

A COUNTY UNIT OF PRODUCTION  
AND ADMINISTRATION OF VISUAL AIDS

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By

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Bachelor of Science

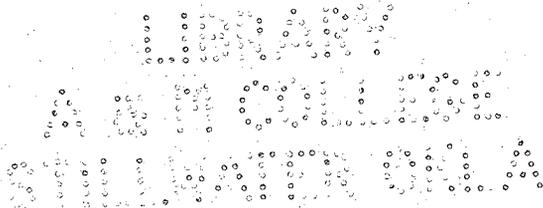
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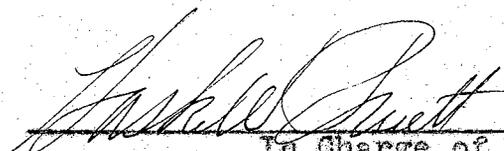
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## PREFACE

In dealing with this subject, the writer has endeavored to assemble facts relative to the establishing and maintaining a County Unit of Production and Administration of Visual Aids in Seminole County. To this is added some of the significant facts that has lead to the development of the present motion picture industry. Included in the study is a review of the present visual services offered to schools.

In the course of research, it was found that in many instances, there was no reliable data on the development of a county unit plan for visual service. Reliance had to be placed on interviews or on personal correspondence with persons having had experience of this kind.

The purpose of this study has been to formulate a plan where by visual service may be placed at the disposal of every teacher in the county and to help her produce her own pictures for projection.

The writer wishes to express his deep appreciation to Dr. Haskell Pruett, his worthy advisor, for the valuable help and suggestions he has given in preparing this thesis. To all others who in any manner furnished information do we hereby express our acknowledgements.

G.S.H.

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## CHAPTER I

## INTRODUCTION

The purpose of this study is to bring together essential information for the development of an adequate program for the production and administration of visual materials on a county basis.

Man, from pre-historic eras to this day, has recorded his deeds, ambitions and ideas in picture forms. The earliest teachers supplemented their lectures with illustrations made in the sand before him with the tip of his finger. Ancient Egyptians left History scratched with a stylus on tablets of wax. Epic Legends have been left by every race in some pictural form on their personal belongings, habitation or cliffs for future eyes to see and to know the past. The modern alphabet and the sign language evolved from the use of signs and symbols to convey thought and exchange ideas. So visual aids in the field of education is not a new concept.

The exact reproduction of objects in the form of photographs is an achievement of this Modern Era. Through modern color processes objects are perfectly reproduced. For more than a century man has been challenged by the idea that pictures could be reproduced in orderly sequence through motion. And as a result of a century of invention, we have the cinema in all its mechanical perfection--a mighty force to be harnessed as an educator's tool.

The Cinema, or "Motion Picture", developed from the

principle of the phenomenon known as "the persistence of vision." This phenomenon is in evidence when a star "shoots" across the sky, or when a burning piece of charcoal is moved about rapidly, or when the pages of a book pictured in sequence are flipped rapidly. Each preceding image is retained on the retina of the eye with no breaks between rapidly changing images. The phenomenon of "persistence of vision" has made possible such immeasurable achievement in visual education that Da Vince<sup>1</sup> who was first to mention in writing deserves mention in a paper that treats of Visual Education.

As early as 1864 a patent was granted for a machine which recorded synthesis of movement. The inventor was Ducas De Horon. Several inventors created improvements over De Horon's machine. They were Maybridge and Thomas A. Edison of the United States, Frias Green of England and Lumier of France.

Maybridge used a battery of cameras to catch successive movements of objects in motion.<sup>2</sup> The battery of lens were synchronized so that each shutter closed one after the other thus recording successive movements. A machine known as Zoopraxiscope was used to project the pictures made in this way.

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1 Poissonnee, George, The History of the Discovery of Photography, p. 11.

2 Ramsey, Terry, A Million and One Nights, p. 21.

In 1862 Dr. E. J. Marey, a Frenchman, perfected a photographic gun with which to study the flight of birds.<sup>3</sup>

Later George Demeny, a fellow countryman, developed several improvements over Marey's machine, the most valuable being the device for allowing intermittent progression of film in the camera.

William Green was the first to produce analytic and synthetic pictures on glass plates. While his achievement was not recognized at once, as early as 1889 he patented a practical Camera using film bands.

Film projected on a "screen" before many people, was made possible by improving one of Thomas A. Edison's early inventions, the "kinetoscope". The Kinetoscope was viewed to the accompaniment of phonograph records. This early type of show was commonly called the "Peep show". The "Pantoptican" and the "Vitoscope" evolved from the mechanical details of the "Kinetoscope".

In 1895 Major Woodville Latham displayed his "Pantoptican", and in 1896 the "Vitoscope" created jointly by Thomas Armat and Francis Jenkins was demonstrated in New York theaters. Thus was born the "Movie" industry, an industry of staggering magnitude in the world of finance, the theatrical world, and a mighty force as an educational tool.<sup>5</sup>

The importance of projected pictures as an educational

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<sup>3</sup> Ibid, p. 42.

<sup>4</sup> Hays, Will H., See and Hear p. 11.

<sup>5</sup> Hampton, Benjamin B., A History of The Movies, p. 21.

tool cannot be overestimated. Since "going to the movies" has become a favorite past time for such large numbers of young people, it is well for Educators to consider how this interest may be turned toward fundamental purposes of the school, that of stimulating social and moral growth.

With sympathetic understanding of the challenge thus presented to Educators, this thesis is a presentation of a plan to create in Seminole County "A County-Unit of Production and Administration of Projected Visual Aids."

A County Unit plan, for any county is as follows in brief: A central plant for production and administration is established and maintained under the direction of a trained Administrator. From this central plant a library of films is made available to all the schools of the county, with a prorata fee for usage.

A county unit presents many advantages over other types of production and distribution of films. A most evident advantage is that the County-Unit plan is economical. A county-owned film eliminates the need for purchasing film by each school using them. A local depository for films also reduces the transportation costs.

To be really valuable film and slides must be available at opportune times. A county unit plan fulfills this need because it includes a program of coordination between participating schools so that films are available at all times for class room work.

Every locality teems with interesting materials for

reproduction on film. With a central laboratory the teaching personnel of any school may create films to fill many needs not anticipated by manufacturers of educational films.

Already several counties in Oklahoma have attempted the County Unit plan for providing films for their schools. Hughes and Pontotoc Counties, border counties of Seminole, have a system of providing films for their schools. Their County Superintendents act as purchasing agent. N.Y.A. students show the films and perform the necessary clerical work. These counties, as do others, rent their films from supply houses, large corporations which produce films of manufactured products, or through the Extension Services of the Universities of Iowa, Kansas, Missouri, Texas or Oklahoma.

No projectors for films are available for rental except in isolated areas such as within an area of fifty miles of Boston. A county-wide use of projected pictures is impossible until projectors as well as film are available.

The County Unit plan satisfies every need of this phase of Visual Education.

Seminole County is admirably situated for the development of this plan. It is inter-laced with excellent hard-surfaced roads. The county is in excellent financial condition, having had no reverses as has most of the counties of the state. In professional preparation the teaching personnel of the county ranks third, in comparison with the seventy-seven counties of the state.

Many schools of the county have, during the past years,

been aware of the value of projected pictures in the class room procedure. Nine schools have purchased at one time or another projection equipment. Early films were used purely for entertainment but as Educational films have been placed on the market they have been purchased and now films are only used if they contribute to the basic text.

The entire teaching Personell of Seminole County is eager for participation in the County Unit plan.

Table No. I summarizes the teacher attitude and available materials.

With so great a need evident and with so great capacity for achievement Seminole County with proper direction and guidance will lead all other counties in the state in the development of a County Plan for making and distributing educational film to every school in the county.

The purpose of this study is to bring together essential information for the development of an adequate program for the production and administration of visual materials on a county basis.

Seminole County was chosen for this study because of its excellent roads, its wealth of able teaching personnel, and because the county is financially able to support a county-wide program of Visual Education. The study shows that there is a demand for the service and that the teachers are eager to participate in a county unit.

## SURVEY RESULTS

TABLE NUMBER I

Questions	Yes	No
1. Would you, as science teacher, appreciate the opportunity to produce your own glass slides or other visual aids?	16	0
2. Would you use the service if it is made available?	16	0
3. Can you at this time do any of this kind of work?	4	12
4. Does your school own a sound motion picture projector?	5	11
5. Does your school own a silent motion picture projector?	6	10
6. What size of film is your projector equipped to handle?	1-35mm. 6-16mm.	
7. Can your auditorium be darkened?	7	9
8. Do you have AC or DC lighting?	15-AC, 1-DC	
9. Do you have an opaque projector?	4	12
10. Do you have a glass slide projector?	7	9
11. Is this slide projector equipped to show film-strips?	4	12
12. Do you use the Visual Aids you now have?	9	0

Three schools did not reply to the inquiry but on being interviewed in person no change in the general result of the survey was found.

One motion picture machine was found that had not been in use for several years and had been discarded until the survey called the attention of the school to it.

## CHAPTER II

### TYPES OF MATERIAL NEEDED

In order to obtain best results from projected pictures, material suitable for use in every subject field should be obtained. The subjects presented must be of educational value and follow the course of study as outlined by the State Department of Education. The visual subject materials should cover the following fields: Social Science, Literature, General Science, Biological Science, Natural Science, Physical Science, Business Education, Home Economics, Industrial Arts, and Physical Education.

The materials needed to project pictures upon the screen include such machines as the opaque projector, the slide projector and the motion picture projector. Some of the opaque projectors have slide and film-slide attachments. The room must be equipped for darkening and have a screen mounted in full view of all the students in the room.

The opaque projector works by reflected light. A lamp throws a strong beam of light upon any object placed upon the stage. By means of mirrors all the light striking the object is reflected to another mirror, set at an angle, which directs the light through condenser lens thense to the screen. The opaque projector inverts any object placed on the stage therefore it must be mounted upside down in order for the students to see the object properly. Opaque projectors require a dark room, a strong source of light and to be placed near the screen in order to get the best

results from their use. The opaque projector is indispensable where magazine pictures, post cards etc. are to be shown.

The glass-slide or film-slide projector work by having a beam of light directed through a film or glass film plate. The magnification is obtained by placing condenser lens in front of the film aperture. The only difference in the two machines is in the type of carrier each has. One is fitted to handle the glass slide the other the film strip. As in the case of the opaque projector, these machines may be secured that will handle both types.

The sound slide, though obsolescent, is to a limited extent used today. It is essentially only a slide machine with phonograph attachment for playing recordings of the slides shown.

The motion picture, in silent and sound, is the newer form for projecting pictures. Motion pictures are made possible from the fact that mans eye holds for a fraction of a second an image of the thing seen. Thus a series of still pictures are flashed upon the screen at the rate of sixteen frames per second in the silent, or twenty-four for sound. A shutter moves over the aperature long enough to move the next picture in place. This takes place so fast that the human eye is unable to perceive it. Sound on film is made practical by the use of an electrical eye that is agitated by variations of density on the sound track on the film.

