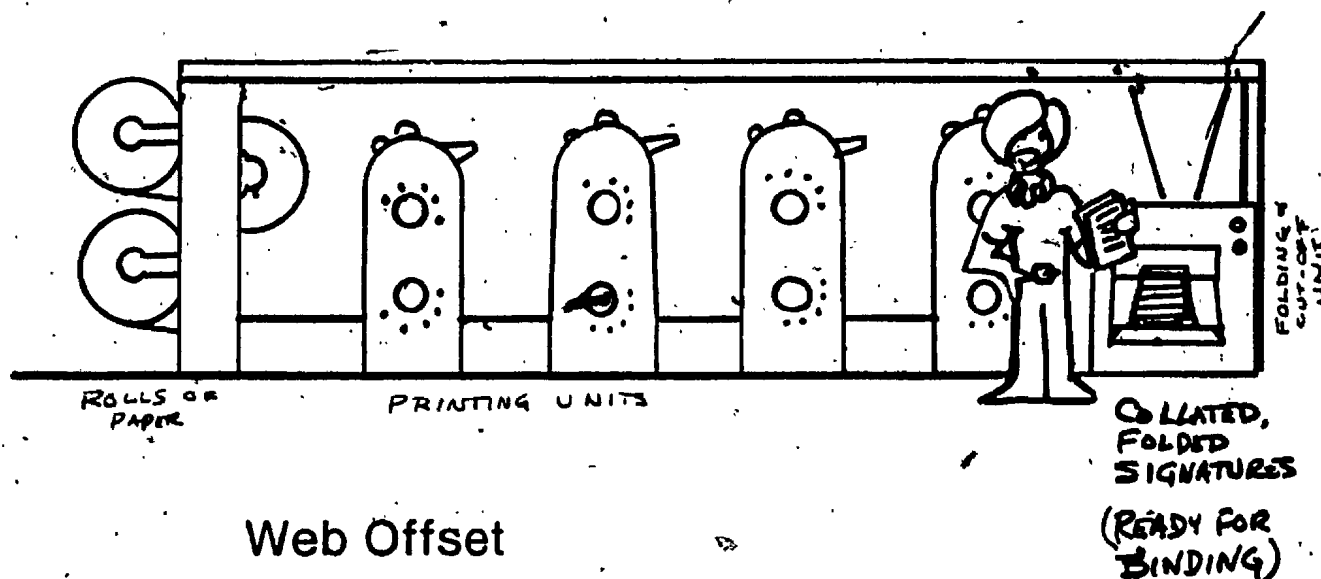
Web Offset

MAGAZINE PRINTERS usually own high-speed "web offset" presses that feed continuous "webs" of paper from rolls, print both sides, gather the webs and fold and cut them to produce several completed signatures at each press revolution. Magazines usually have P4 (215X280mm) pages, and are printed on glossy paper.

NEWSAPER PRINTERS often supplement their incomes by printing books and pamphlets between their newspaper printing runs. Because the web press is so fast (15,000—30,000 impressions per hour) and can use cheap newsprint as well as more expensive book papers, this is usually the most economical method of printing very large runs. Runs of 5,000 and up are economical on newsprint paper by this method.

WEB OFFSET PAGES ARE USUALLY SADDLE-STITCHED OR "PERFECT" BOUND

GRAPHICS

GRAPHICS

Review Questions

What is meant by:

1. "Single page" printing _____

   _____

   _____

2. "Two-up" printing _____

   _____

3. "Big sheet" printing _____

   _____

   _____

4. "Web offset" printing _____

   _____

   _____

Which of the above methods is most likely to be used in each of the following situations?

_____ 5. A booklet of 64 pages has been typeset, and 10,000 copies must be printed, folded and bound for fast delivery.
_____ Cheap paper is acceptable.

_____ 6. 125 copies of a 60-page engineering report must be printed, collated and bound for presentation to the client. The engineer's secretary has pro-
_____ duced a very high quality typing job.

_____ 7. A 32-page booklet has been designed for a small page format (125 x 200mm --5"x8" approx.).
   2000 copies are required.

WHAT SIZE SHOULD A PAGE BE?

The next three pages present a brief
overview of the metric paper system
used in Europe. This is presented for
the sake of comparison only. The
European "A" and "B" sheets are not
made for the Canadian market.

o Don't attempt to memorize the
European metric measurements.

o Do notice the system, the way that
folding or cutting a metric sheet
creates a new metric size.

The pages about Canadian paper are
important. You should learn the
dimensions of the "4's"--P4, R4,
and S4 are common page sizes in
Canada.

WHAT SIZE SHOULD A PAGE BE?

EUROPEAN STANDARD

"**A**" sheet
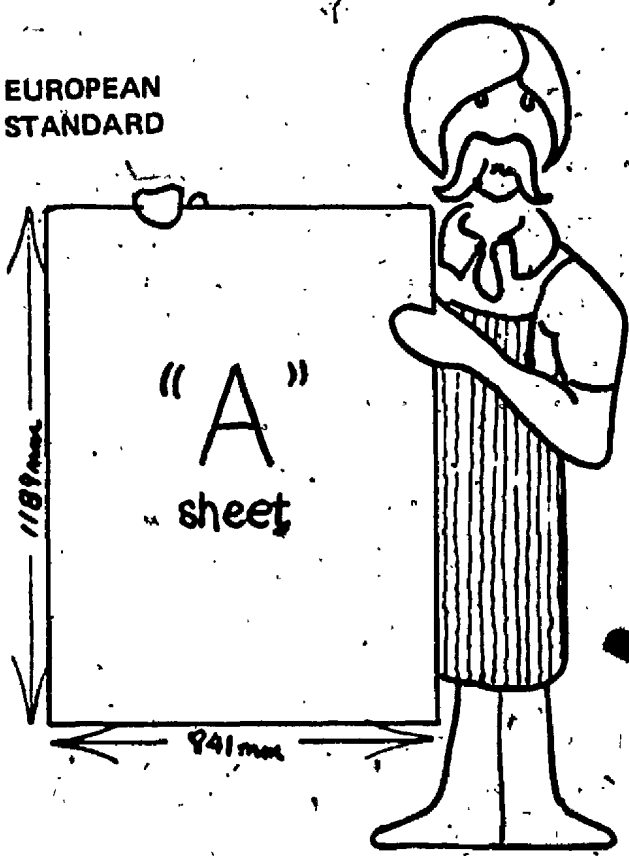
1189mm

841mm

IN EUROPE (including England, now) paper sizes are based upon the "A" sheet — a sheet of paper measuring 841mm X 1189 mm.

Why such an odd size?

There are two reasons:

1) These are the proportions of the "golden rectangle."

2) 841mm X 1189mm = 1 square metre.

THE "GOLDEN RECTANGLE"

The ancient Greeks (ca. 500 B.C.) were fascinated by geometry.

Although they considered the circle and the square to be perfect shapes, they found that square buildings, square paintings etc. never *looked* square, and they began a search for a rec-tangular shape that would be pleasing to the eye, and that would retain its proportions when divided in half.

By the application of geometry they finally discovered that if they drew a diagonal line across a square, measured it, and then used that measurement for the long side of a rectangle, that shape would be the most pleasing to most people, and it would also cut in two to make two rectangles of the same proportions as the original. They used this shape extensively for the shape of paintings, doorways, buildings, and many other applications.

DIAGONAL

THIS SIDE SAME LENGTH AS DIAGONAL
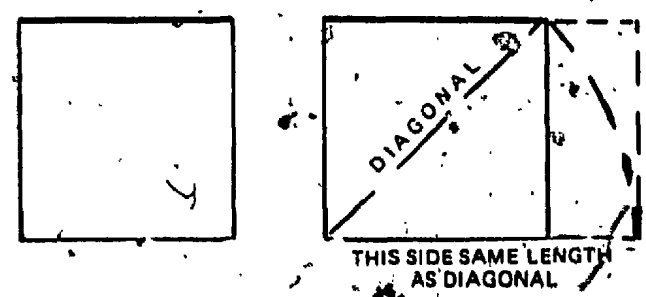
The ratio of the golden rectangle is:

$$1 : 1.414$$

During the Renaissance in Europe, after the Middle ages, the Greek golden rectangle was re-discovered and widely adopted in art and architecture. It is still used for the shape of most paintings, and the European paper industry has made it the standard for office stationery and book pages.

"A" sheet

841mm · 1189
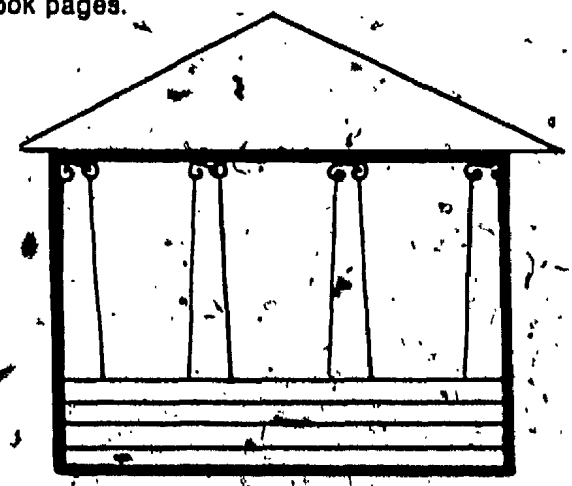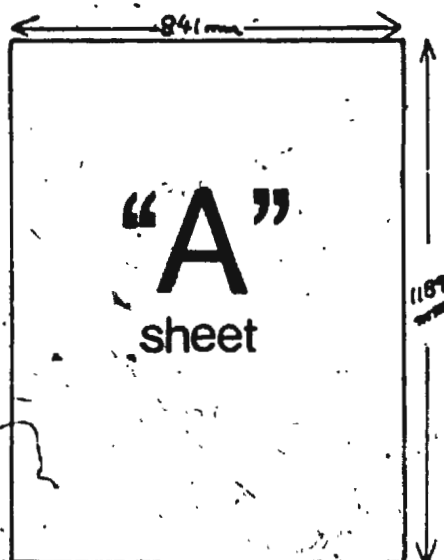
"A" sheet

The "A" sheet is also called the "A0" (A-zero) sheet.

An A0 sheet cuts or folds in half to make 2 A1 sheets.

A1 · 841 mm · 594

A1 · 594 · 841 mm
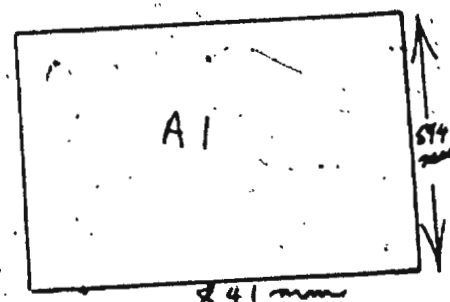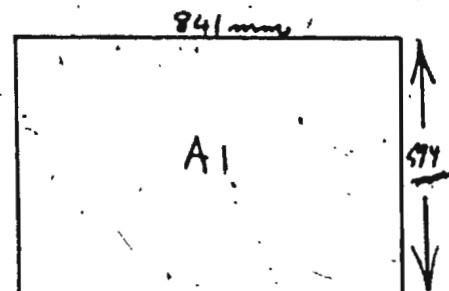
An A1 sheet cuts or folds in half to make 2 A2 sheets.

A2 · A2 · 594mm
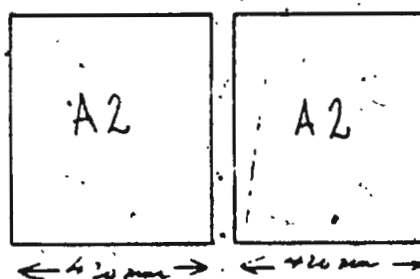
An A2 sheet cuts or folds in half to make 2 A3 sheets

A3 · 420mm · 297

A3 · 297
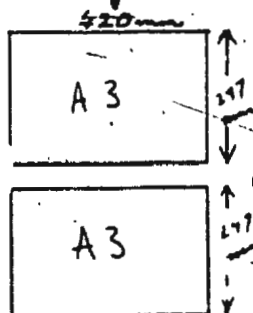
An A3 sheet cuts or folds in half to make 2 A4 sheets.