At the present time films for rent can be secured to cover the following subject fields: Agriculture, Biological Science, Child Psychology, Description and Travel, Family Relations, General Science, Geography, Health, Safety, History, Human Biology, Literature, Music, Natural Science, Sports and Athletics, Teacher Training, and Vocational Guidance. Glass slides and film slides are available in the same general subject fields but it has been found that in renting this material it is more reliable to rent by the individual subject of the group. A greater listing for primary subjects is found in the film-slide than in any of the other types of pictures offered.<sup>6</sup>

At the present time a large number of commercial concerns produce films of educational value but to some degree are based on propaganda. The chief sources of pure educational films are such companies as DeVry, Bell and Howell, and Erpi Class-room films.

Great effort is being made to improve the quality of films sold to schools and to produce them of such quality as is demanded of good text books. One instance of this effort is the fact that The Rockefeller Foundation made a large grant to the University of Minnesota for the purpose of research in the field of educational pictures.<sup>7</sup>

In spite of the large number of producers and rental

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<sup>6</sup> Bulletin Oklahoma University, Visual Education Issue, p. 2.

<sup>7</sup> Personal letter.

libraries available to draw on, Educators find it hard to secure the films that will fit the subject matter covered in the text. Further difficulty is experienced in getting the material when needed there by losing a major portion of the value of the picture.

With these difficulties in mind this study is attempted. Chapters three and four will point the way.

## CHAPTER III

## THE PHYSICAL MEANS

Seminole is an ideal location for the County Unit Headquarters. Seminole is centrally located and served by a network of hard-surfaced roads going to every section of the county. Within a radius of ten miles of Seminole, twelve of the county's nineteen high schools are located. Six of these schools lie within six miles of the city limits of Seminole. Seminole is the trade center for the patrons of all of the schools in the county except four that are located in the extreme eastern part of the county.

In Wewoka, the county seat, no space is available for the headquarter of the County Unit. In spite of the fact that an annex has been added to the Court House no extra office space is provided. Recently the County Health Unit had to be moved to Seminole because of inadequate housing at the county seat.

The City Council of Seminole is willing to furnish space in the new Municipal Building for a County Unit of Visual Aids and will give the necessary space free. The rooms that are available will fit into the requirements of a dark room and daylight laboratory admirably. The floor plans for each room have been worked out to fit the space available. The plans are found in the appendix.

The daylight laboratory should be equipped to be made into a semi-dark room so that films and slides can be tested on the screen. Since the office and laboratory will have to

be combined a partition may need to be placed so as to give the office light when the rest of the room is in darkness. The Municipal Building has two connecting rooms in the basement that will serve admirably for this purpose. The first room leading from the hall has two windows, the other has no outside window. Thus, the second room can be made into a dark room with the minimum of cost.

#### DARK ROOM PLANNING

According to the floor plan a light trap is constructed between the dark room and the daylight laboratory. This is accomplished by having doors opening in the opposite direction into a little connecting hallway.

The hallway between the two rooms is shown large enough to house a supply closet. In this closet extra supplies of all kind will be kept such as chemicals, film, paper, and film cartridge filling equipment. All loading and unloading of cameras may also be done here.

Doors leading into the dark room must be stripped with felt in order to make the room light tight. As an added precaution a red light should show over the dark room door whenever the dark room is occupied. This will lessen the chance for a person to open the door when developing is being done.

The dark room, if really dark, can be finished in any color desired. White enamel is a good finish for a dark room because of its great reflecting ability. The safety light used will throw out more light with no more danger

Of fogging the film than if the room was finished in black. White shows dirt easily thus if all the wood work is finished in white, the persons using it will have to keep it clean. Cleanliness should be the watch word for every dark room if first class work is to be expected. All work table tops in the dark room should be made of soap stone or of some other acid-proof material. The floors should be made of a material that is easily cleaned and also acid-proof. An abundance of storage space for group equipment and individual supplies must be provided. Adequate electrical outlets should be provided. The dark room plans show that an adequate number of the above needs have been included.

A cooling unit is desirable in order to maintain the proper temperature for the chemicals and to make the dark room a livable place during the warmer months. If a large cooling unit is used the entire headquarters can be kept at an even temperature through forced ventilation between dark room and daylight laboratory. The plans for the dark room shows the arrangement of all shelving, cabinets, sink, cooling unit, and electrical outlets. The room was planned to accommodate as many as five persons working at a time.

#### DAYLIGHT LABORATORY

The daylight laboratory is planned to keep down as much friction as possible between persons working on different projects at the same time. Each piece of equipment is placed so that there will be sufficient room to carry on the

work done around it. Detailed drawings of the copy table and slide mounting table can be found in the appendix. The slide mounting table and the copy table can be made from any old library table if the directions given in the drawing are followed.

The viewer on the slide mounting table is merely a ground glass cover over an opening in the top of the table under which has been placed a small light. This viewer makes it possible for a person assembling a slide to see if the films and mask are properly aligned. A commercial slide vise will do to take the place of the sited vise shown if desired. The other opening in the slide table top is a trap for trimming scraps.

The copy table is an old library table with the legs cut off. The Speed-O-Copy attachment is mounted near the back center of the table and light is furnished by four ordinary desk shades into which is fitted photoflood bulbs.

The front elevation drawing of the laboratory shows the arrangement of the editing bench, the optical printing space, and where titling can be done as well as where the finished product can be tested.

The daylight laboratory should house the cabinets for storing movie films, film-slides and glass-slides. A place for keeping negatives of the group should be provided. Book shelves, magazine racks and shelves for other literature pertaining to the work of producing pictures should be provided in this room.

discussed in order to be able to make a wise choice of equipment for the County Unit.

#### SAFETY LIGHTS

Every dark room should have a complete set of safety lights so that every type of film or paper can be processed without danger of fogging. Amber lamps are recommended for use with all gaslight and chloride papers. The ruby light is safe to use with all color blind and orthochromatic film and bromide paper. Green light is safe for use with panchromatic or red sensitive emulsions.

The most inexpensive safety light is simply a bulb tinted with a preparation to make it safe. Probably the next most practical dark room lamp consists of a safety bulb that fits into an outer shell that further filters the light. (6)

The "Stewart 6-in-1"<sup>8</sup> safety light is one that hangs from the ceiling. A large rectangular hood directs the light from a 15w Mazda bulb through glass filters. This safety light is equipped with six glass plates each plate is designed to be safe to use with some particular emulsion.

The Eastman Kodak Co.<sup>14</sup> has several safety lights on the market. The Brownie, Eastman Safety Lamp, Kodak Safety being the most frequently advertised. The Brownie Lamp, is made of a specially prepared red paperboard and is safe to use with ordinary verichrome film. The Brownie Safety Lamp, is

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<sup>8</sup> Used for Chapter III to indicate the number of manufacturing or supply houses from which the material can be purchased is listed in the bibliography.

designed to screw into a wall socket and reflect the light down on the work. It is made of gray-lacquered metal and is only slightly larger than the bulb it holds. There is an opening on the side and end so that the user can inspect work being done. The Eastman Safety Lamp, is fitted to be suspended over the work table from an overhead socket. The filter in this lamp is safe to use with all film except panchromatic films. The Kodak Safety Lamp, the more expensive of the Eastman products, is fitted with an adjustable bracket and can be swung at 180°. Made to be mounted on the wall in front of the operator, it will serve all the needs of the amateur photographer for safety lights.

The cheapest and most satisfactory arrangement for safety lights, should one wish to build his own dark room, would be to arrange for a number of outlets on the wall above the work bench. By designing a light shield to keep the light out of the eyes, and using the various safety bulbs, the cost of securing sufficient light in the dark room would be solved.

#### DEVELOPING TRAYS

Developing trays, a pan in which the solutions used in developing roll film and paper prints, can be secured in a variety of sizes and made of a number of materials. Any material that will not react to the chemicals can be used. At the present time developing trays are made of paper dipped in paraffin, glass, enamel ware, ebonite, rubber compounds, and stainless steel. Glazed crockery will serve

for developing trays but care must be given to prevent cracking.

### DEVELOPING TANKS

There is always a need for tank developing especially where a large number of people are using the dark room. A large variety of developing tanks are on the market however this discussion will be confined to daylight tanks used for developing roll film from the miniature up to the 116 sizes. Few amateurs will need to know about the deep tank or cut film developing tanks.

Roll film developing tanks are made of bakelite or of stainless steel or a combination of each. The difference in the tanks is whether the reel is made of bakelite constructed for spiral filling and adjustable, or whether constructed of stainless steel and non adjustable, or if fitted with an apron for loading.

If the tank is to be used in developing several sizes of film, the most practical tank would be a stainless steel tank with a bakelite lid and reel. This combination insures durability and ease in adjusting to different sizes.

The "Nikor" tank,<sup>7</sup> in one and two reel loadings, is the most durable on the market. Constructed of stainless steel throughout makes this tank free from the danger of breaking and insures adequate room for chemicals to come in contact with the film by the rounded construction of the reel.

The "Correx"<sup>25</sup> tank can be secured in sizes large

enough to accommodate almost any length of 35mm film. Constructed of bakelite and using an apron for loading, makes a very good tank if care is shown in loading and handling after development is through. The objections to this tank are that most beginners will put too much tension on the film in loading thus preventing the chemicals coming in contact with the film, and further, that if the reel is dropped on concrete it is sure to break.

#### THERMOMETERS

The thermometer is an indispensable device in the regular equipment of every dark room. Thermometers have been designed to fit the requirements of every photographic operation. If one works with the tank or with trays, there is a design to fit that need. Some are reinforced so that they can be used as a stirring rod. The most recent addition to the line is the tank thermometer that is read from a dial face. Most of the thermometers have a graduation from 30° to 100° Fahrenheit. Many have 65° marked in red to aid in seeing the operating temperature. The "transparo", thermometer is visible in the dark room. Price range is flexible enough to suit every budget.

#### BOTTLES

Bottles for the dark room should be amber in color in order to filter out any harmful effects caused by light on the chemicals. The tops should be screw type and large enough to transfer chemicals without spilling. There should be an adequate supply for every need. All bottles should be

marked so that no error could be made by the worker, in the dark room.

#### TIMING DEVICES

The dark room timer should be one that can be easily set to give the desired interval, easily seen and dependable in performance. The regular timers are equipped with full sweep second hands with large easily read numerals. Some have the minute hand for use when a longer interval is needed. There are several electrical timers available, however, the most efficient timer on the market is the "Automatic Dial Timer",<sup>20</sup> which operates on the same principal as the telephone. This type of timer is dialed to the seconds required and the enlarger light will switch off when the time has expired.

#### STIRRING RODS

The stirring rod becomes a problem if care is not taken in handling. An entire tank of chemicals may be ruined by using the hypo stirring rod in a developing solution. To prevent an accident of this kind it is advisable to secure the bakelite stirring rod that is made up in three colors for use in the three solutions used in developing. This stirring rod is sold under the trade name of "Softex", and is tapered toward one end to be used for crushing.