(An A4 sheet measures 210 X 297mm, and is the standard letterhead size in Europe) Size — roughly 8¼" X 11½"

A4 · A4 · 210mm · 210mm · 297mm

A5 · 148 · A5 · 148 · 210mm
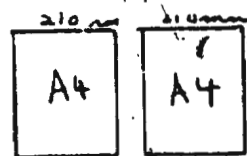
An A4 sheet cuts or folds in half to make 2 A5 sheets (148X210mm) — a common booklet page size in Europe.
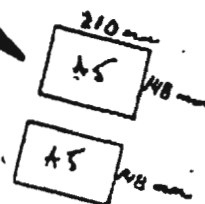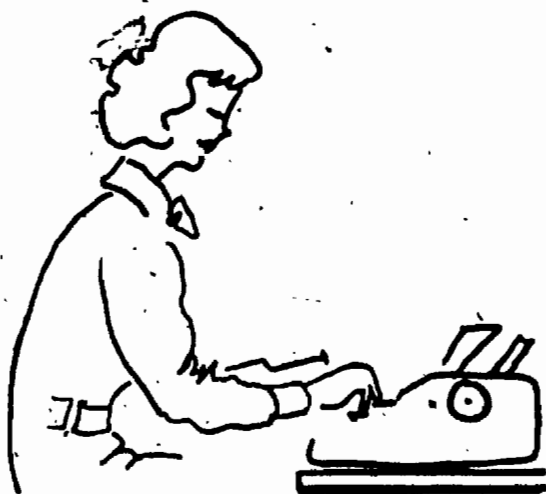
In Europe,

A-4 bond paper is
the standard letterhead,
and . . .

A-4 book paper is
a standard page for larger
books, and magazines.

A-5 book paper is also
a standard page size for
books and booklets.
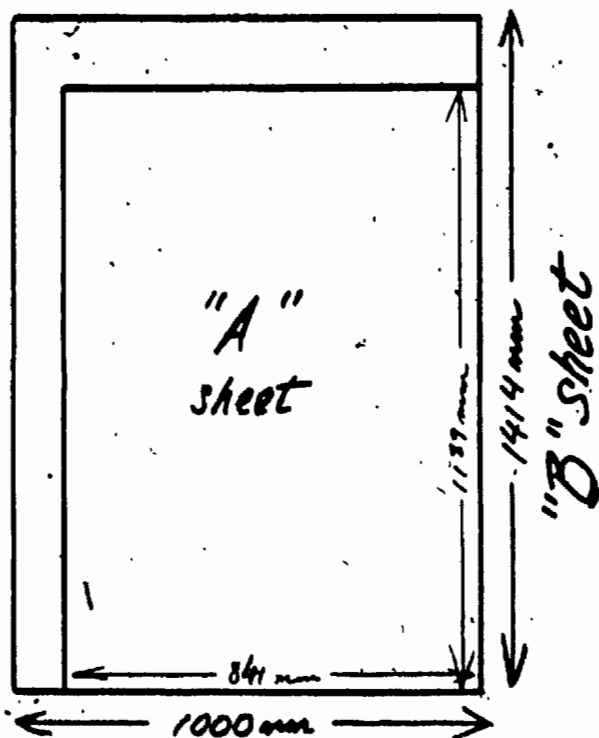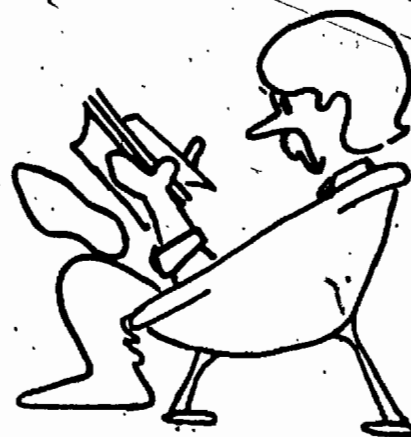
There is one other
standard size of book
paper used in Europe . . .

The European "B" sheet measures
1000mm X 1414mm (note the propor-
tions of the golden rectangle, again).

An European A4 sheet
measures 210 X 297mm
(roughly 8¼ X 11½")

An European B4 sheet
measures 250 X 353mm
(roughly 9¾ X 14")

"A" sheet

"B" sheet

1131 mm

1414 mm

841 mm

1000 mm

Canadian standard sheet sizes

There are four standard metric sheet sizes in Canada, and a number of non-standard ones.

BOND PAPERS (for office use)

The "P" sheet measures 86 X 112cm (34"X 44")

The "Q" sheet measures 86 X 142cm (34"X 56")

The "R" sheet measures 112 X 142cm (44"X 56")

The "S" sheet measures 91 X 122cm (36"X 48")

NOTE: Book papers are usually slightly larger than bond papers, to allow for trimming the pages after printing. The "PT" size of book paper implies a "P" sheet with a 2cm trim allowance, "ST" an "S" sheet with a 2cm trim allowance, and "RT" an "R" sheet with a 2cm trim allowance. There is no QT sheet.
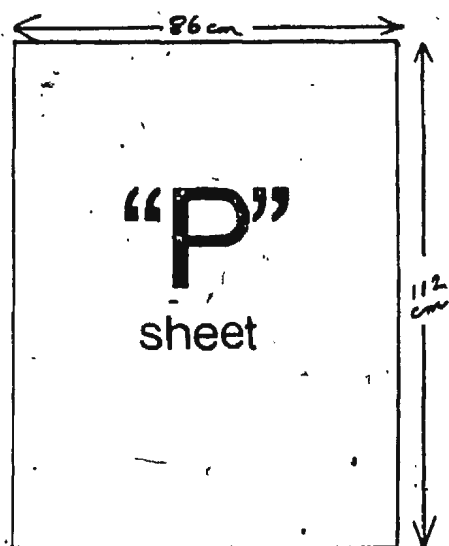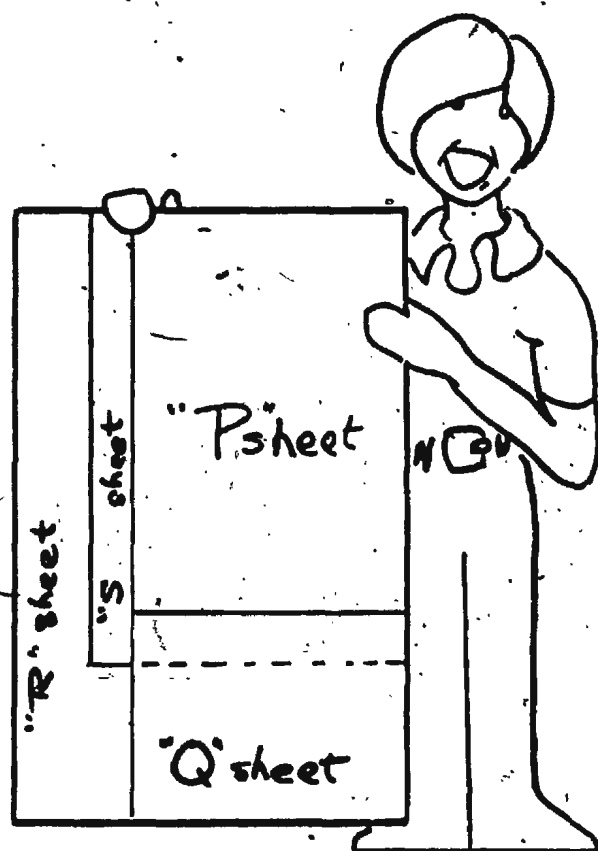
CANADIAN STANDARD

The most common size of paper sold in Canada is based on the "P" sheet which measures 86cm X 112cm (formerly 34X44 inches).

As in the European system, a P-zero sheet cuts or folds in half to make 2 P1 sheets.

P1
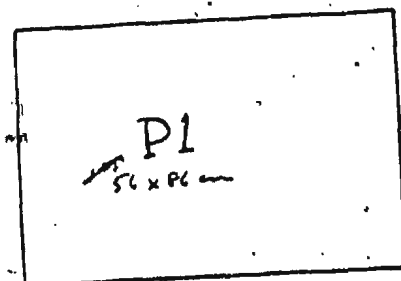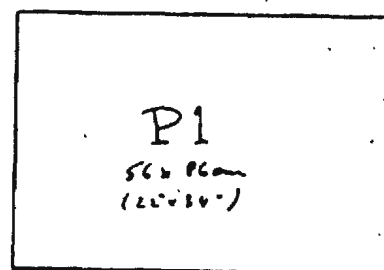
THIS PAGE IS SIZE P4
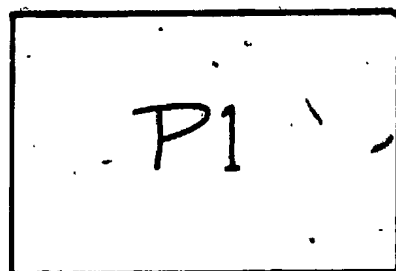
A P1 sheet cuts or folds in half to make 2 P2 sheets.

P2

P2
43×56cm
(17"×22")
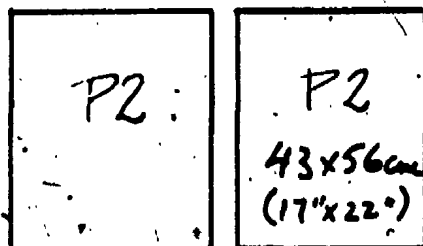
A P2 sheet cuts or folds in half to make 2 P3 sheets.

P3

P3
28×43cm
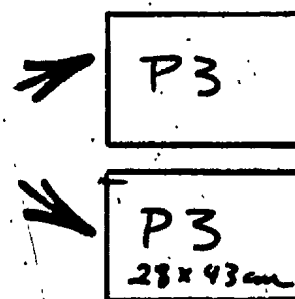
A P3 sheet cuts or folds in half to make 2 P4 sheets.

Popular size for booklets: 140 X 215mm (5½" x 8½")

P5

P5
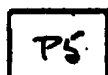
A P4 sheet cuts in half to make 2 P5 sheets . . .

P4 **P4**

A P4 sheet measures 21.5cm x 28cm, which is the standard Canadian letterhead size.

The standard U.S. letterhead measures 8½"x 11", which is 1mm wider and 1mm shorter than a Canadian letterhead.

and so on . . .

and so on . . .

P6 **P6**

and so on . . .

P7
P7

Q1
71 × 96cm

Q2
43×71cm
(17"×28")

Q3
"foolscap"

Q4
"legal"

Q5

Q6 **Q7**
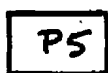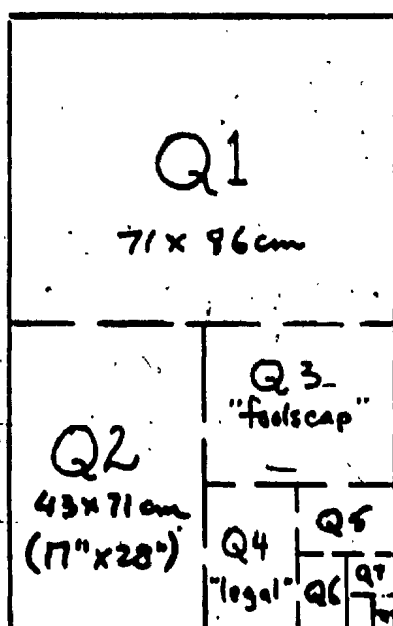
Another common Canadian paper size, made especially for office use, is now called the "Q" sheet.

In Canada, a long letterhead is often called a "legal" sheet because it is widely used for legal documents. It was once called the "half-cap" sheet (half a foolscap).

The original foolscap sheet was made in England. It measured 16⅞" X 13⅜". It's now 355 X 430mm in Canada (metric Q3), 17"X 14" in the U.S.

The Q4 sheet is the "legal" or long letterhead in Canada. It measures 215 X 355mm. In the U.S. it's 1mm wider: 8½"X 14".

BUT WHY DO THEY CALL IT "FOOLSCAP" PAPER?

R1

R3

R2
56 x 71 cm
22" x 28"
— Showcard Board

R4
280 x 355
mm
— 11" x 14"

25

26

27

R sheet — 112 x 142 cm

LEGAL

LETTERHEAD

P4

R4

Q4
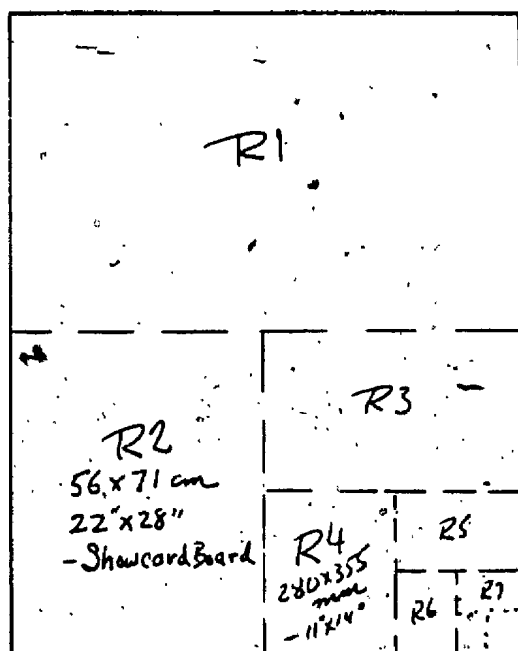
The "R" sheet is a standard Canadian sheet that is primarily used in advertising, and for printing large art books and oversize magazines (e.g. "Life" magazine).

For the sake of comparison,

An R-4 sheet is as *wide* as a letterhead is long,

and it is as *long* as a "legal" page.
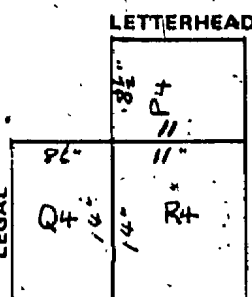
Fine "bristols" (light cardboard) are made in size RT2 (R2 plus a 1cm trim allowance).

Book papers, both coated and uncoated, are available in size RE2 (R2 plus a 2cm trim allowance).

"T" stands for "TRIM" allowance

S1

(STANDARD NEWSPRINT)
SIZE

S2

S3

S4

S5

S6

S7

S sheet — 91 x 112 cm

ST1 sheet — 63 x 76 cm (25" x 38")

"T" stands for "TRIM" allowance
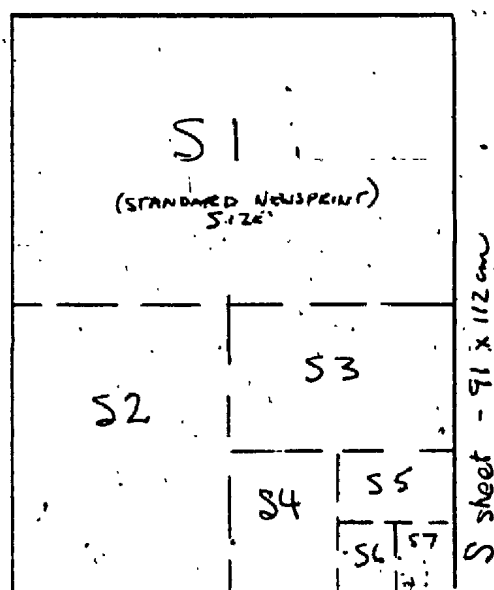
The "S" sheet is a standard size for newsprint and ledger papers.

FOURTH FOLD

SECOND FOLD

FIRST FOLD

THIRD FOLD

TRIMMED BOOK
"S5"
PAGE
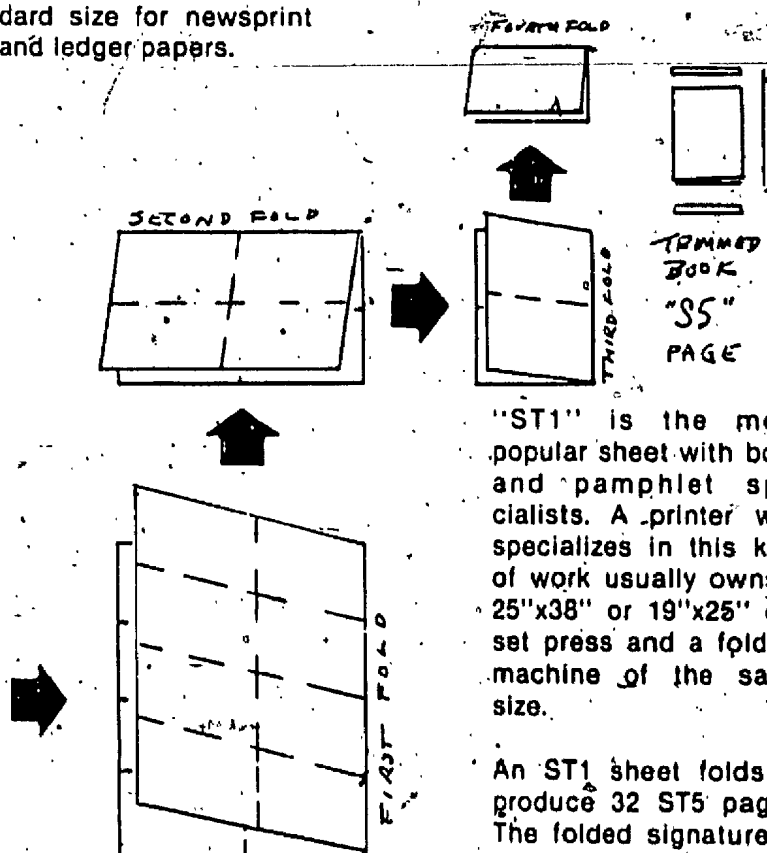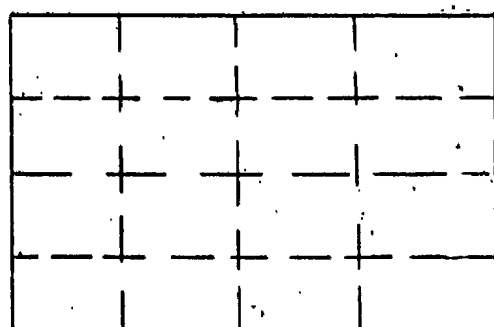
"ST1" is the most popular sheet with book and pamphlet specialists. A printer who specializes in this kind of work usually owns a 25"x38" or 19"x25" offset press and a folding machine of the same size.

An ST1 sheet folds to produce 32 ST5 pages. The folded signature or booklet will be trimmed to make an S5 size.

Page Proportions

DESIGN
Ratio 1:2.25

BOOKLET
Ratio 1:1.5

DOESN'T FIT!
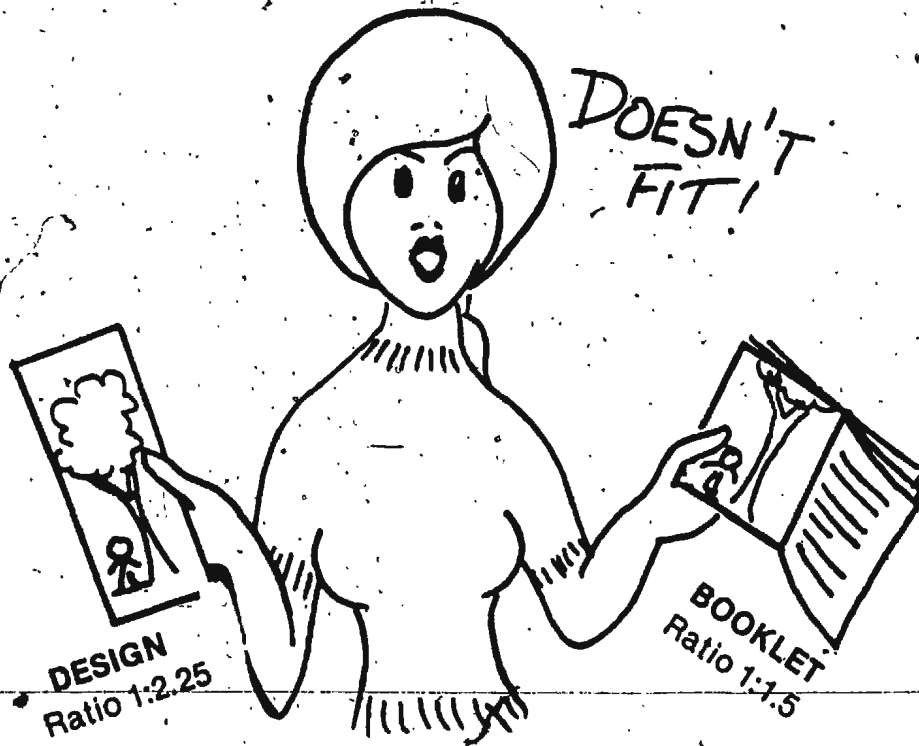
A book page can be reproduced in the same size as the original design-...

It can be enlarged ...

or, it can be reduced ...

But — the design can only fit the page if the artwork is done in the same *ratio* as the book page.

Page Proportions are expressed as ratios.

e.g. a 4"x 6" page has a ratio of $\frac{6}{4}$ = 1:1.5

an 8"x 10" page has a ratio of $\frac{10}{8}$ = 1:1.25

Four common page ratios

"Golden rectangle"

The European standard

e.g.

$$A4 = \frac{297 \, mm}{210 \, mm} = 1:1.4$$

$$B5 = \frac{250 \, mm}{176 \, mm} = 1:1.4$$

Half a golden rectangle is also a golden rectangle. In Canada, there is no standard page size that is exactly a golden rectangle.
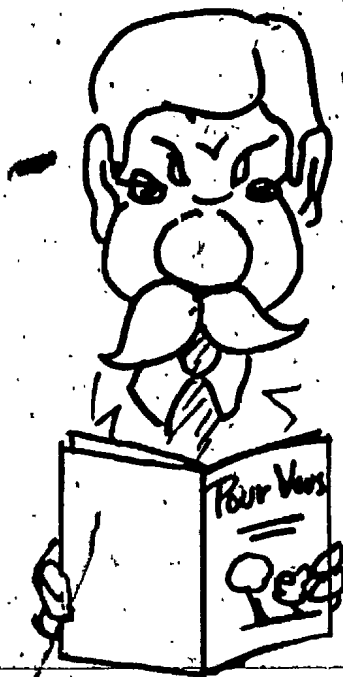
"Printer's rectangle"

e.g. Canadian S4

$$\frac{12"}{9"} \frac{(300 \, mm)}{(225 \, mm)} = 1:1.33...$$

9"x12" is a common page size for large books.

$$\frac{6"}{4\frac{1}{2}"} \frac{(150 \, mm)}{(112 \, mm)} = 1:1.33...$$

4½"x6" is a small pocket-sized booklet.

"Regular rectangle"

A regular rectangle is half a printer's rectangle.

e.g. Canadian S5

6"x9" (225x150 mm)

$$\frac{9"}{6"} = \frac{3}{2} = 1:1.5$$

This is the most common booklet size in the U.S. and Canada.

Note: P5 (5½"x8½") is very close in proportion to S5.

"Letter-size" page

The letter-size page is becoming the most popular size of all in the U.S. and Canada. Giant web-offset machines for printing magazines are designed to print this page size.

The letter-size page is called the "Metric P4" in Canada, and measures 215x280mm (approx. 8½"x11").

Ratio

$$\frac{11"}{8\frac{1}{2}"} = 1:1.29$$

(or 1:1.3)

PAGE PROPORTIONS

The "Golden Rectangle"

In Europe, almost all books are printed on pages that retain the proportions of the golden rectangle:

1 : 1.414

These are the A4, B4, A5, B5, etc.

In Canada, there is no standard page size with the exact proportions of the golden rectangle. The closest Canadian size is:

"R4" — 280 X 355mm (11"x 14")
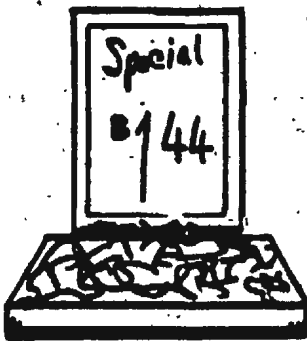
The R4 size is widely used for display advertising cards, because it is ¼ of a standard sheet of fine bristol or show-card board.
It is also popular for large art books and magazines.

There is a special exception to this: booklets printed on newsprint paper on newspaper presses. Newspaper presses have a standard "cut-off" of 58 X 89cm, which can be folded on the press to produce a standard P4 page. However, most newspapers buy rolls of paper 79cm wide to save money. When the press is used for booklet production, between runs of newspapers, the publisher is reluctant to change over to a different size of paper. For this reason, newspapers usually specify that their low price for booklets can only be applied to a special page size: 19 x 27cm when trimmed (7½"x 10½") — which is very close to a 1:1.414 ratio.
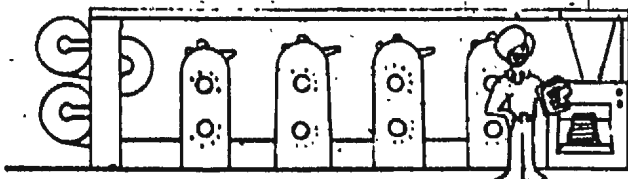
Newspaper printers often print books on newsprint paper, but they produce a special page size — 7½"x 10½" (ratio 1:1.4 — a golden rectangle).

The "Printer's Rectangle"

Canadian printers who specialize in book production use more ST1 paper than any other size, because large sheet-fed offset presses are built to take this size. In fact, many specialty book papers are available in this size only, except by special, large order. This sheet folds and trims to produce an S4 or S5 page.