Stirring rods may be secured made of rubber, stainless steel and glass. One rod comes equipped with a thermometer thereby serving a double purpose. The Eastman rod,<sup>14</sup> a hard rubber rod with a loop in the end is the most efficient one

to use in dissolving chemicals. A good inexpensive rod can be made by cutting a glass towel rack into, using each of the ends for crushing or stirring.

#### FILM WIPERS

To prevent spots on film in drying it is often desirable to have some means of sponging off the water after the film is taken from the washing bath. The sponge absorbs the moisture from the film and allows it to dry much faster. Du Pont's Viscose<sup>13</sup> sponge is the most inexpensive sponge on the market. Any wiper used on film must be made of a material that will not scratch the film when drawn over it. A chamois slightly moistened will serve as a film wiper.

The "Trojan Viscose Dryer",<sup>8</sup> "F-R" Film Squeeze,<sup>18</sup> are other frequently used film dryers. The Trojan wipette is constructed like a pair of tweezers with a piece of viscose sponge on each prong. The F-R wipette is made of cellulose sponges mounted at each end of a flexible metal spring.

#### PRINT TONGS

Print tongs will prove most economical when one is provided for each developing bath. The tong must be acid-proof, light, and inexpensive. Print tongs further economy by preventing finger marks on the finished prints as well as save chemicals from being contaminated.

Print tongs are available in stainless steel, bamboo, and wood painted with an acid-proof material. Amber will serve for making tongs also.

## FILM CLIPS

If an inexpensive clip is desired, an ordinary clothes pin is sufficient. A wire, run through the loops in the springs of the ordinary clothes pins provides a line upon which any number of films may be hung. A stainless steel clip made of heavy gauge metal is a durable clip and will not become weakened by continued use. The "Pako",<sup>8</sup> clip is made much the same way as the stainless steel clip except that the Pako clip has four tongs instead of two for clasp- ing the film. Both clips can be used for deep tank develop- ing, or for hanging film to dry.

The Kodak film clip has jaw-like teeth to grasp the film. The jaws are provided with holes to allow water to drain from the clip. Lead weights can be had to hang on the lower clip when drying films to keep the proper tension on the film and prevent curl.

## ENLARGERS

Enlargers are available for every size of film made. They carry a wide price range, the price determining the excellence of the finished product. So before an enlarger is bought several facts should be carried in mind. In the first place the quality of lens used determines the quality of the work done by the enlarger. Second, the upright must be sturdily constructed to prevent any vibration while in use. Third, focusing and adjustments should be automatic or at least rapid and easily performed. Fourth, the lamp house and film carrier should be free from dust. Fifth,

the lamp house should be adequately ventilated. Sixth, it should be made to accommodate a variety of sizes of film. Critical focusing is desirable but not necessary. Probably the best enlargers in the miniature field are the following well known trade names: Valoy,<sup>25</sup> Simmon Omega,<sup>31</sup> Elwood,<sup>16</sup> Rexo,<sup>6</sup> and Solar.<sup>6</sup> In the lower price range but still good enlargers will be found the Kodak,<sup>14</sup> Argus<sup>23</sup> and the Federal.<sup>8</sup>

#### EASELS

Enlarging easels are necessary in order to get the proper margin on the paper and to get the portion of the negative enlarged that is desired. Some enlargers come equipped with an easel but the better enlargers do not include them in the price of the enlarger.

To get the most out of an easel, it should possess the following features: easy paper alignment, positive masking, band contact, non-warping board, non-fogging surface, automatic adjustments, scaled for setting border, and non-skid base.

#### PRINTING FRAMES

In order to be of permanent value, a printing frame must be constructed so that it cannot warp or twist. Most of the frames are built of heavy wood and are dovetailed at the corners to prevent warping. Some frames are made of metal backed with felt. All frames have strong springs with the backs hinged so that the paper can be inserted with the maximum of speed. The price placed on these frames is de-

terminated by the size of the print to be made and the weight of the materials used in making the frame.

#### CONTACT PRINTER

Contact printers are available for all sizes of negatives from the 35mm to the 8" x 10" size, in price range of eight dollars up. Many of the printers are adjustable to handle a wide range of negatives and are fitted to give an even margin to the finished print. The value of the contact printer lies in the ease and speed with which prints can be exposed. If a little effort is given, a home-made contact printer can be made as effective as the commercial printer. A contact printer takes most of the guess work out of the exposing of contact paper and negative. Without their aid good printing cannot consistently be secured without much waste of time and material.

There are several contact printers on the market for the miniature film in which paper or positive film can be used. The Lietz Corporation has a commercial printer that holds about fifty feet of film. The negative is drawn into place and can be viewed through a ruby viewer. When the roll of paper or positive film is in position all that is required to expose is to press a button for the desired interval. The Eastman Kodak Co. makes rolls of paper to fit this printer. The most practical use for this type of printer is that positive transparencies can be made with it without using an optical printers.

## PRINTING MASKS

One of the most efficient masks for inexperienced persons to use is the "Kodaloid",<sup>8</sup> mask. This mask is made of a semi-transparent orange-red mask that permits the operator to see if he has an even margin on the print. Scotch masking tape can be used, however, some damage may be done to the print when the tape is removed. Masks of an artistic nature can be secured in almost any design required. Most masks are made of opaque paper cut to the size of print to be made. There is also an adjustable metal mask designed to fit any size of paper. Paper for making your own masks can be bought in packs of 25 to 100 sheets. As yet no mask, for use in contact printing, has been designed that will be adjustable and at the same time hold the paper in place. However, there is a printing frame that is fitted with masking bands that will do this work.

## PRINT WASHERS

A very important step in the production of good prints is the washing. If the films or the print are not well washed there is always the danger of stain, blotches or blurs. Prints should be washed of all traces of hypo if long life is expected. In order to get the best results the prints should be kept agitated while in the water and not be allowed to stick to each other. The water must be clean and cool. A kitchen sink has served this purpose for many photographers.

Among the commercial washers is the "Trojan",<sup>8</sup> film

washer, which consists of a rubber hose capable of fitting any standard faucet. On the nozzle end there is a clamp fixed so that a stream of water will flow down the sides of the film. The "Sprayo",<sup>8</sup> has a similar arrangement except this washer is equipped with interchangeable clamps for prints or films. The "Ingento"<sup>6</sup> washer consists of a round tank into which a down current of water is forced, water exits near the top furnishing plenty of agitation.

#### FINISHING ROOM EQUIPMENT

The finishing room or daylight laboratory will need the following equipment discussed under each heading.

##### Water Heater

A hot plate for bringing the temperature of water up to the proper mixing temperature of 125° is necessary whenever chemicals are to be mixed whether ready prepared or home-mixed. The hot plates found at any electrical supply house will do for this work.

##### Chemicals

Chemicals can be bought in bulk from reliable houses much cheaper than one can get them ready mixed. If care is taken in compounding them and a fresh supply is always at hand the best work can be done in this manner. However, there are a large number of the well known formulas put up ready mixed. All that is required to do is dissolve in water at the desired temperature, cool, and the solution is ready to use. The ready-mixed preparations prove very

satisfactory where inexperienced persons are doing the work. Among the better known formulas that are sold prepared in powder form are: Edwal No. 12; Edwal No. 20; Edwal Glycin Developer; Edwal Ninicol;<sup>15</sup> M-Q by all chemical works; Eastmans Ultra Fine; Eastmans D-76; D-72; D-73; Champlin No. 15; Agfa W-17; W-5; the F-R Developer;<sup>18</sup> G.D.X. Fine Grain Developer; Micrograin "85"; Permin and Pertone are among the chemicals formulas that are sold in the liquid form. A new formula "Monobath"<sup>31</sup> a one bath developer and fixer is sold in the liquid form also. Edwal, Eastman, Agfa, Du Pont and Gavert are the leading manufacturers of photographic chemicals.

#### Optical Printers

Optical printing consists of taking a picture of a negative by means of a lens. In optical printing the light source must be controlled so that varying intensity of light can be had. Then with the aid of attachments made for the purpose, the camera is brought into focus with the negative and the picture is taken. When the film thus made is developed a positive transparency results. Several camera works make optical printing attachments for their cameras. Some have designed attachments for reducing the size of the negative as well as exact reproduction. The most advertised optical printing attachments now available are those sold by the Leitz Corporation or by Argus.<sup>22</sup>

#### Slide Mounting Material

Slide vices are available in two general forms, mounted

as a combined vice and binder or as a single instrument to be mounted as desired by the operator. Among the leading slide vices are the "Marsyall", "Ingento", "Argus", and "DeLux".

The Marsyall<sup>6</sup> slide binder is heavily constructed and has a sponge rubber bottom to prevent its slipping while in use. The tape holder is adjustable from side to side laterally, when adjusted, the tape automatically centers on the slide. The slide is free moving and the glass cannot get out of position. Each jaw of the vice has a thrust bearing to prevent the glass from moving. The Ingento<sup>6</sup> vice is constructed with a loop under the jaw of the vice allowing the fingers to be brought under the glass slide in working. When the slide is in place the jaws can be locked to prevent moving. The only difference in the DeLux<sup>6</sup> and the others is that the slide is released by pressing on a clamp instead of having to screw the jaws apart. Argus<sup>22</sup> has a slide mounting device that seals the slide together by pressing the slide and clip into a frame.

The binding tape used in slide mounting can be had in the opaque gummed paper form or the Scotch cellulose tape.<sup>27</sup> For the miniature slide the Scotch Cellulose tape is the most practical for it can be secured in a variety of colors making it easy to identify subjects by color.

Slide mats can be secured made of flint glazed paper opaque, black on one side and white on the other. Embossed or silvered, and die set to insure true edges. Mats can be had in a variety of sizes and in any style of opening.

Glass for slide making is sold by the pack or in the bulk. The price payed is determined by the trueness of the cut and thickness of the glass. In the  $3\frac{1}{2}$ " x 4" size, glass comes in 14 to 18 to the inch or 20 to 24 to the inch. The 20 to 24 to the inch demands the higher price. For the miniature slide the glass imported from Checo-Slovakia is best for it is free from any imperfections, a requisite of any good slide glass.

The table for mounting slides is discussed in chapter two and a working drawing is found in the appendix.

#### Paper Trimmer

Any trimmer that is suited for school use that will cut a clean line will do for print trimming. A pair of scissors will do if nothing else is available. If a great amount of trimming is to be done a heavy duty 24" bed trimmer would be the most practical trimmer to buy.

#### Negative Filing Systems

The greater the number of negatives made the greater is the filing problem. The system used will to a large extent be determined by the quantity of work done. In this study is it apparent that a very extensive filing system must be employed. In the first place, the type of film used presents a problem. The same style of filing cannot be employed for 35mm negatives that can be used by the regular roll film sizes. Necessity has produced a variety of filing systems to meet the demand, among them are: The Kodak album, consisting of 100 transparent envelopes bound

in heavy cloth and fitted with a snap tight clasp. Inside there is an index sheet.