The S4 page measures 225 x 300mm (9"x12"):

1:1.333 (3:4)

The "Regular Rectangle"

This page is one-half of a "printer's rectangle":

The S5 page is the most popular size with printers who specialize in booklet production. It measures 150x225mm (6"x 9").

1:1.5 (2:3)

The "Letter-sized" Page

This size was once used almost exclusively for office stationery, but with the dramatic increase in the use of offset duplicating and web offset it has become very common for book and booklet production. Most popular, large circulation magazines are printed on this size page because all new web offset presses are built to this size. It is also the most popular size for reports and catalogues, and is becoming increasingly popular for books and booklets because this size is so readily available in P4 "cut stock."
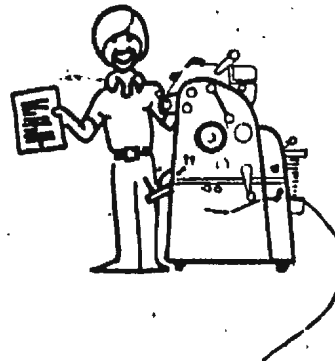
1:1.3 (8.5:11)

This page is printed on Letter-sized paper.

WHAT ABOUT A SQUARE PAGE ?

A square page *can* be extravagantly expensive because it will be a "special order" of paper, or else you will have to cut it from a standard size and absorb a loss from excessive waste.

IF you can buy large paper such as PT-zero (89X114cm/35"X 45"), and have a paper cutter, printing press, and folding machine large enough to handle it, a square page may not be impractical.

BUT some very attractive modern books have square pages. How is it done? Did the publisher waste a lot of money?

A PT0 sheet can be folded to make 20 8½"X 8½" leaves, or cut to make 10 8½"X 17" pieces for printing square pages 2-up. Similarly, an ST0 sheet will yield 20 leaves 9"X 9".

45" (1.14cm)

9"   9"   9"   9"   9

8¾"   8¾"   8¾"   8¾"   8¾"

35" (89cm)
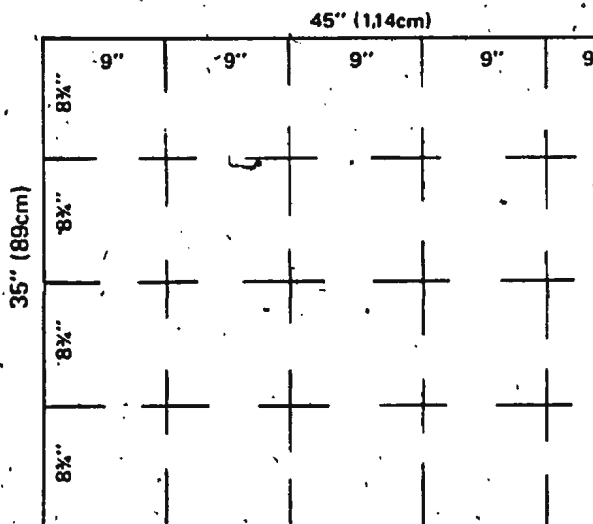
A PT0 sheet can be folded or cut to make 20 leaves 8½"x 8½" (with trim).

THE "ALBUM" PAGE

A page that is wider than it is high is called an "album page." This style of page is very desirable for certain kinds of books, such as art books, but before you design a book or booklet in the album style, be sure you have access to a printing press and folding machine that can print it. If the book is to be printed on single pages and side-stitched, loose-leaf or plastic-ring bound there will be no problem.
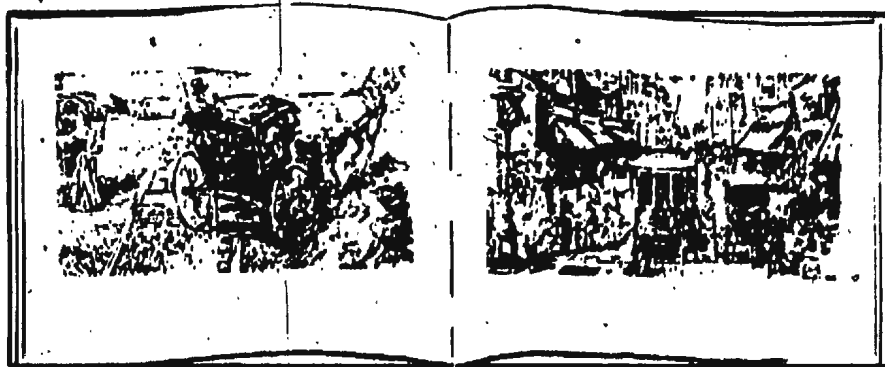
Review Questions

1. Give the proportions (e.g. "1:1.25") of the following standard page sizes:

    a) The "golden rectangle" _____

    b) The "printer's rectangle" _____

    c) The "regular rectangle" _____

    d) The "letter-sized page" _____

2. What page size is most popular for typewritten reports? _____ why? _____

3. "Consolidated Print & Litho Co." has four medium-size offset presses (2 size 25"x38" and 2 size 26"x40") and a well-equipped pamphlet bindery. The page size they find most economical to produce is size _____ . Because _____ _____

4. Mail Mart Corp. has requested bids for the printing of 20,000 catalogues in the P4 page size. A very low bid has been submitted by The Daily Express newspaper, who specify that they will use newsprint paper, but that the page size must be reduced to 7½"x10½" at that price.

    a) This page size is closest to the _____ rectangle (see #1 above).

    b) The newspaper has bid low on this page size because _____

5. A university professor who has just arrived from Germany wants to produce a booklet of German poetry. He asks you what Canadian page is closest to "metric A-5." Your answer:

    a) Metric A-5 measures _____ x _____ mm (_____ x _____ in.)

    b) The closest Canadian page size is the _____ page, which measures _____ x _____ mm (_____ x _____ inches).

Designing a page, or a book

Picture yourself as a designer, who has been asked to illustrate a book ...

First decision . . .

how much type will there be on an ordinary page?

Apply the 70% rule . . .

70% of width →

←— TYPE "MEASURE" —→

17
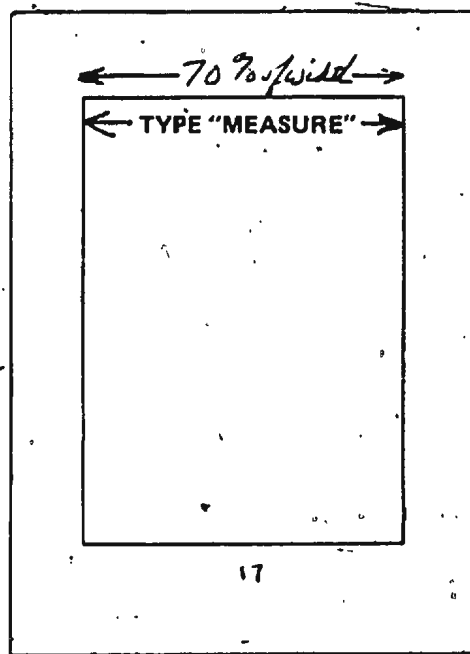
$$\underline{width\ of\ page} = X\ picas$$
$$\times\ 70\%$$

$$\frac{.70}{}$$

$$type\ measure = .70X\ picas$$

(to the nearest whole pica)
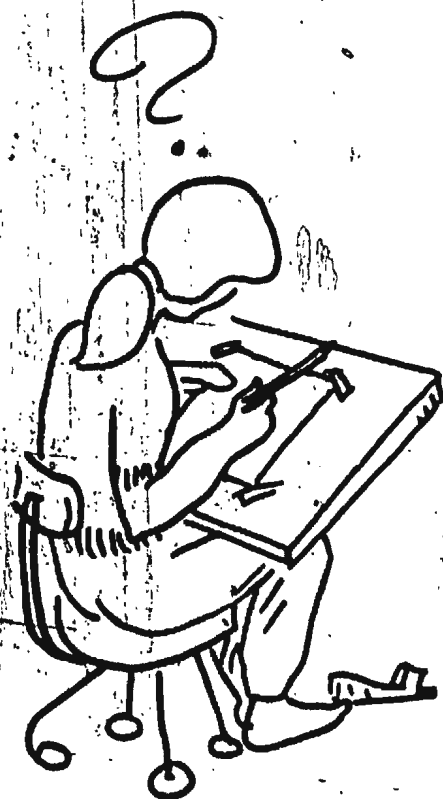
NORMAL COPY   The amount of type on a page is at the discretion of the designer. It is a widely accepted rule that 70% of a page width should be the type "measure," or line width. However, page design is often dictated by the publisher's budget.

THE "OPEN PAGE"   A page with a small amount of type is called an "open" page. An expensive book is most likely to have an open page design with large type and wide margins. The type measure will be less than 70% of page width, in this case.

"HEAVY COPY"   When budgets are tight, or when a book has to be made small as possible or light as possible, the designer is forced to reduce the page margins, and may use a smaller than normal type size. This is called "heavy copy." Sometimes when heavy copy is called for, the designer will divide the type area into two columns or more. An encyclopedia, for instance, usually is typeset in two columns. A telephone book may be set in three or four columns.

Apply your knowledge . . . .

1) For an R6 page (140x177mm or 5½"x7")

    Page width is 5½" x 6 picas/inch =   33   picas

    70% rule   x .70

    Type measure will be   picas

    (work it out to the nearest whole pica)

2) For an S6 page   (112 x 150mm or 4½"x 6")

    Page width is 4½" x 6 picas/inch = ___

    70% rule .   .   .   ___

    Type measure will be   ___

3) For an R5 page   (177x280mm or 7"x11")

    Page width is   = ___

                    X ___

    Type measure will be   ___

¿ WHY SHOULD A DESIGNER USE "PICAS" ?

Because typesetting machines are programmed to
compute in picas and points.

Second decision...

Should the page have equal side margins, or "progressive margins"?
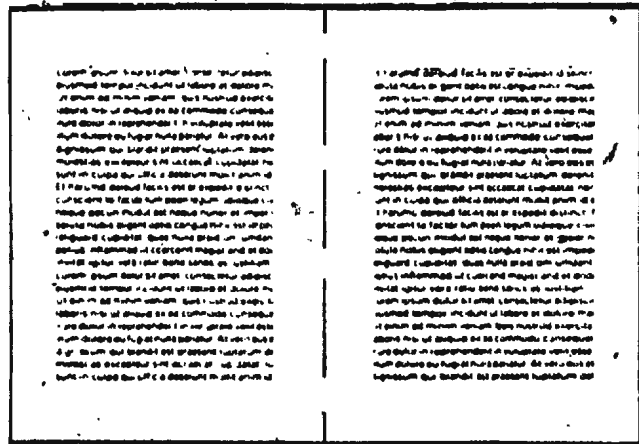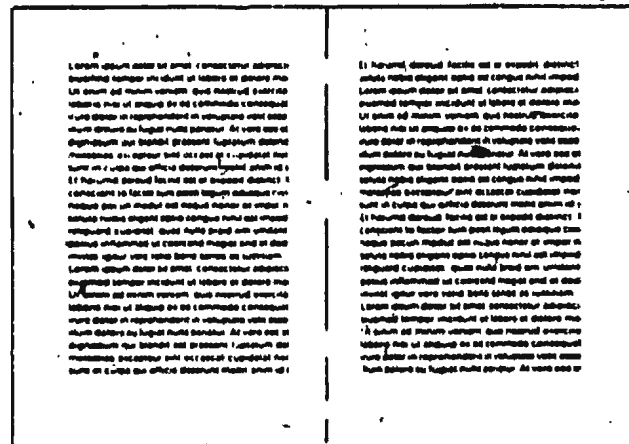
All margins equal

Outside margins wider than centre

Foot margins wider than head

When two pages are printed together, if all margins are equal in width:

- ☐ The centre margins will look too wide.
- ☐ The bottom margins will look too narrow.

But, when the outside margins are wider than the centre margins and the bottom margins are wider than the top margins, the two-page spread "looks" right.