The film chest, capable of holding 1800 to 3600 negatives is fitted with 100 envelopes which will accommodate up to 35 negatives each, with space for exposure details and remarks. Each negative is protected from dust or scratch by a translucent insert. Ten index cards break down the filing system for further subject classification.

Negative filing book,<sup>8</sup> designed to resemble a book, this negative file accommodates 100,  $2\frac{1}{2}$ " x  $4\frac{1}{4}$ " negatives or a greater number of smaller ones, protected from finger prints, scratches or other damages by transparent envelopes, each numbered and indexed.

Trojan film file, contains sixty compartments into which are placed sixty rolls of 35mm or vest pocket size negatives. On the lid is numbered to correspond to the compartment in which each roll is found. A metal case is equipped with a humidifier into which the negatives are placed.

The spiral film wallet is a booklet with twenty spaces for inserting strips of film, equipped for labeling and viewing without damage to the negative.

The E. Z. Viewer negative file has twelve rows of super plastic glassine, foiled according to accordian fashion enabling one to view at a glance through 144 negatives, and a half-moon cutout on the side allows easy manipulation of the film for both insertion or removal.

If an enormous number of negatives are to be stored none of the above methods would be adequate. Probably the most economical way would be to number each roll, cement each roll together by years and reel on to a large cored reel and store in a humidified can in a cool place. Keep a record of the number of rolls for the year and the pictures on each roll. If proper care is taken, the negatives stored in this way will keep for years.

#### Print Straightener

If the prints are dried on the electrical dryer with the proper pressure on them there will be very little use for a print straightener. If prints of this kind are placed between the leaves of a large book and left over night all the curl will be gone. In the case of film to be mounted between glass, the curl can be taken out by cutting strips of about six frames and binding between long strips of glass.

If, however, a demand for rapid straightening of a large number of prints arises, there is a motor driven print straightener on the market that will take the curl out of several hundred 12" x 20" prints per minute. The print is run through several rubber rolls much like a clothes wringer and when the print comes out it is free from any curl.

#### Film Splicers

Film splicing and rewinding equipment can be had all ready mounted into a single unit at a lower combined price

than if bought separately. The Craig, Keystone,<sup>24</sup> Excel, and Seeman<sup>6</sup> are common trade names among persons using film splicers or rewinding equipment.

The Craig<sup>9</sup> Senior splicer probably is the most efficient to use due to the fact that they are made of better material and more workmanship is shown in their construction. Each size of movie film requires a different splicer as well as do silent and sound films.

### CAMERAS

Probably no piece of photographic equipment is offered on the market in so many forms and under as many names as is the camera. Cameras have been designed to fit the need of every photographic problem. Cameras can be classed into two general types, still or movie cameras.

Still cameras are designed for regular functions, or are made to do a special task such as to produce stereoscopic negatives or for use in color reproduction such as is used in technicolor.

The price paid for a camera is determined by the quality of lens it uses or by the mechanical perfection with which it is produced. Import duties on some of our foreign made cameras causes the price to be higher than if produced in America, however, the sale price is an index to the quality of camera in spite of this condition. The best cameras will come equipped with lens made by Leitz, Zeiss, Schneider, Cook, Hugo Meyer, Goerz or Dellmeyer.

The German made lens are better because the best glass

sand in the world is found in Germany. The glass will stand the greatest amount of grinding for corrections so in producing high quality lens. Another reason the German lens are better is that for generations the German people have practiced the art of producing fine optical work and have become the most efficient in the world in this art.

The number of regular roll film, cut film, film pack and plate cameras are too numerous to name. Among the view cameras we have the Autoflex,<sup>30</sup> Beierpflex,<sup>26</sup> Contaflex,<sup>19</sup> Exakta,<sup>30</sup> Falcon-Flex,<sup>34</sup> Flexette,<sup>30</sup> Graflex,<sup>19</sup> Ikoflex,<sup>38</sup> Irwin Dual Reflex,<sup>23</sup> Korelle Reflex,<sup>6</sup> Pilot,<sup>7</sup> Rolleicord,<sup>7</sup> Soho Reflex<sup>28</sup> and the Voigtlander<sup>36</sup>. In the color cameras include the Curtis Color-Scout,<sup>10</sup> Devin One-Shot,<sup>11</sup> Pelli-oles<sup>29</sup> and the X-Or Color camera<sup>37</sup>. Cameras for stereoscopic negatives include the Altiscope,<sup>7</sup> Heidoscope,<sup>7</sup> and the Rolleidoscope<sup>7</sup>.

All still cameras are priced according to the amount of similarity in perfection compared with that found in the Leica<sup>25</sup> and the Contax<sup>38</sup> miniature cameras. The features that make these cameras the leaders in the field are:

In the Lica, cartridge load, helical focusing, exposure count, screw mount, interchangeable lens, focal plane shutter, 1/20 to 1/1000 sec. shutter speed, and coupled range finder.

For the Contax, cartridge load, tube-mount bayonet type, metal focal plane shutter, automatic film transport, self timer, exposure counter, coupled range finder and view

finder, depth of focus guide, and built-in photostatic exposure meter.

### MOVIE CAMERAS

In general, the same things that make a still camera of high quality also makes the movie camera belong in the same class. However, the movie camera presents problems peculiarly their own. Among these problems that the camera must overcome are: uniform operating speed, film threading while out in the open, focusing arrangements and view finding.

Many of the movie cameras are equipped to handle a number of different lens in order to fit the personal choice of the operator. Several have a turret with international screw mount carrying as many as three lens at one time thereby making instantaneous change of lens possible. Others have the bayonet mount to make changing of lens easy and rapid.

The leading cameras in the 16mm field are: The Bolex,<sup>3</sup> the Eastman Cine-Kodak Special,<sup>14</sup> DeVry,<sup>12</sup> Ditmat,<sup>21</sup> Excel,<sup>17</sup> Filme,<sup>5</sup> Irwin,<sup>23</sup> Keystones,<sup>24</sup> Zeiss Movicon,<sup>38</sup> and Victor<sup>35</sup>. The better of these include the Bolex, Eastman Special, Ditmar, Filme and the Victor.

### EDITING EQUIPMENT

Editing equipment consists of rewinder, viewer, and splicer. In many splicing units a viewer is incorporated and the entire set is sold as editing equipment. In most cases it proves economical to have two rewinders and one

splicer and viewer mounted on the table where editing is being done.

A viewer consists of a light that throws a ray of light through the film in such a manner that the operator sees an enlargement of the picture he is working on. In the "Kodascope"<sup>14</sup> viewer a projection of the picture is thrown on a screen. The film being viewed can be notched where a splice is to be made. This viewer can be used independently or with a rewind. The "Mico"<sup>8</sup> viewer is capable of being focused to the individual eye sight.

#### TITLING EQUIPMENT

If a number of different movie cameras are to be used, a variety of letters from different makers such as the Spel-o-letter,<sup>6</sup> pin-letter, Automatic Titles<sup>8</sup> should be secured. The decorations for backgrounds can be secured from cut-outs from any magazine.

A home-made camera carrier can be designed to fit any camera at the proper distance from the board where the letters are to be mounted, with two desk lamp reflectors mounted parallel to the letter board and even with the camera, sufficient lighting can be had with photoflood bulbs to make excellent titles.

#### REELS AND CANS

The humidior can is not as important today as in the past but is a necessity when films are to be kept for any length of time. All producers of motion picture film have

some kind of can and reel on the market. Often the purchase price of the film includes the can. Reels and cans are on the market under the trade names of Eastman, Burk & James, Central and Filmador. In selecting a reel care should be taken to get one that will flare out a little near the outer rim in order to make rewinding easy and to prevent damage to the film.

#### SUMMARY

Seminole was chosen for the headquarters for the County Unit because it is nearer to the majority of the schools of the county than any other town, because better housing facilities are afforded, and because of the inter-lacing hard surfaced roads that lead in all directions from Seminole makes transportation a minor problem.

Plans for the dark room and daylight laboratory call for equipment sufficient to accommodate as many persons as five in the dark room and five in the laboratory working at the same time.

A review of the necessary equipment available for use in photography is given to enable one to make a wise selection of equipment. The materials discussed can be secured at any leading photography supply house.

## CHAPTER IV

## ADMINISTRATION PERSONNEL

It has been the common practice among schools and school systems to centralize the visual instruction service, to make some person or committee responsible for procuring and using appropriate visual materials for instruction.

The problem of coordinating visual instruction in the several schools of the county will require the service of a trained Director of Visual Education. This office to be filled through the County Superintendents office and serve as an assistant under him<sup>8</sup>.

The duties of the County Director of Visual Education, in general, will consist of coordinating the resources of the various teachers, departments and schools. To meet the needs of visual material for this group and help train teachers in the production and use of visual materials such as projected pictures. He will be responsible for the procurement of all necessary materials, equipment, supplies, transportation, etc. needed in the management of a county program of visual education.

The task of administering the service will require assistance. A committee composed of representatives of the several schools in the county, preferably science teachers, will aid in selecting the material to be used after the requests of all the teachers are in. This committee will also

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<sup>8</sup> Dent, Ellsworth C., The Audio Visual Handbook, p. 145.

function in their own school as the Director of Visual Education, and will assist in the arranging for place and time of showing of pictures in their schools. The members of this committee should be relieved of some of their teaching duties in order to compensate for time given in serving on the committee.

The service of a secretary will be needed to keep all records, attend to correspondence and to keep an accurate filing system of all records, sources of material, work schedule in the laboratory, time schedule for showing of films, when ordered, when to be returned, and the filing of all negatives produced by the members of the county faculty that have been used for producing of teaching materials. In the beginning this will require only a part-time secretary but as the service expands a full-time secretary will be needed.

In the beginning the Director of the County Visual Education Service will have to transport all visual materials to the schools, attend to the showing and do all the mechanical work attached to such tasks. He will need to start training the teachers and student help in the mechanics of operating the equipment, immediately. After the service is established for a while the student help in each school should do this work. Many schools now use N.Y.A. help to operate the movie mechanics while other student help operates the other projection equipment.

The secretary should have on file in her office a

complete collection of rental library catalogs and should always be on the lookout for new material. A record of each requisition for films or slides should be kept showing the time and place wanted. A bibliography of all material approved by the committee and available to the schools, should be compiled and made accessible to every teacher in the county early in the year. The secretary will keep a record of every order of films, when made, when filled, when and where shown and when returned, giving the transportation cost and rental charges.

Suitable office equipment such as desks, cabinets, book shelves, magazine racks, filing cabinets, etc. should be provided for the secretary and director. These files should accommodate the films, glass slides and negatives produced or owned by the County Unit.

A careful filing system must be employed in order to keep track of the materials available. For example, if a film "The Life of Lincoln" is the property of the Unit and is to be filed away, it must be classified into subject field and numbered. This picture is a History subject thus it will go in the History file under the number it bears. A letter and number is given to each subject in a subject field and filed accordingly. A key to the system giving details should be kept handy in order to help locate any material needed without delay.

#### METHOD OF DISTRIBUTION

For all purposes a family car will serve to transport

projection equipment and materials to and from the schools, however a panel delivery or station wagon would serve admirably where funds will justify the cost.