IMPORTANT QUESTION

How wide should the margins be to "look" right?
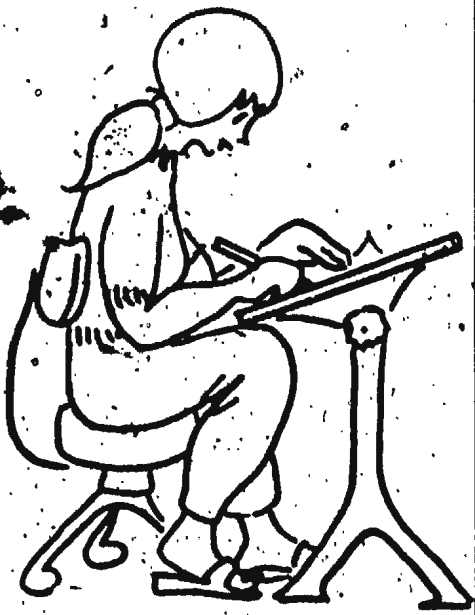
Use <u>equal</u> side margins when part of the page will be obscured . . . .
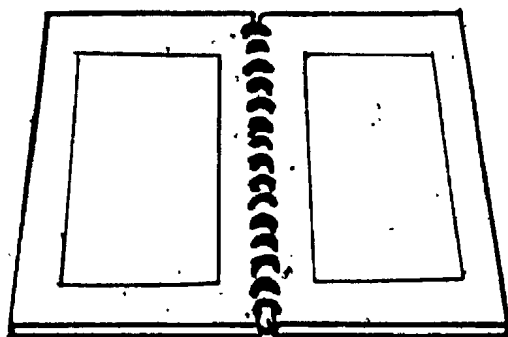
PLASTIC RING BINDING
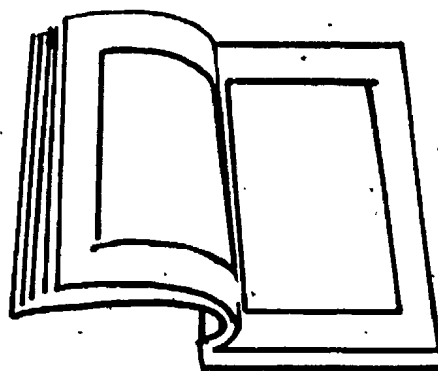
SIDE-STITCHED BINDING
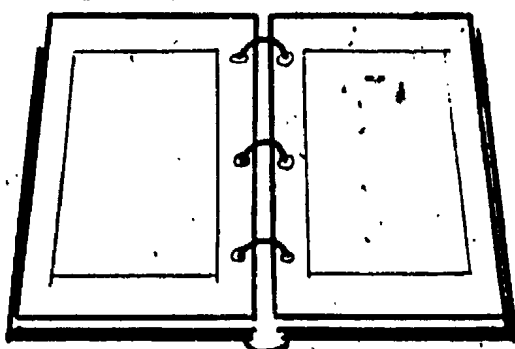
LOOSE-LEAF BINDING
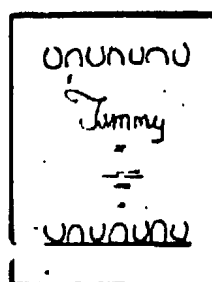
Or, when the page must stand alone
(e.g. Flyleaf, or Advertisement)

Use <u>progressive</u> book margins
when two pages will be printed and viewed together
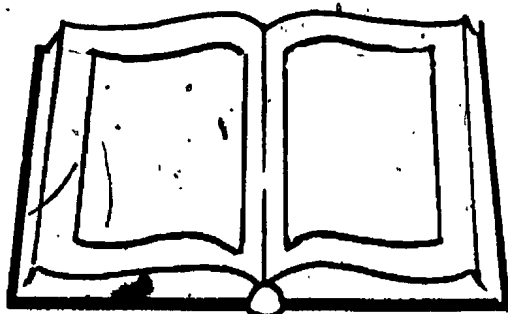
CASE BOUND
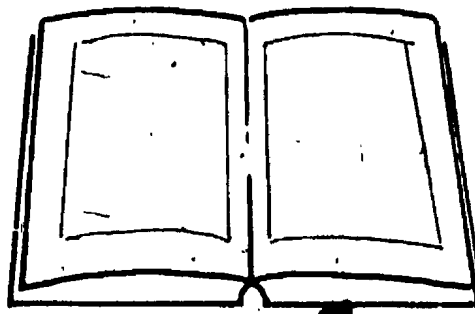
PERFECT BOUND
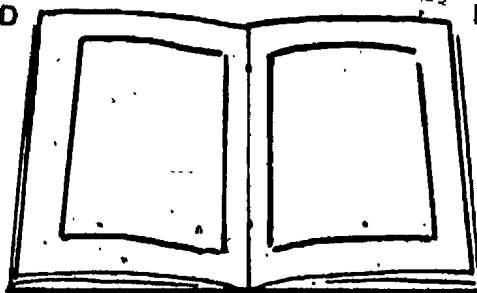
SADDLE-STITCHED

Planning a page with equal side margins

First, calculate the type
measure, and divide the
excess white space into
two equal margins.

Then, make the top margin
a little wider than the side
margins, about 25% more.

Finally, make the bottom
margin a little wider than
the top margin.
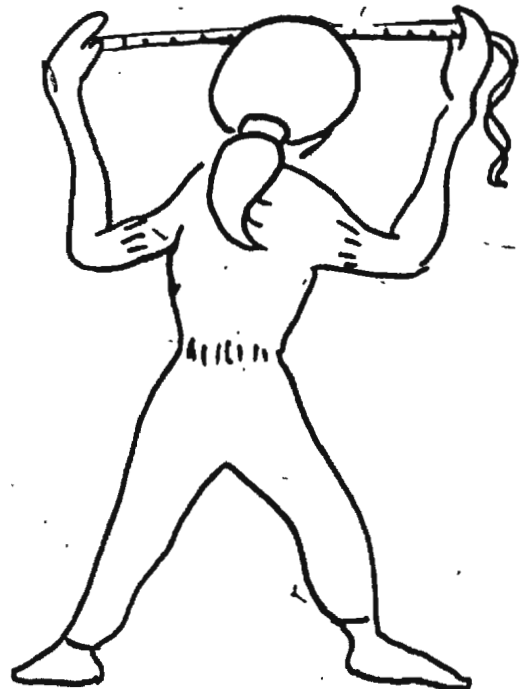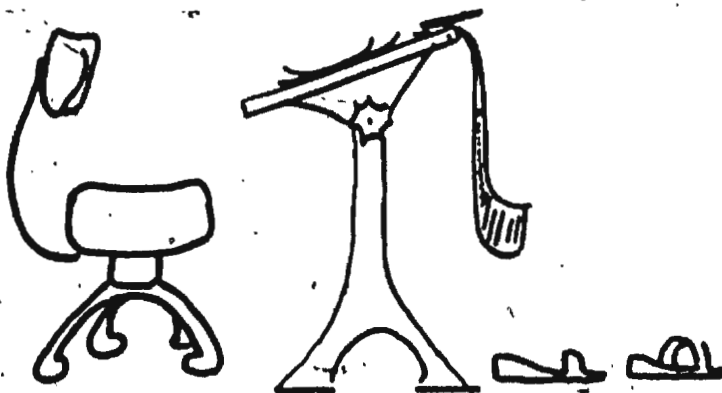
Apply your knowledge . . .

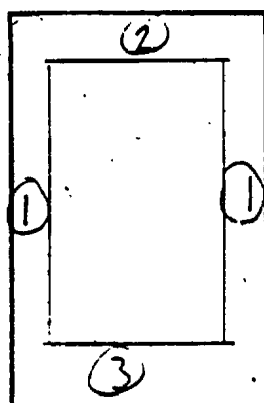For a P5 page   (140x215mm or 5½"x8½")

      Page width is 5½" x 6 picas/inch = '   picas

      70% rule   X   .70

      Type measure will be .   .   picas

           (1)   Side margins will be _____ picas

           (2)   Head margin will be wider,

                            _____ picas

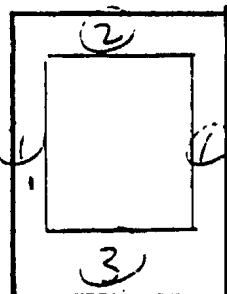   (3)   Foot margin will be

                 wider again,   _____ picas

For an S6 page   (112 x 150mm or 4½"x6")

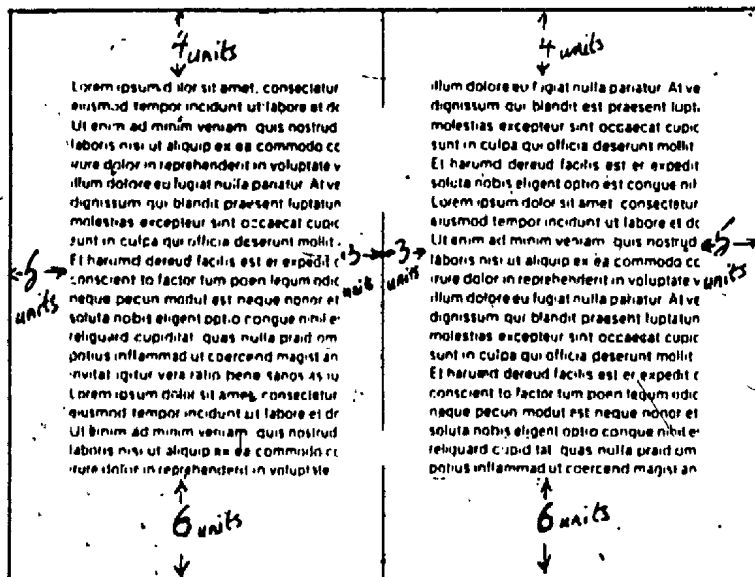   Page width is   _____ picas

      70% rule

      Type measure   picas

           (1) Side margins will be. _____ picas

           (2) Head margin will be   _____ picas

           (3) Foot margin will be _____ picas

Progressive book margins

The placeholder diagram shows two pages with margin measurements: "4 units" (head), "6 units" (foot), "3" (back), "5" (fore) units labels.

The 3–4–5–6 rule of progressive margins

Pleasing page proportions can be achieved by dividing the margins so that, starting from the centre margin:

- ☐ The head margin is 1 unit wider than the back (centre) margin.

- ☐ The fore margin is 1 unit wider than the head margin.

- ☐ The foot margin is 1 unit wider than the fore margin.

3 – 4 – 5 – 6 ——That's progressive !

Calculating the side margins

Left diagram labelled "TOTAL MARGIN WIDTH". Right diagram labelled "3/8" and "5/8".
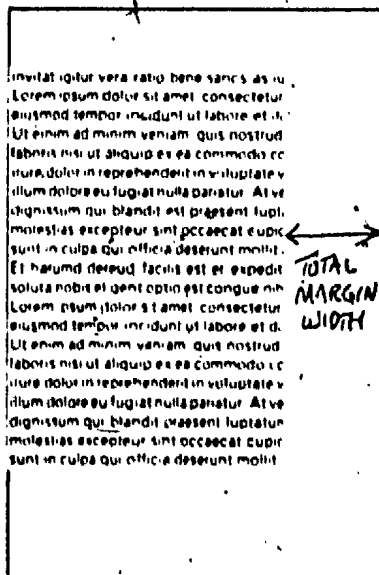
If the back (inside) margin of a page must be 3 units wide, and the fore (outside) margin must be 5 units wide, the total margin width will be 8 units.

(3 units + 5 units = 8 units)

The back margin should be 3/8 of total page width.

The fore margin should be 5/8 of total page width.

EXAMPLE:
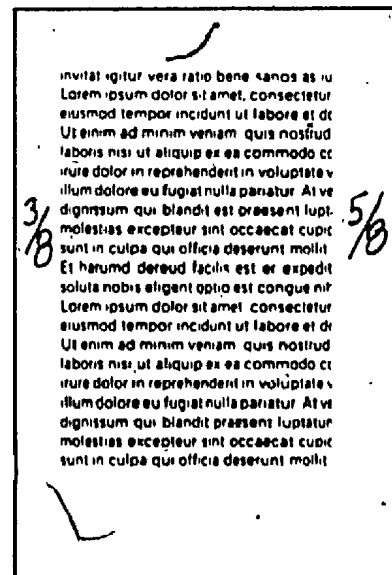Given a 6"x 9" page size, and the 70% rule . . .

A 6" page	= 36 picas
Type measure	= 25 picas
Margins	= 11 picas

Divide this space 3:5 —

3/8 × 11 = 4 picas

Apply your knowledge . . .

Progressive book margins — mathematical method

You are designing a booklet with P5 pages . . .
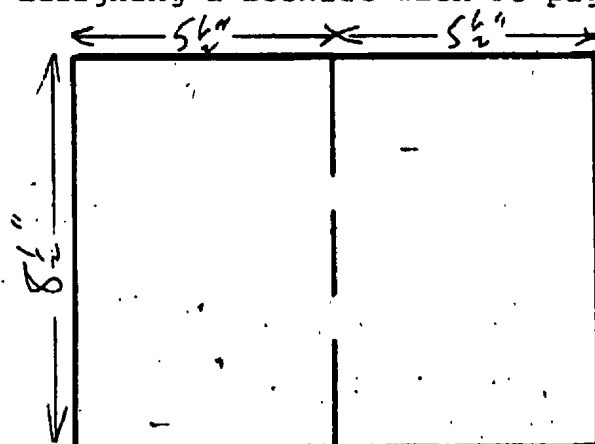
Page width is 5½" x 6 picas/inch =   picas

70% rule   X
_____

Type measure will be   .   .   .   picas
_____

Total side margins (left + right)   _____ picas
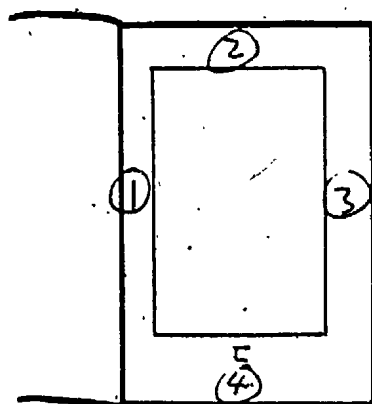
(1) Back margin   . . . — . . — . — . . . — . . .

     3/8 X _____picas = _____ picas

(2) Head margin

     4/8 X _____ picas = _____ picas

(3) Fore margin

     5/8 X _____picas = _____ picas

(4) Foot margin

     6/8 X _____picas = _____ picas

Using geometry for progressive book margins

①
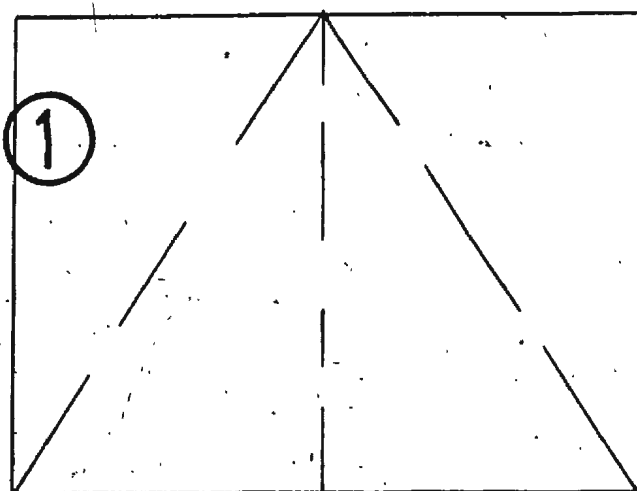
A simple way to plan progressive book margins involves the use of diagonal lines for good proportions. The first step in using this method is to draw two diagonal lines, from the top centre fold line to the lower outside corners.

②
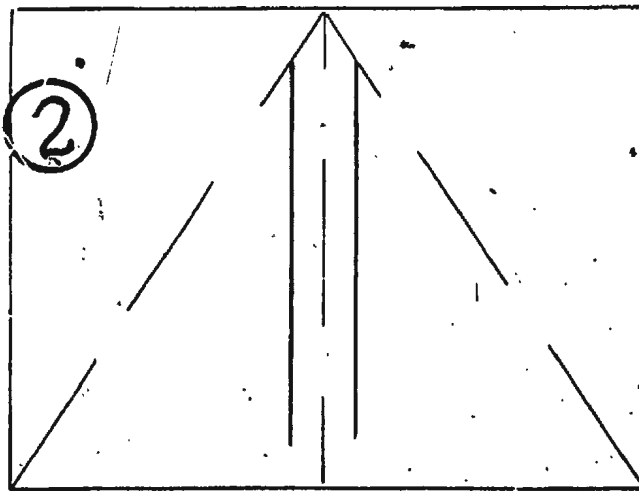
Back margins

Draw two perpendicular lines to indicate type depth. They should be 3 units from the fold line (in our example of a 6" wide page this is 4 picas), and should run from the diagonal lines downward, a little longer than the anticipated type depth.

③
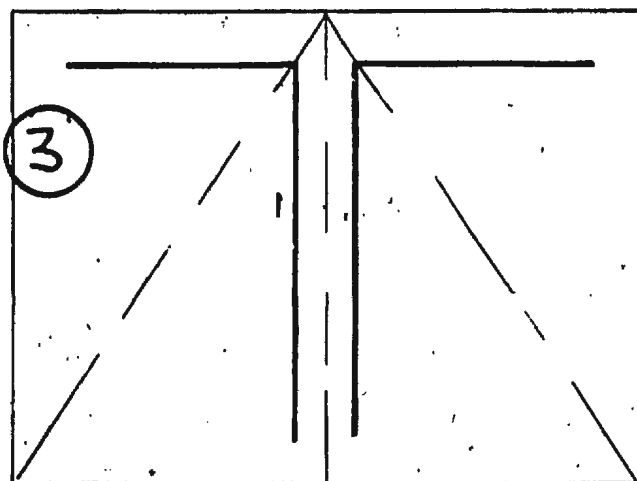
Head margins

Draw two horizontal lines from the place where the back margins meet the diagonals. Make them equal to the type measure.

(In our example of a 6" wide page, this is 25 picas)

④
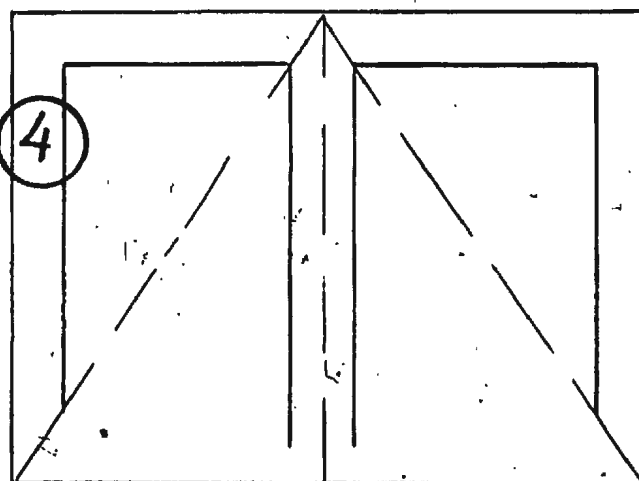
Fore margins

Now draw two perpendicular lines from the top of the type area to meet the diagonals.

⑤

⑥
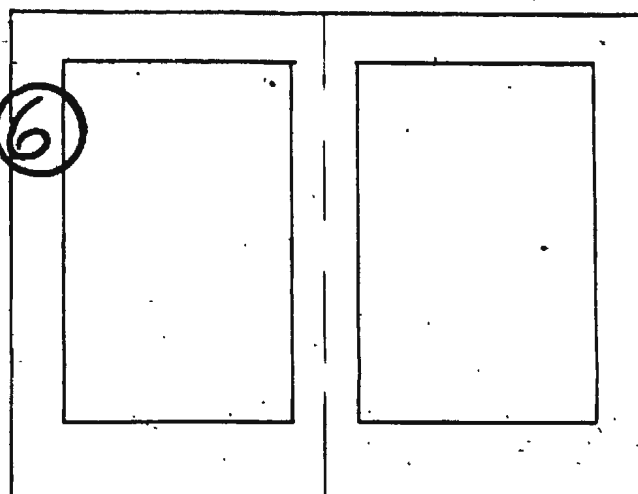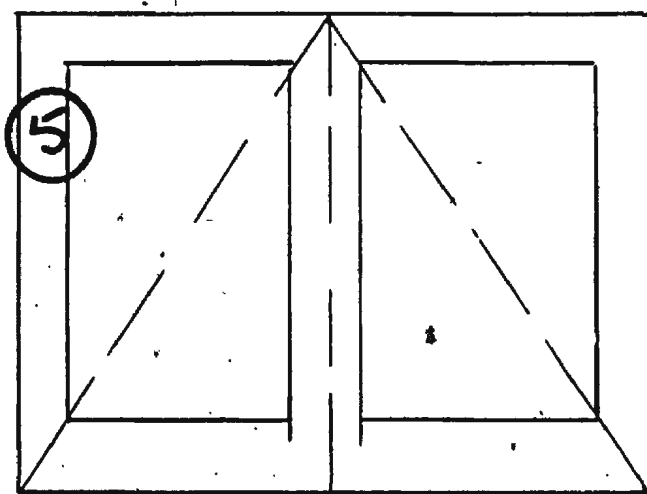
Foot margins

Finally, draw two horizontal lines to close off the bottoms of the type areas. Erase the diagonal lines, and any excess length on the back margins.

Note that the running heads are measured as part of the text. The folios, because they are so small, are not.

**With this method,
you only need to calculate the
back margins —
everything else "falls into place"**

Indicating type area

Type area can be indicated by drawing parallel lines, appropriately spaced.

A short cut — cut samples of type from booklets or magazines and paste them into place. (Note: the size and style of type must be the same as you are planning to use).

You can also use "greeking."

"Greeking" is a type sample that looks like words, yet isn't. Its advantage is that it indicates type size and style accurately, yet doesn't distract the client because he can't read it.

Greeking is available in different sizes, styles and line spacing. It is made by "Letraset" and other instant lettering manufacturers, or you can make your own and make photostats of it for paste-up.

Samples
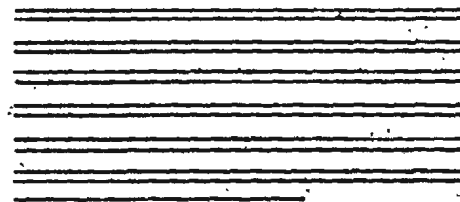
A remarkable number of firms have suddenly appeared that market prerecorded cassettes (see box). And if you have a TV camera you can transfer 8-mm home movies or slides onto video tape, or send film out to firms like Fotomat that put film on tape.

I've been testing four of the latest VCR models, indirectly com-

Lorem ipsum dolor sit amet, consectetur ; eiusmod tempor incidunt ut labore et dol Ut einim ad minim veniam, quis nostrud (laboris nisi ut aliquip ex ea commodo con irure dolor in reprehenderit in voluptate ve illum dolore eu fugiat nulla pariatur. At ver dignissum qui blandit est praesent lupta molestias excepteur sint occaecat cupid; sunt in culpa qui officia deserunt mollit a Et harumd dereud facilis est er expedit soluta nobis eligent optio est congue nihi Lorem ipsum dolor sit amet, consectetur ; eiusmod tempor incidunt ut labore et dol

Letraset Body Type
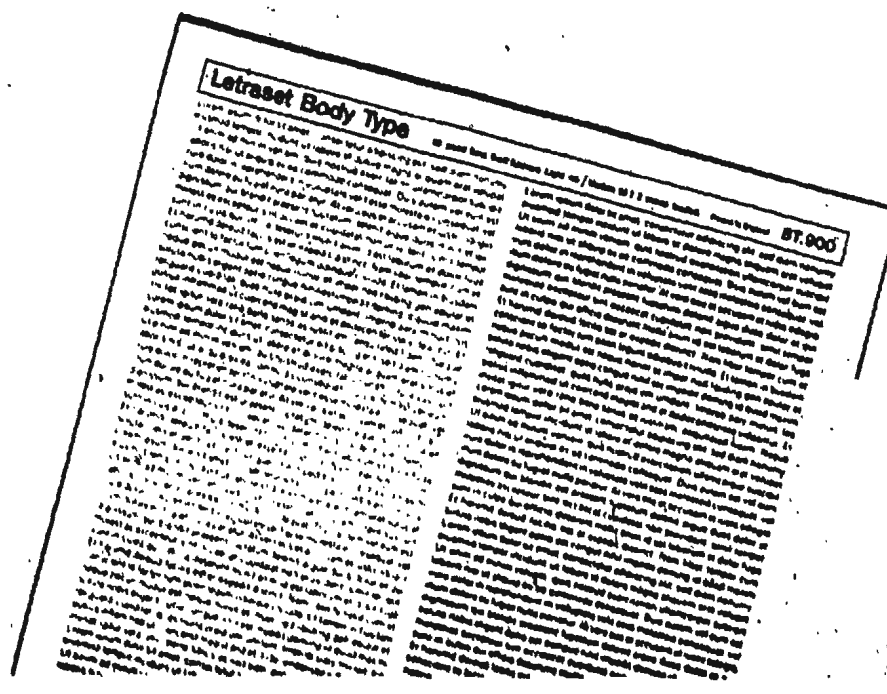
Apply your knowledge

PROGRESSIVE BOOK MARGINS -- BY GEOMETRY

On the opposite page there is a layout of two S6 pages.
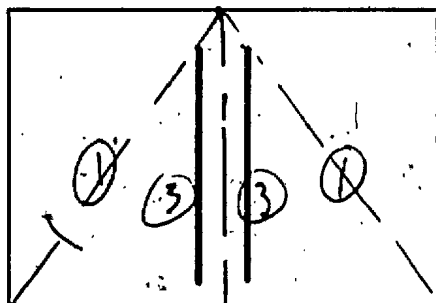
1) <u>Lightly</u> pencil in 2 diagonal lines, from the top fold to the lower outside corners.