In arranging for the films enough time must be allowed for showing to permit the same films to be taken to every school in the county before returning. The route taken and time given for showing is outlined in the accompanying table. In laying out this route, minimum of distance nearness of schools in the circuit and kind of roads were given consideration. This routeing leaves the Director near home at the end of every day and near the school to receive the first showing the next morning.

Schedules of time and place will remain the same throughout the year. The particular films to be shown each week will be published in the two county papers on Sunday before the week in which they are to be presented. In this way the general public as well as the schools will have an opportunity to know what type of pictures are being used.

In determining what the cost of furnishing a visual education program to the county, an estimate of the cost of equipment, rental and transportation fees, and administrative costs must be made. In order to make certain that the program will secure adequate support financially, there must be set up in the budget of the several school districts and the County Superintendents budget enough money to pay for the cost.<sup>9</sup>

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<sup>9</sup> Dietrich, E. N., Visual Instruction Manual, p. 13.

TABLE II  
SCHEDULE OF ITINERARY

Monday, Sept. 11

Excelsior	9:00 to 10:00 a.m.
Cromwell	11:00 to 12:00 a.m.
Butner	1:00 to 2:00 p.m.
Wewoka	3:00 to 4:00 p.m.

Tuesday, Sept. 12

Strothers	9:00 to 10:00 a.m.
Pleasant Valley	11:00 to 12:00 a.m.
Varnum	1:00 to 2:00 p.m.
Prairie Valley	3:00 to 4:00 p.m.

Wednesday, Sept. 13

New Lima	9:00 to 10:00 a.m.
Mt. View	11:00 to 12:00 a.m.
Seminole	1:00 to 2:00 p.m.
Pleasant Grove	3:00 to 4:00 p.m.

Thursday, Sept. 14

Sasakwa	9:00 to 10:00 a.m.
Konawa	11:00 to 12:00 a.m.
Vamoosa	1:00 to 2:00 p.m.
Wolf	3:00 to 4:00 p.m.

Friday, Sept. 15

Bowlegs	9:00 to 10:00 a.m.
Garr City	11:00 to 12:00 a.m.
Central	1:00 to 2:00 p.m.

TABLE III  
CAPITAL OUTLAY

Item	Cost
Movie Camera and Accessories	\$ 150.00
Sound Movie Projector	495.00
Film Slide Projector	25.00
Opaque Projector	120.00
Daylight Screen	35.00
Developing Trays Set	7.05
Graduates	.90
Funnels	2.70
Paper Clips	2.40
Scales	4.50
Print Paddle or Stirring Rod	.45
Printer	12.50
Timer	2.95
Siphon to use as print washer	4.95
Safety Bulbs	2.25
Gallon Bottles	1.35
Thermometer	.85
Developing Tank	7.50
Correx Developing Tank	8.40
Enlarger "Focomat"	75.00
Easel	13.00
Squeegee (Six)	10.00
Print Roller	.59
Blotter Roll	1.50
Print Dryer, Electric	27.50
Paper Trimmer	5.25
Slide Vise	3.90
Editing and Splicing Equipment	19.50
Copy Attachments	25.80
Titling Kit	8.50
Exposute Meter	22.50
Device for Reproducing Prints	28.50
Tripod	12.50
Furniture and Supplies	200.00
Total	\$ 1340.04

TABLE IV  
CURRENT EXPENSE

Item	Cost
Director's Salary	\$1500.00
Secretary's Salary	500.00
Film Rental	450.00
Glass Slide Basic Charge	15.00
Film Strip Service	8.00
Transportation	230.00
Depreciation on Projection Equipment	138.16
Depreciation on Other Equipment	69.24
Chemicals	50.00
Splicing Cement	3.00
Total	<u>\$2963.40</u>

No provisions have been made for many individual items that will be used by the teachers working in the laboratory or in the dark room. Such supplies as glass for slides, cellulose taken for taping, contact paper, projection paper and films for taking pictures, should be kept in stock in order to accommodate the teachers wishing to use the service.

In order to distribute the cost of the service equitably between the schools and the county, the schools should pay all the current operating expense and the county furnish the capital outlay. The participating schools will according to this schedule have to raise two thousand nine hundred sixty-three dollars and forty cents, (\$2963.40). This sum representing an outlay of one hundred fifty-five dollars and ninety-six cents, (\$155.96) for each of the schools in the county.

The schools that now have projector service would, if they rented the same number of films at the regular price as is used in making this estimate, spend at least one hundred fifty dollars (\$150.00) per year. By using the County Unit plan, all schools in the county can have the service of a projector plus the additional service of being able to make their own pictures for projection.

The average daily attendance per school for Seminole County in high school is about one hundred twenty-five students. There will be at least sixty days during the year that all students will have the opportunity to participate. This will make an aggregate total attendance to the showings of one hundred thirty five thousand children. This will make the per capita cost to the schools of two cents. The total per capita cost, counting school and County outlay, would be thirty one and nine tenths mills (.0319).

By including depreciation for equipment in the estimate of current expense in about six years there will be funds sufficient to replace all the capital stock. Should the county wish to continue to help in the service, films and slides could be purchased to become the property of the County Unit and thereby increasing the capital outlay and serve to reduce the current expense.

## CHAPTER V

## CONCLUSION

In this study an effort has been made to set up the necessary framework for organizing and administering a County Unit of Production and Administration of Visual Aids. The primary interest in setting up this Unit has been to make projected pictures as a teaching aid available to every school in the county. This was undertaken because it was found that the present supply of films, film strips and motion pictures did not meet the demands nor need of the local situations.

With the County serving as the center of circulation and production more interest will be shown in the use of projected pictures. A saving on the cost for rentals will be realized. A more uniform program of instruction will be possible. By producing pictures of local interest the teacher and pupil will receive more good from the use of the picture. Pictures on the subject needed will be had more nearly when needed than if a remote source of material is depended upon.

All the necessary materials in the production of pictures has been provided for in the planning and equipping of the dark room and the daylight laboratory. The equipment has been discussed as to the merits of each kind with the view of making a wise choice in selecting the equipment to go into the dark room and laboratory. The equipment provided will take care of any production problem

arising in the production of film strips, glass slides or the editing of motion pictures.

The total cost of the service for the first year will be a little less than \$4000.00 of which the individual school will have to pay \$150.00. The total cost for each succeeding year will be less due to the accumulation of films and other supplies that can be reshown, and due to the fact that much of the first cost is for more permanent equipment. Thus the schools not now enjoying the use of pictures in their school can have the service at about the same cost as those schools that have used rental films in the past.

If the service presented the 100 showings as planned to the eighteen schools of the county, a total of 26,860 students would participate. This would make the per capita cost amount to only one mill. With this fact in mind, the use of pictures as a teaching aid is the most inexpensive aid in use today.

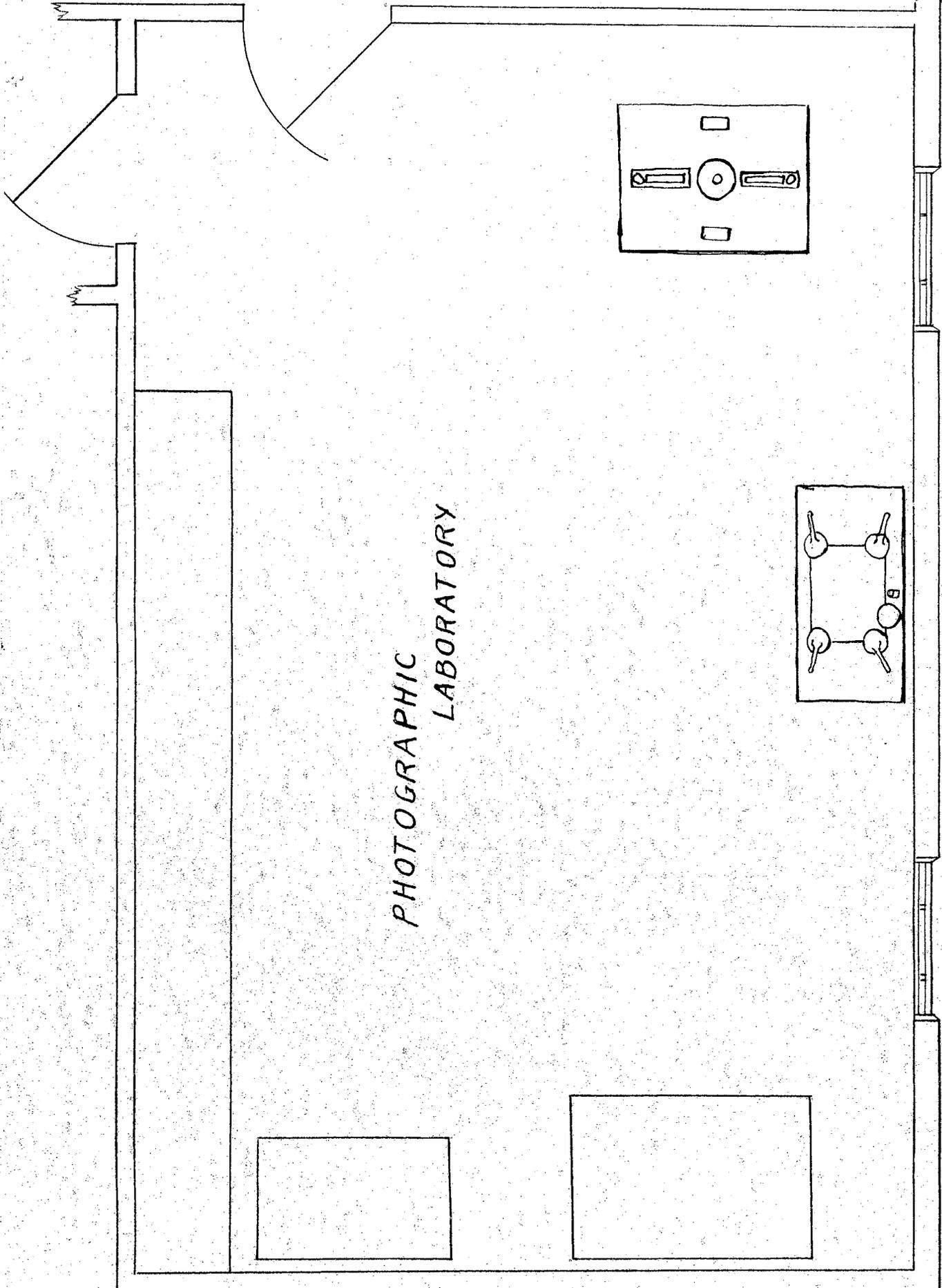
In conclusion, it has been shown that a County Unit of Production and Administration of Visual Aids will better serve a greater number of persons over a longer period of time at lower cost to the schools. The county will have better service. The teachers and students will have the opportunity to participate in the production of valuable teaching aids. The expenditures are necessary, fair, and equitable as proven and tried out by industrial data.

## APPENDIX

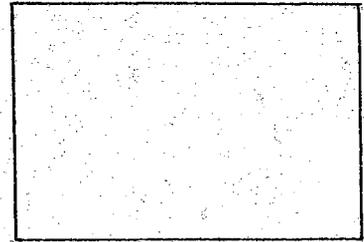
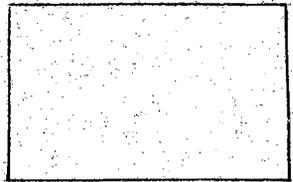
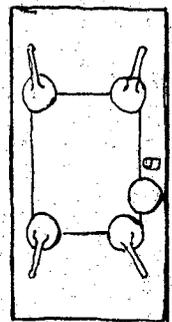
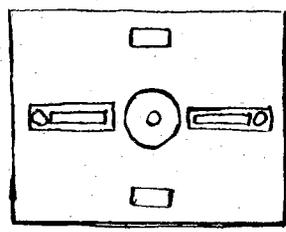
DRAWINGS OF DARK ROOM

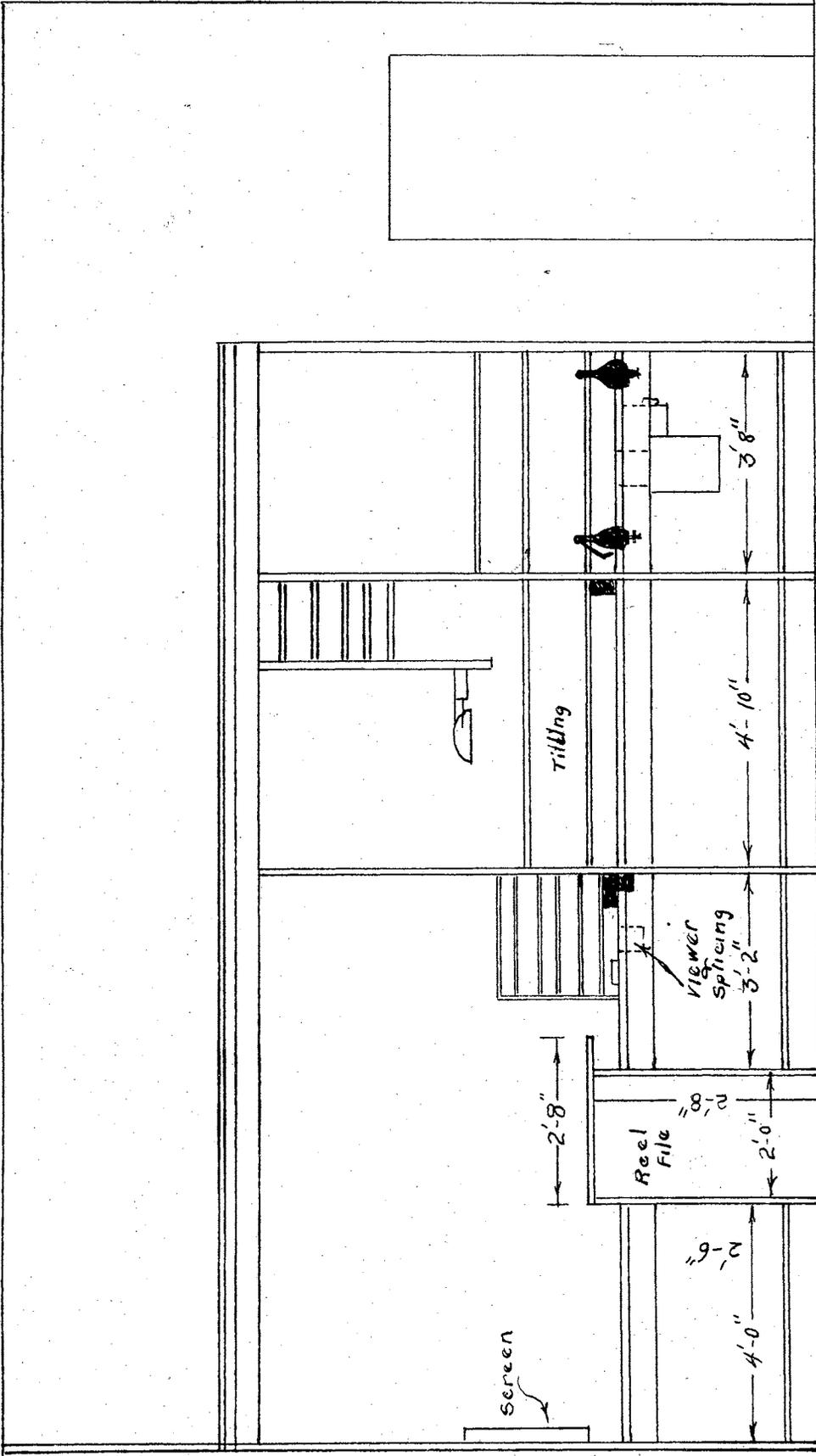
AND

DAYLIGHT LABORATORY

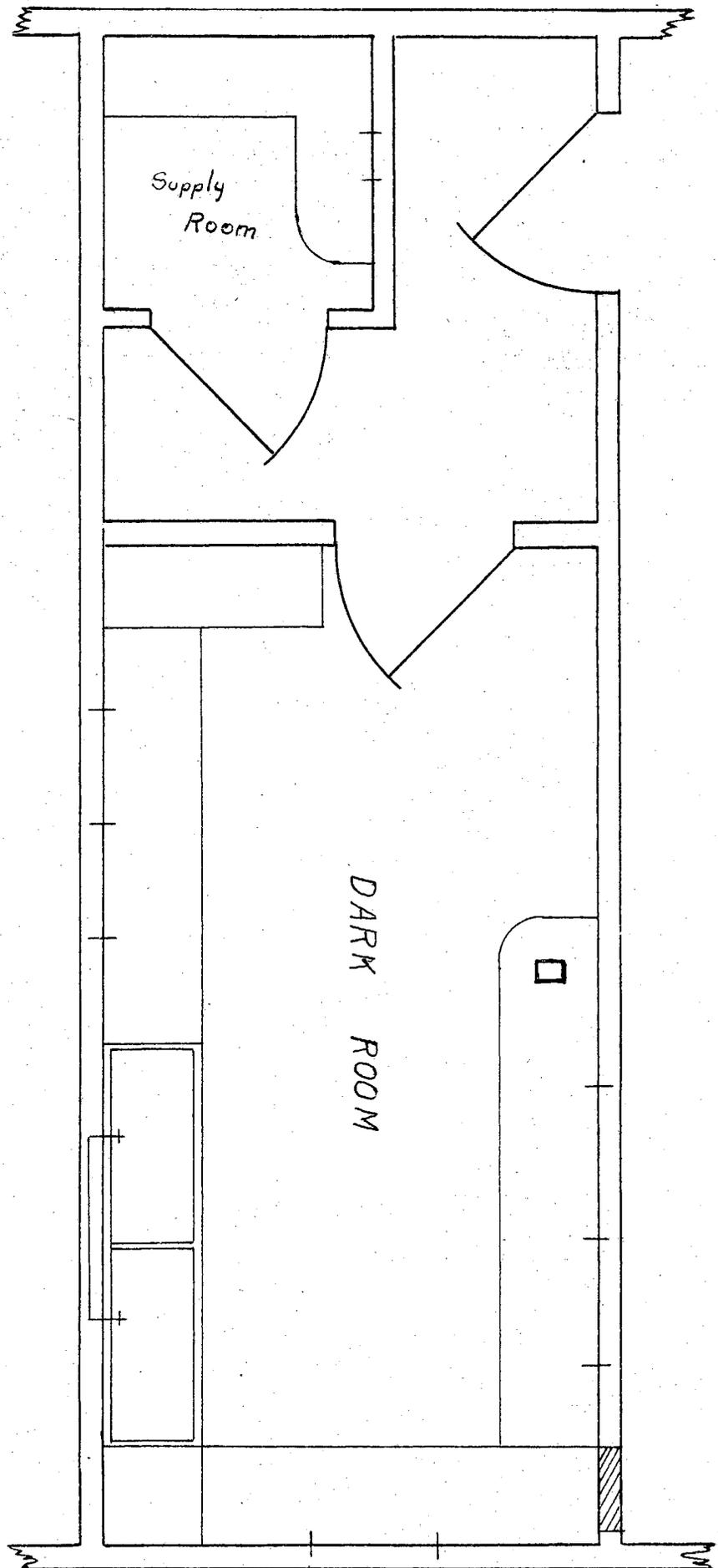


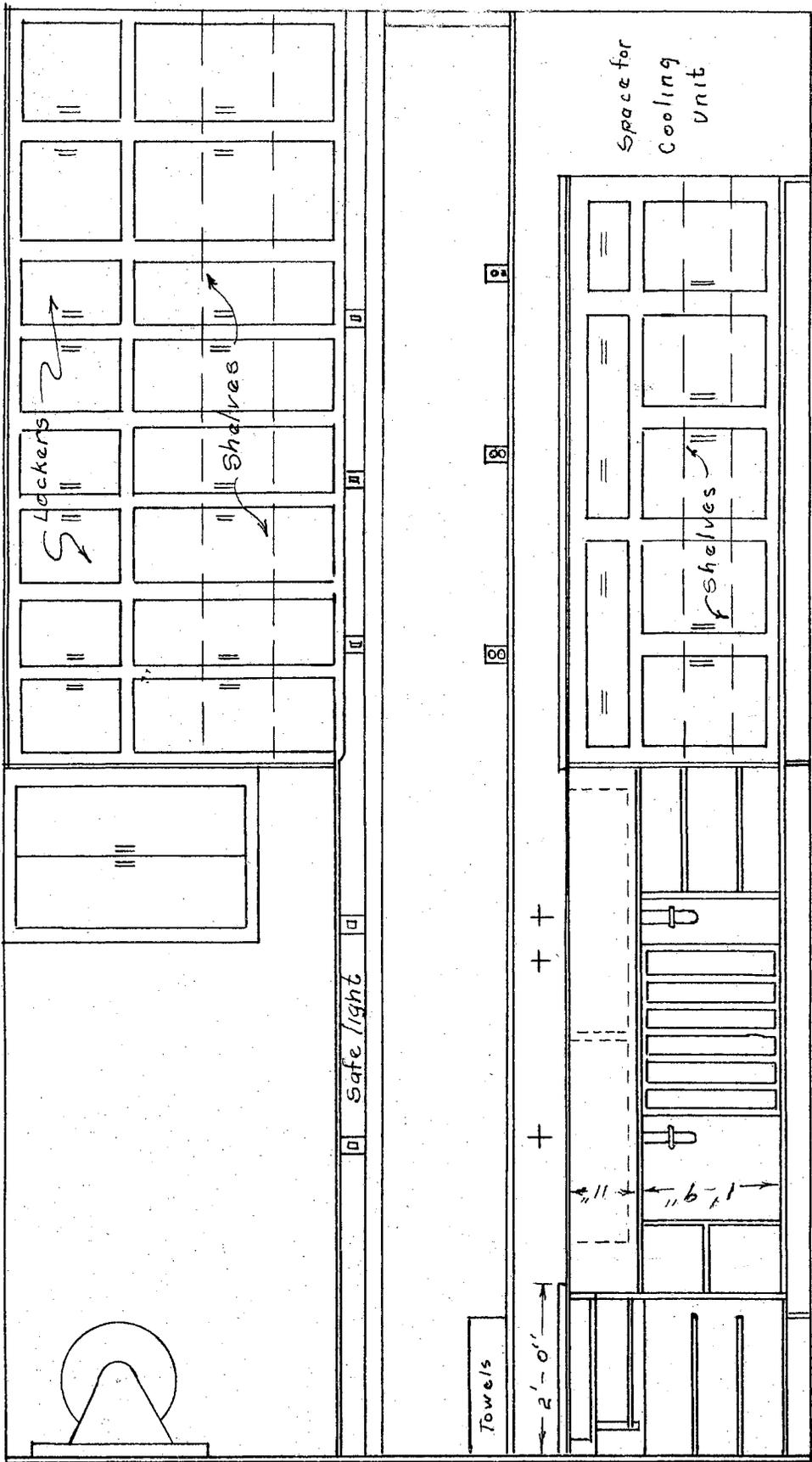
PHOTOGRAPHIC  
LABORATORY





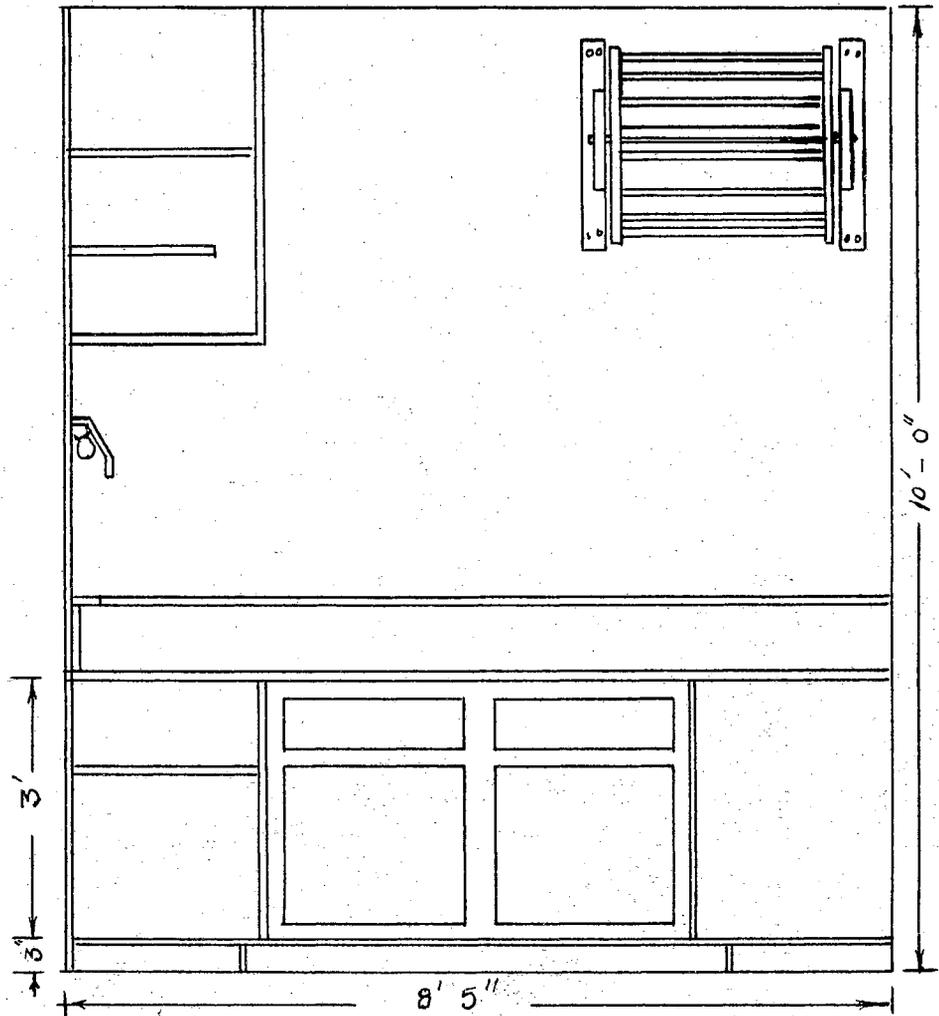
ELEVATION OF LABORATORY  
 WEST WALL  
 Scale  $\frac{3}{8}'' = 1'-0''$