2) Calculate:
   Single page width   =   27 picas
   Subtract type measure   picas
   _____
   Total side margins   picas

   Back margins 3/8 X   =   picas
   —

3) Draw two lines to indicate back margins.

4) Draw 2 lines to indicate head margins (from inter- section of back margin & diagonals, ___picas long).

5) Draw fore margin lines, down to meet diagonals.

6) Draw foot margin lines to close up type area. Erase diagonals.
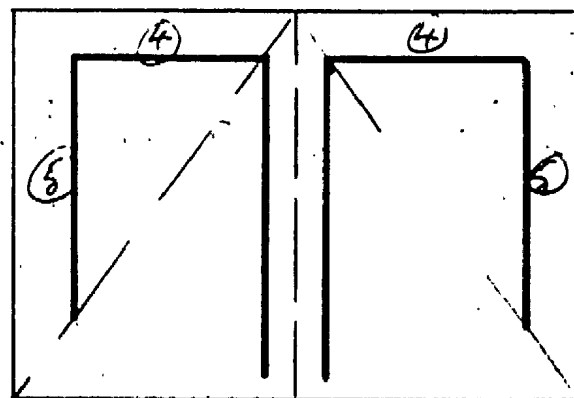
WHAT IS THE ADVANTAGE OF THE "GEOMETRIC" METHOD?

_____

_____

"Paging"
2-page spreads

WHICH PAGES WILL PRINT TOGETHER?
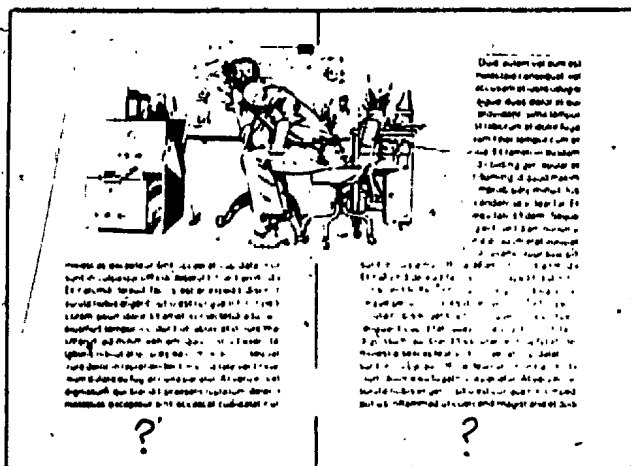
In planning book production, it is important to remember that two pages that appear side-by-side in the finished book do not necessarily print side-by-side.

Pages that are printed two-at-a-time (or in fours, eights, or sixteens) are folded before being assembled and bound together. The assembly method for books that will be saddle-stitched is called "inserting," although the word "collating" is also commonly used today. "Inserting" means that the folded pages are slid inside of each other. Then, page 3 will be inserted beside page 2, page 5 beside page 4, and so on. How can we determine which pages should print together, so that they will be in the right places after folding and inserting?

The best way to work this out is to make a "dummy" of the book or booklet. There are, however, a few rules that provide us with short-cuts for book planning.

"Two-up" pages are folded and inserted, then saddle-stitched.

SADDLE-STITCHED BOOKS

The "Plus One" Rule

In a saddle-stitched booklet, any two pages that will print side-by-side add up to the total number of pages *plus one*.

EXAMPLE: A 16-page booklet.

Pages 1 and 16 will print together *(1 + 16 = 17)*
Pages 2 and 15 will print together
Pages 3 and 14 will print together

THE "DIAGONAL METHOD" OF PLANNING 2-PAGE SPREADS

To make a "page chart,
draw a vertical line,
and mark page 1 at the
top right:

Drop diagonally to the next
line for page 2 . . .

and diagonally to the next
line for page 3 . . .

etc., etc. . . .

until the two centre page
numbers are side-by-side:
(remember the "plus one" rule)
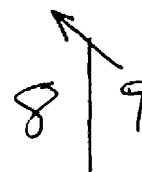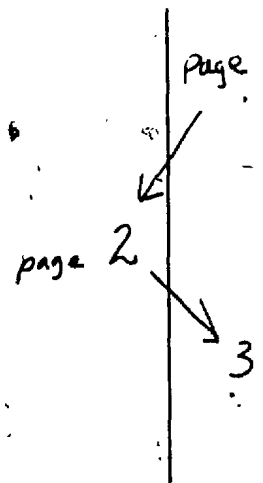
Then, go back *up* the chart,
diagonally, filling in the gaps
as you go.

THE FINISHED DIAGRAM


```
16 | 1      [16:1]
 2 | 15     [2:15]
14 | 3       etc.
 4 | 13
12 | 5
 6 | 11
10 | 7
 8 | 9      [8:9]
```

NOTE:
To avoid mistakes, books are
designed so that:

★ Odd numbers are always
on the right

★ Even numbers are always
on the left

PLANNING SIDE-STITCHED, CASE-BOUND, AND PERFECT-BOUND BOOKLETS

THE "FIRST & LAST" RULE

Books that will be side-stitched, case-bound, or perfect-bound from folded signatures are assembled by "gathering" the signatures on top of each other.

To make a paging chart for these books, use the "diagonal" method to make a separate chart for each signature.

The "plus one" rule does *not* work for gathered books, but a guide number can be calculated by adding together the first and last folios of each signatures.

> Add the first and last folios of each signature.
>
> Any two pages printed side-by-side in that signature will add up to the same number.

EXAMPLE: A 64-page book — 4 signatures of 16 pages each.

| SIG. NO. 1 pp. 1—16 | + | SIG. NO. 2 pp. 17—32 | + | SIG. NO. 3 pp. 33—48 | + | SIG. NO. 4 pp. 49—64 | = | GATHERED BOOK pp. 1—64 |

16 | 7		32 | 17		48 | 33		64 | 47
2 | 15		18 | 31		34 | 47		50 | 63
14 | 3		30 | 19		46 | 35		62 | 51
4 | 13		20 | 29		36 | 45		52 | 61
12 | 5		28 | 21		44 | 37		60 | 53
6 | 11		22 | 27		38 | 43		54 | 59
10 | 7		26 | 23		42 | 39		58 | 55
8 | 9		24 | 25		40 | 41		56 | 57

Each pair of pages add to	Each pair of pages add to	Each pair of pages add to	Each pair of pages add to
17	49	81	113
(1+16)	(17+32)	(33+48)	(49+64)

THE "DUMMY"

The designer's "dummy" is a folded representation of a finished booklet, or book/booklet signature. It may be made from the actual size of paper that will be used, but it is usually a miniature, folded from scraps of paper.

It is sometimes called a "folding dummy."
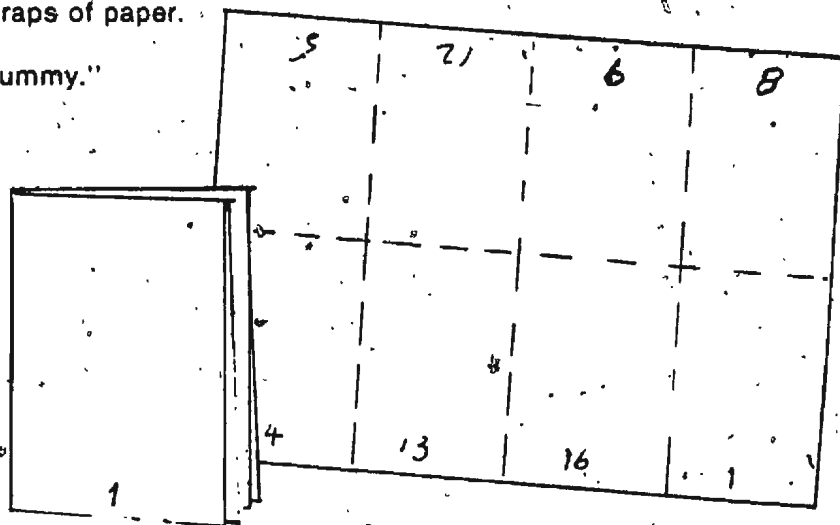
A 4-page folding dummy

This style of dummy is used for planning "2-up" printing.
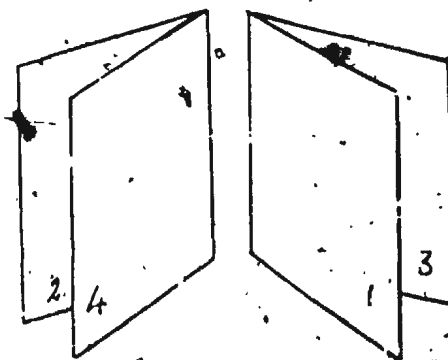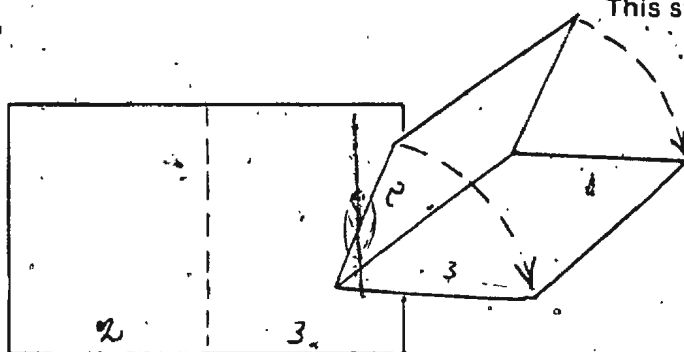
A 16-page "right angle" folding dummy
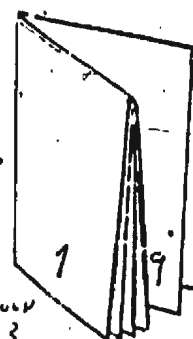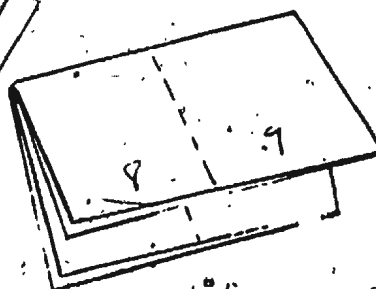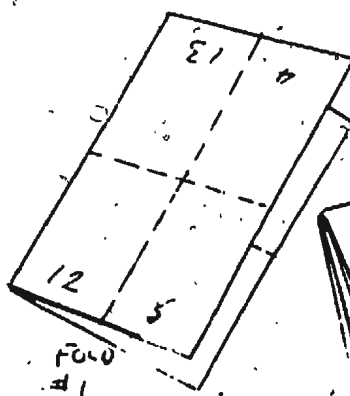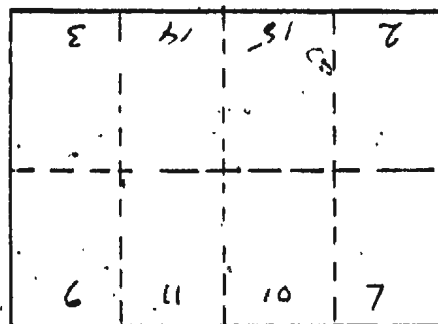
Review Questions

1. A 16-page booklet is being printed "2-up" and will be folded and saddle-stitched after printing.

   Which page will be printed beside page 7 ? _____

   Which page will be printed beside page 12? _____

   Which two pages will be at the centre-fold of the book?

   _____

2. A 48-page booklet is being printed "2-up" and will be folded and saddle-stitched after printing.

   Which page will be printed beside page 1? _____

   Which page will be printed beside page 7? _____

   Which page will be printed beside page 22? _____

   Which two pages will be at the centre-fold of the book?

   _____

3. A 48-page booklet is being printed "8-up". That is, three large sheets will be printed, then folded to make three 16-page signatures. The three signatures will be "gathered," and perfect-bound.

   List the first and last pages of each signature:

Signature 1	Signature 2	Signature 3
pg 1 --	pg --	pg --

   Which page will be printed beside page 1? _____

   Which page will be printed beside page 7? _____

   Which page will be printed beside page 22? _____

   Which page will be printed beside page 48? _____

4. A "dummy" is _____

   _____

   _____

DESIGNING THE PAGE

Conventional book design demands that pages have uniform margins. This implies that the type on most pages should be of uniform depth, which makes for a monotonous appearance. This monotony is broken by the chapter headings, and endings, however.

Book designers like to use these and other devices, such as initials and illustrations, to make a book more attractive and readable.