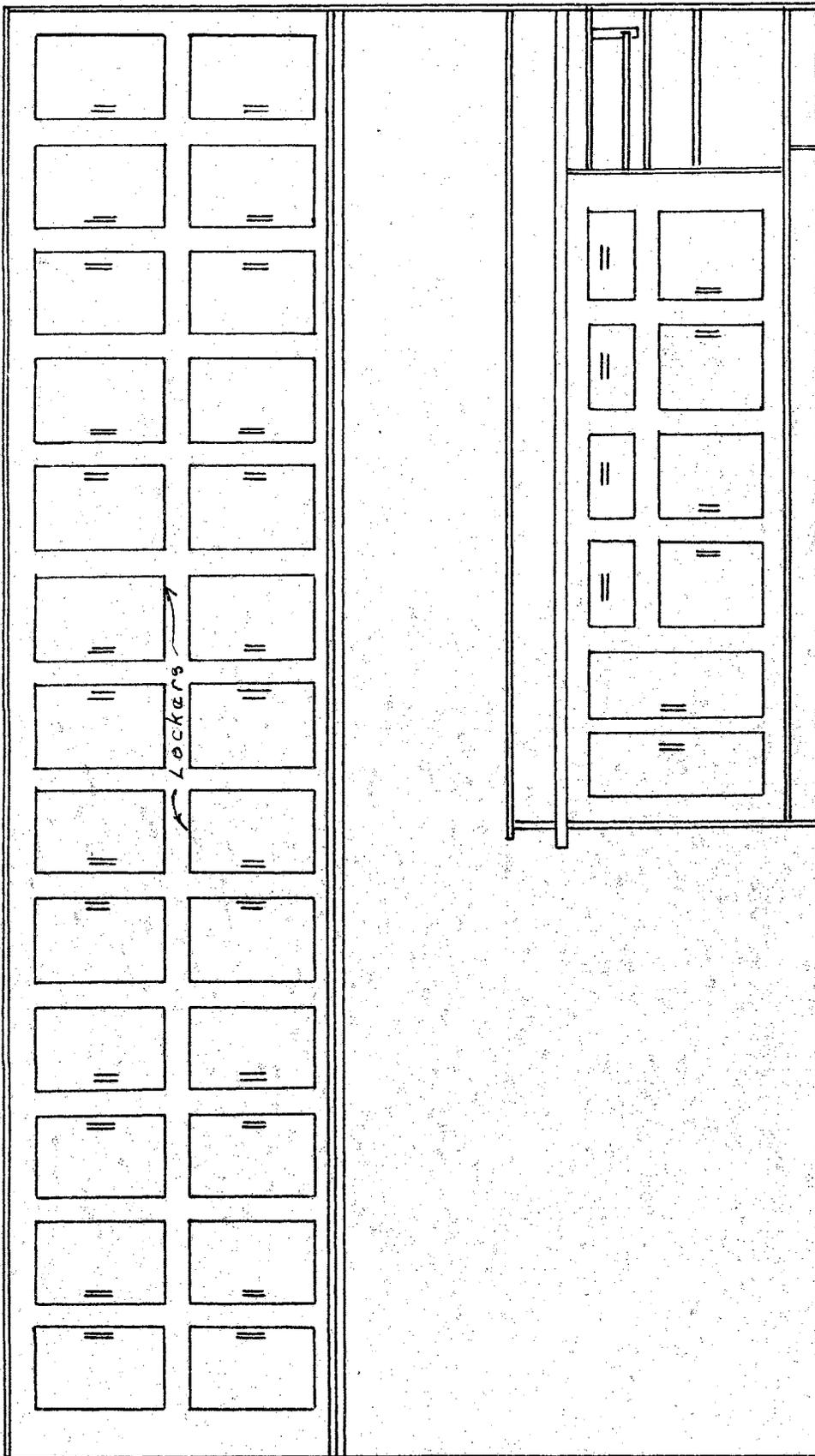


ELEVATION OF WEST WALL

Scale  $\frac{1}{2}'' = 1'-0''$

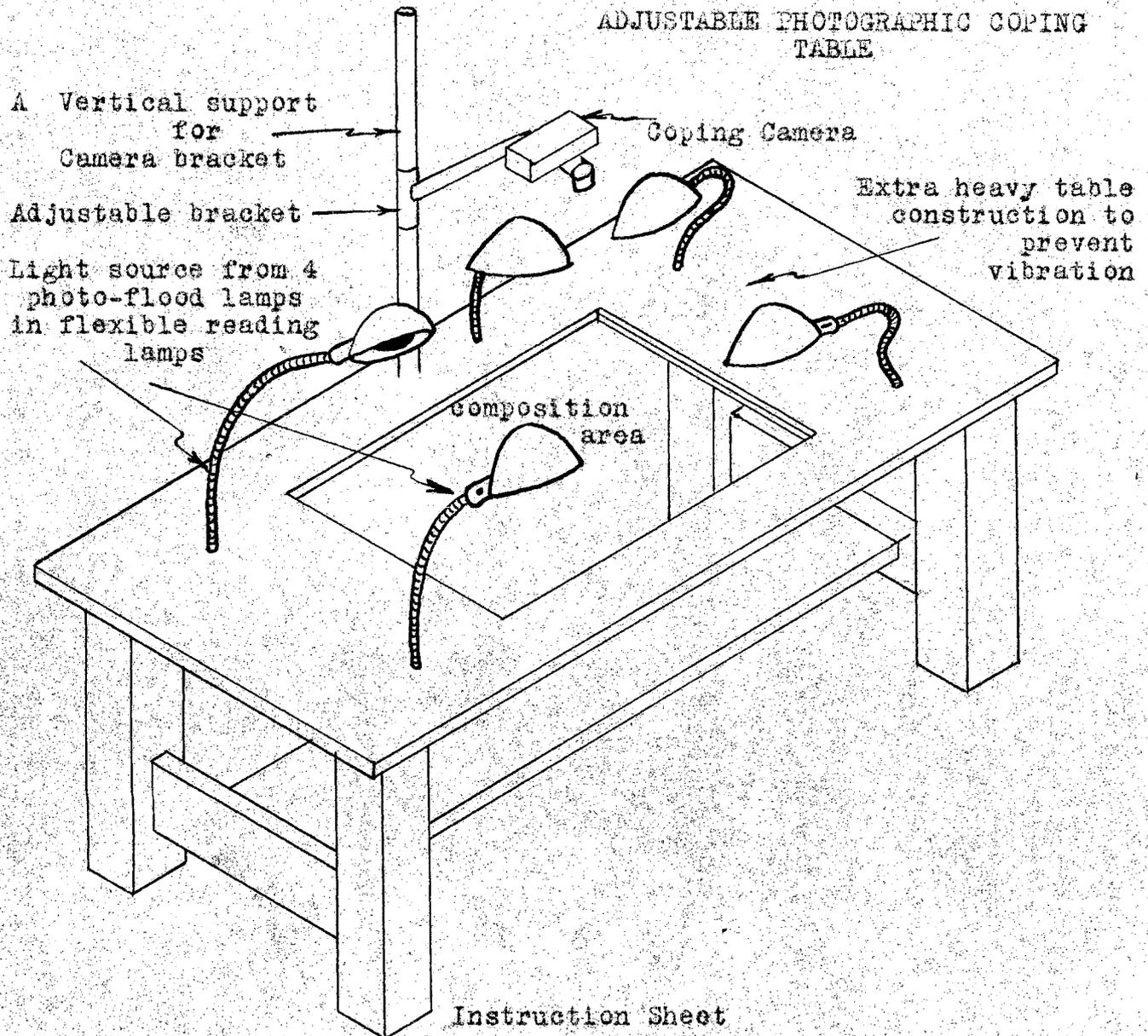


ELEVATION OF SOUTH WALL  
Scale  $\frac{1}{2}'' = 1'-0''$



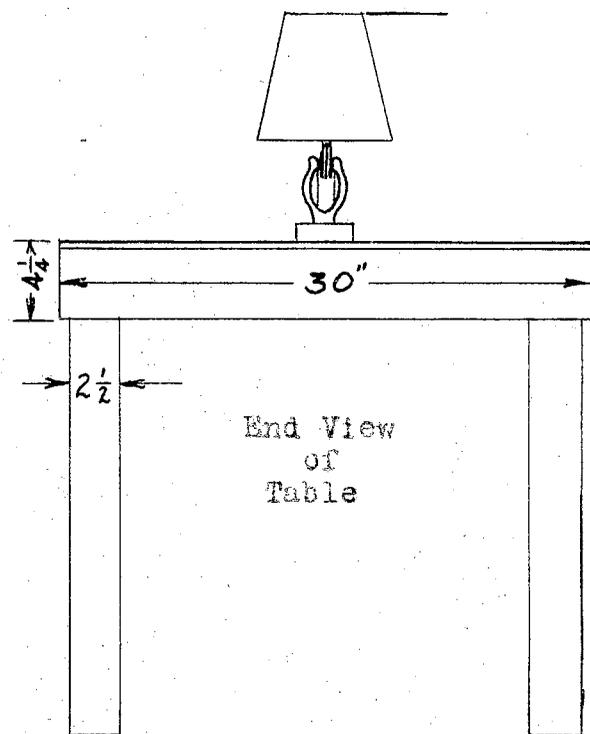
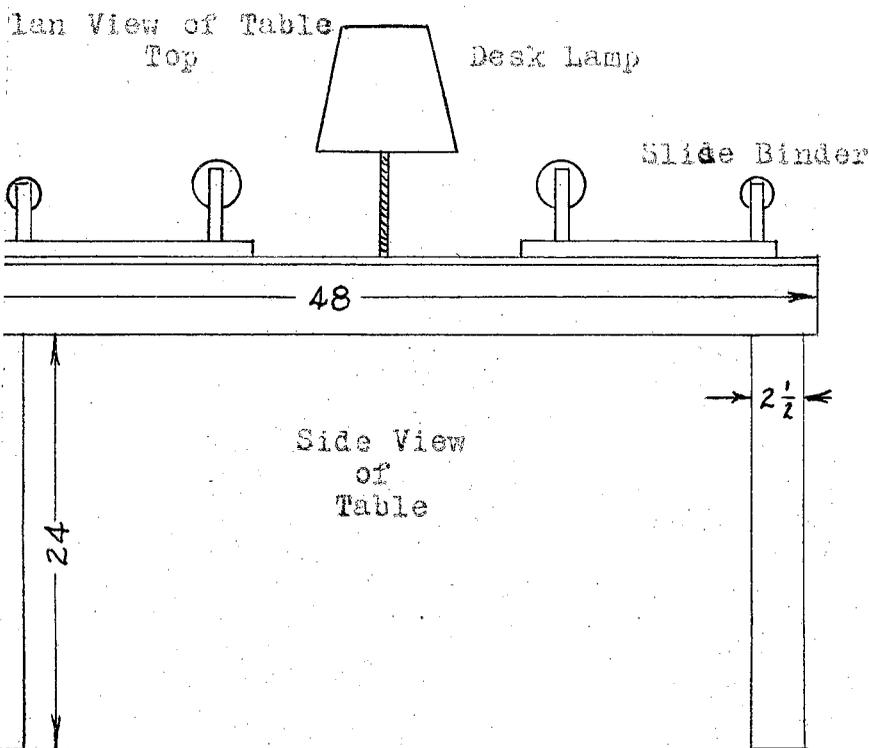
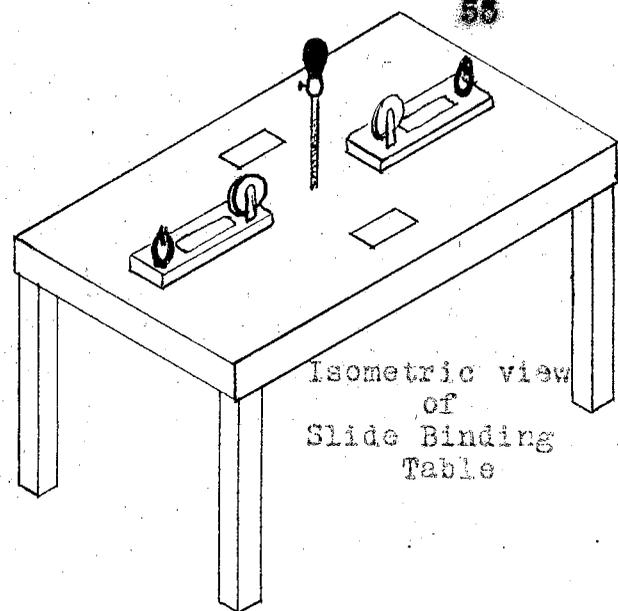
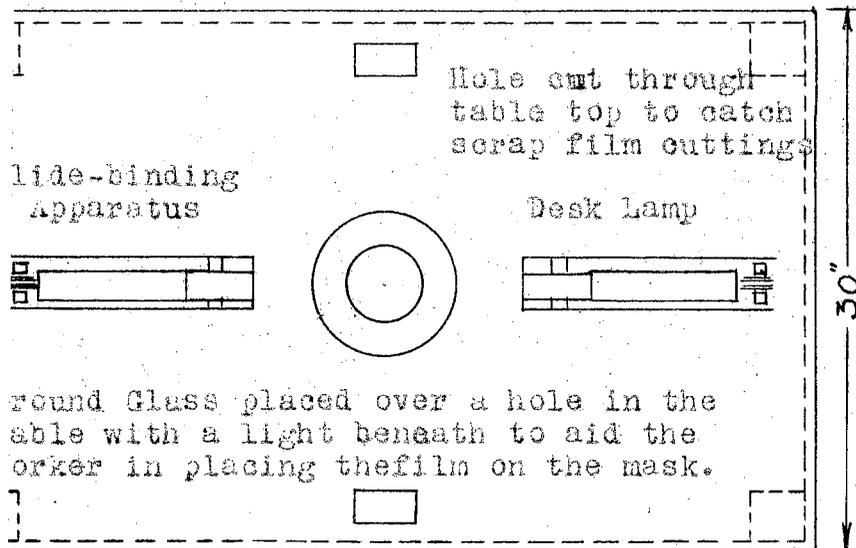
ELEVATION OF EAST WALL  
 Scale  $\frac{1}{2}$ " = 1'-0"

## ADJUSTABLE PHOTOGRAPHIC COPING TABLE



1. Arrange the material to be photographed in the order that it is to be shown.
2. Check the photo-flood lights to see if they are all burning.
3. Place the material to be photographed on the board in the center of the table.
4. Focus the camera by means of a special ground glass; swing this out of the way and place the camera in its place.
5. Turn on the flood-lights and expose the film.

Due to the various colored subject-matter to be photographed, there is not a great deal of difference. It has been found that f6.3 at 1/40 sec will give excellent exposures.



Instruction Sheet

This table was designed to speed the work of binding slides. Four persons can work at once due to the convenient arrangement. One person places the film on the masks; two people bind the glass and film together, while the fourth person presses the tape together at the corners and trims them. Experiment has shown that one can trim as fast as two can bind.

The efficient, time-saving routing of the different processes in slide binding tends to make the problem of preparing slides a simple, easy task.

Prepared for the Department of Visual Education under the Supervision of Dr. Haskell Pruett

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3. Bulletin University of Missouri. Visual Education Service. University Press, 1939.