*Allow 25% to 50%
of type depth,
for attractive
chapter headings.*

Chapter 1

Rules & Regulations

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*All pages should
be uniform
in depth*

*Except the last
page of a chapter.
Note that head
margin is uniform*

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sunt in culpa qui officia deserunt mollit ai
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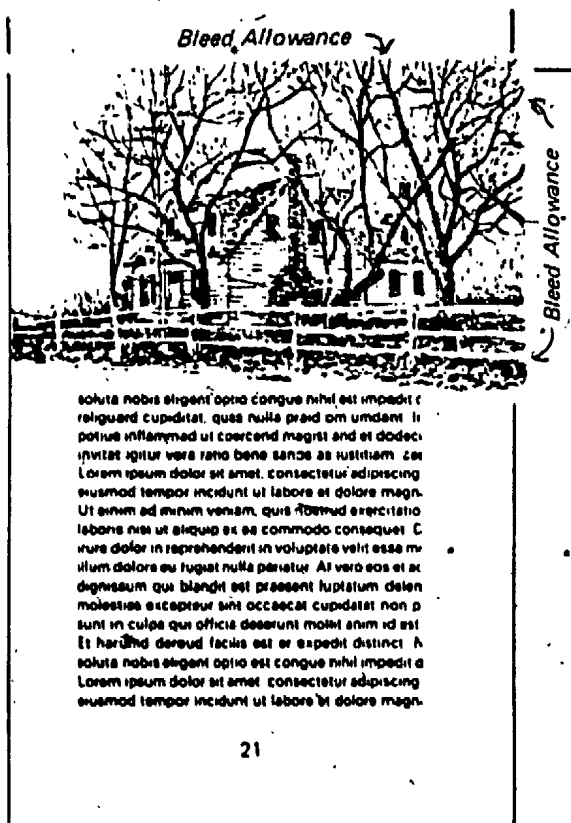
14

ILLUSTRATIONS

ILLUSTRATION INSET IN IMAGE AREA WITH TYPE RUNAROUND

When a small drawing or photograph is to be set into a page of type with a minimum of lost or wasted space, the typesetter usually sets several lines of type on a narrower measure than the rest of the page to make room for the illustration. This is called a "runaround."

Note that the type and illustration all fit within the normal margins. This is the traditional way to use illustrations in a book.

Bleed Allowance

Bleed Allowance

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21

BLEED ILLUSTRATIONS

Sometimes a designer wants to run a photograph or illustration right to the edge(s) of a page, the printer calls this a "bleed" illustration. A bleed illustration extends beyond the page size, and is partly cut away by the final trimming of the book after printing and binding have been completed.

Note that the type fits the normal image area of the page, except where it meets the illustration. A "bleed allowance" of approximately 3mm ('/,") should be provided **outside** of the page area.

Standard book paper sizes are slightly larger than bond paper sizes because of this "bleed allowance." You will recall that, in the section on paper, you encountered the sizes "ST1", "PT1" etc. The "T" implies a "trim" allowance — approximately 2cm has been added to the sheet so that the printed and folded book can be properly trimmed.

Little Boys

B ETWEEN the innocence of babyhood and the dignity of manhood we find a delightful creature called a boy. Boys come in assorted sizes, but all boys have the same creed: to enjoy every second of every minute of every hour of every day and to protest with noise (their only weapon) when their last minute is finished and the adult males pack them off to bed at night.

Boys are found everywhere—on top of, underneath, inside of, climbing on, swinging from, running around, or jumping to. Mothers love them, little girls hate them, older sisters and brothers tolerate them, adults ignore

A "dropped" initial

INITIALS

A fancy initial "dresses up" a page, and provides an attractive way to start a chapter.

Initials may be "dropped" (inset in the type area), or "raised" above the top line, with the base-lines aligned.

It is traditional practice that when a fancy initial is used, the balance of the first word is set in capital letters. In modern typesetting this custom is frequently disregarded.

L ITTLE GIRLS are the nicest things that happen to people. They are born with a little bit of angel shine about them and though it wears thin sometimes, there is always enough left to lasso your heart — even when they are sitting in the mud, or crying temperamental tears, or parading up the street in mother's best clothes

A "raised" initial

CAPTIONS

The explanatory wording printed beneath a photograph or illustration is called a "caption."

A short caption should be centred under the illustration.

A caption should never be longer than the width of the illustration. If it consists of more than one line, the measure should be the width of the illustration, and the last line should be printed either "quad left" or centred.

Captions look best when set in a smaller type size than the text, and in a different type style, such as italic or sans serif.

In an "open page" design, captions are often typeset in several short lines, quadded left or right, alongside the illustration rather than beneath it.

J. W. ARMSTRONG

Winner of 3M's "Florida Sweepstakes", Kent Sutherland, Bomac Batten Ltd., Toronto, receives his free ticket to Florida from Denys Bruner, 3M district sales manager for Ontario, as 3M sales representative George Kerr looks on.

Individual work/study carrels are provided in an open office environment

Projects in wood, metal and plastic are fabricated in a well-equipped workshop

Review Questions

____ 1. For an attractive chapter heading,

A. the whole page should be used for the heading.
B. the heading should occupy 25%-50% of the page.
C. use as little space as possible.

____ 2. When a chapter ends with 5-6 lines of type left over, these lines should be

A. placed at the top of the page with uniform head margin
B. centred on the page
C. combined with the heading of the next chapter.

____ 3. The traditional way of placing a small illustration on a page is

A. the bleed method
B. the inset method
C. to centre the illustration on a blank page

____ 4. A "bleed" illustration is one that is

A. printed beyond the trim lines and "bled" after printing.
B. printed to the edges of the page and no further
C. printed with white margins all around

____ 5. A "bleed allowance" should measure approximately

A. 3mm
B. 1cm
C. 2cm

____ 6. An initial that aligns with the base-line of the 1st line of type is called a _____ initial.

A. dropped
B. base-line
C. raised
D. indented

Between the innocence of babyhood and the dignity of manhood we find a delightful creature called a boy. Boys come in assorted sizes, but all boys have the same creed: to enjoy every

____ 7. An initial that is inset so that its head aligns with the head of the 1st line of type is called a _____ initial.

A. dropped
B. indented
C. head-aligning
D. raised

L ITTLE GIRLS are the things that happen to p They are born with a little angel-shine about then though it wears thin sometimes, th always enough left to lasso

_____   8. A caption of more than 1 line in length should
          be set to a measure

          A. exactly equal to the width of the photo or
             illustration it explains.
          B. narrower than the width of the photo or illus.
          C. which is the standard column width of the book
             or magazine in which it appears.

_____   9. A short caption should be

          A. centred under the photo or illustration
          B. centred over the photo or illustration
          C. letterspaced to the exact width of the photo
             or illustration.

WORK ASSIGNMENT

THE PROJECT

To design a 16-page booklet.

Title: "Organizing the Block"

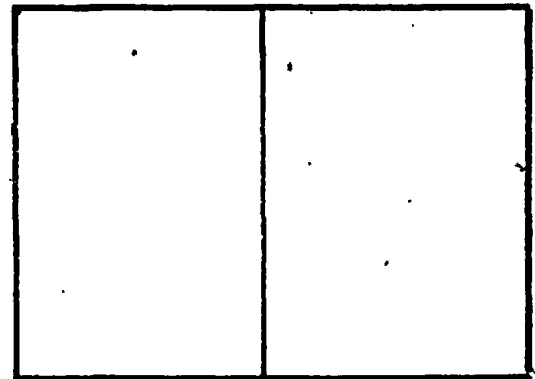Page Size: 5"x7" (____picas x _____picas).

Type Style
  & Size: 10/12pt. Helios (average copy)

PROCEDURE

Prepare a 2-page basic layout, on the sheet of printer's graph paper supplied.

1) Draw a rectangle 10"wide
   by 7" deep.

   Divide the rectangle into
   two 5"x7" pages.

2) Calculate

   Single page width=   picas
   Type measure   _____ picas

   Total margin w. _____ picas
   Back margin will be

   ____ picas

3) Draw 2 diagonal lines from the top fold mark.
   Draw 1)back margin lines
       2) head margin lines
       3) fore margin lines
       4) foot margin lines

WORK ASSIGNMENT (Continued)

INDICATING ILLUSTRATIONS ON A LAYOUT

On the left-hand page, trace the shape of
illustration "A", near the left-hand margin.
Inset it, and lightly pencil in a type "runaround."
Fill the rest of the type area with parallel lines
drawn to indicate 10/12pt. type.

On the right-hand page, trace the shape of
illustration "B", at the top of the page,
as a "bleed" illustration.
Fill the rest of the type area with parallel lines
drawn to indicate 10/12pt. type.

THE PAGE CHART

Use the diagonal method to prepare a page chart
showing which pages will be printed together when
printing 2-up:

THE BOOK "DUMMY"

Get a few sheets of coloured paper, of any size,
and fold them to make a small 16-page dummy (the
pages will be printed 2-up).
Number the pages carefully.

ANSWERS TO REVIEW QUESTIONS

BINDING METHODS

1.	A	5.	B
2.	E	6.	D
3.	F	7.	F
4.	C	8.	A

PRINTING METHODS

1. Single page--pages are printed one at a time on a small printing press, then collated and bound.

2. Two-up--pages are printed two at a time, then two more pages are printed on the other side of the sheet.
The sheet will be folded, then inserted and bound.

3. Big sheet printing--pages are printed in multiples of 4, 8, 16 or 32, then the other side of the sheet is printed with the same number of pages. The sheet is folded in a large right-angle folding machine to make a book signature.

4. Web offset printing refers to printing by the offset method on a roll ("web") of paper. The press is very fast, and has its own folder and cut-off device, so that it produces multi-page book signatures.

5. Web offset printing will be fast and cheap for 10,000 copies of a multiple of 32 pages on cheap paper.

6. Single page, offset duplicating, will be the fastest and cheapest way to print 125 copies of a typewritten report.

7. Two-up printing will probably be cheapest for 2000 copies of a 32-page booklet (that will be 16 printings, 8 signatures). Big sheet printing will be competetive on this run because it is a multiple of 8 pages (it could be one big sheet size 23"x35" folded to make 32 pages, printed two sides).

PAGE SIZES

1.
   a) 1 : 1.414
   b) 1 : 1.333 (3:4)
   c) 1 : 1.5 (2:3)
   d) 1 : 1.294 (8½:11)

2. P4 -- because it's the standard size bond (office) paper.

3. S5 -- (approximately 6"x9") because this size folds and trims with no waste from ST1 paper, the most common book paper size in North America.

4.
   a) golden rectangle
   b) Because the newspaper press is already loaded with rolls of paper that fold down and trim to 18x27cm (7½"x10½")

ANSWERS TO REVIEW QUESTIONS, CONTINUED

5. a) metric A5 measures 148x210mm (approx. 5 3/4"x 8 1/4")
   b) Canadian p5 measures 140x215mm (5½"x8½")

APPLY YOUR KNOWLEDGE, 70% RULE

1.   23 pica measure
2.   19 pica measure
3.   29 pica measure

APPLY YOUR KNOWLEDGE, SINGLE PAGE MARGINS

1.   P5 page: 23 pica measure   Side margins: 5 picas each
     Head margin: 6 picas   Foot margin: 7 picas

2.   S6 page: 19 pica measure   Side margins: 4 picas each
     Head margin: 5 picas   Foot margin: 6 picas

APPLY YOUR KNOWLEDGE, PROGRESSIVE BOOK MARGINS

     P5 page: 23 pica measure
     Side margins: Back margins 3½ picas, Fore margins 5½ picas
     Head margin 4 picas   Foot margin 6 picas

APPLY YOUR KNOWLEDGE, PROG. BOOK MARGINS BY GEOMETRY

2.   Type measure 19 picas, Back margins 3 picas
4.   Draw head margin lines 19 picas long (type measure)

     The advantage of the geometric method is that you only
     have to calculate the back margins.

BOOK PAGING

1.   pages 10 & 7   pages 12 & 5   pages 8 & 9 at centre
2.   pages 48 & 1   pages 42 & 7   pages 22 & 27
     pages 24 & 25 at centre
3.   Sig #1--pp1-16, guide #"17"
     pages 16 & 1   pages 10 & 7
     Sig # 2--pp17-32, guide #49 -- pages 22 & 27
     Sig #3--pp33-48, guide #81   -- pages 48 & 33
4.   A dummy is a folded sheet which represents a book signature.
     If it is folded and paged accurately, it tells us where
     to place each page on the press sheet.

PAGE DESIGN

1.   B   4. A   7. A
2.   A   5. A   8. A
3.   B   6. C   9. A