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8. Dietrich, E. N. Visual Instruction Manual. State of Ohio, 1939.
9. Hampton, Benjamin B. A History of the Movies. Civic Friede, 1931.
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Stegal, Ray, Pontotoc County Superintendent.

Parker, Prof. E. C. S. T. C., Ada.

Murray, Clive E., Murray Jr. College.

## 15. Photographic Supply Catalogs

1. Agfa Ansco Corp. Binghamton, New York.
2. Albert Specialty Co. Chicago, Illinois.
3. American Bolex Co. New York City, N. Y.
4. Bass Camera Co. Chicago, Illinois.
5. Bell & Howell. Chicago, Illinois.
6. Burk & James. Chicago, Illinois.
7. Burleigh Brooks. New York City, New York.
8. Central Camera Co. Chicago, Illinois.
9. Craig Movie Supply Co. Los Angeles, Calif.
10. Curtis Thomas S. Lab. Huntington Park, Calif.
11. Devin Colorgraph Co.
12. DeVry Corporation. Chicago, Illinois.
13. Du Pont Inc. New York City, New York.
14. Eastman Kodak Co. Rochester, New York.
15. Edwal Laboratories. Chicago, Illinois.
16. Elwood Pattern Works Inc.
17. Excel Projection Corp.
18. Fink Roselieve Co. New York City, N. Y.
19. Folmer Graflex Corp. Rochester, N. Y.
20. Hanksraft Co. Madison, Wisconsin.
21. Hans Unified Corp.
22. International Research Corp. Ann Harbor, Mich.
23. Irwin Corporation.
24. Keystone Mfg. Co.
25. Leitz E. Inc. New York City, New York.
26. Mimosa American Corp. New York City, N. Y.
27. Minnesota Mining & Mfg. Co. St. Paul, Minn.
28. Nichols B. B. Inc.
29. Pellicles Inc.
30. Photo Marketing Corp.
31. Pratt Laboratories. South Norwalk, Conn.
32. Simmon Brothers Mfg. Co. Long Island, N. Y.
33. Shull Paul D. Los Angeles, California.
34. Utility Mfg. Co. New York City, N. Y.
35. Victor Animatograph Corp. Chicago, Illinois.
36. Willoughby's Inc.
37. X-Or Color Laboratories.
38. Zeiss Carl Inc. New York City, N. Y.

Typist:

Opal Slack