1001 WAYS
TO IMPROVE
YOUR PHOTOGRAPHS

Edited By
Willard D. Morgan

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PHOTOGRAPHY is rapidly gaining a new emphasis as thousands of camera users enter the field and new uses for pictures develop daily. The photography of the second World War justifiably assumes a good share of the credit for allied victories. Every important maneuver of enemy and allied armies is being recorded on still and motion picture films. Aerial reconnaissance has reached new perfection with the exposing of tens of millions of aerial negatives.

Back of the Army and Navy the industrial and experimental laboratories depend upon photography to speed up production. Newspapers, picture magazines and books bring the reality of war to the people working at home. Nor can we overlook the millions of snapshots being taken during the war years. These intimate family photographs carry a warm personal message to servicemen and women and family members working away from home.

As we turn to peacetime photography there are vast opportunities opening to the amateur and professional photographer for creative expression. All the technical developments in cameras, films, papers and lighting are ready for individual use. What are you going to do with these innovations?

This volume provides a reference book which will serve as a guide during your coming photographic years. With all this technical perfection and working information, you can use these materials to bring about a truer expression of our modern world. Tomorrow will be the day of the creative thinker. The successful photographer will be continually on the alert to find new interpretations of our visual world.

From now on I feel that there should be a greater interest in improving the quality of photographs. This calls for better subject selection, composition, and final print quality. Such a need comes out of the past fifteen years of unprecedented photographic experiment and development.

We have been through the excitement of the promiscuous candid camera era when offguard photos of notables and friends were snapped by the million. Then the experimental period of flash photography caught the imagination of many, and finally do not forget the soft focus and misty salon photographs followed by revivals of the wiresharp pictures. Now it is time to profit by all these developments and be free to use them creatively. We are entering a period when we can be at the same time more profound in our interpretation and finished in executing the final picture.

Composition may be selected as one important subject for more detailed study as a basis for improving picture quality. Instead of getting too involved with geometrical diagrams and “S” curves, I feel that composition should be approached from a freer viewpoint. Pictures need simplicity of idea and subject. When we include too much in a picture it quickly weakens the statement.

Another way to approach this subject of composition is to become more conscious of the fact that the photographer sees his subjects in three dimensions — width, height, and depth. This stereoscopic reality must be translated into two dimensional photog-
raphy when we examine the final paper print. Our eyes are accustomed to focus for depth as we see objects in reality. In the case of the photographic print, our eyes can go around only from side to side and up and down on one plane.

The three dimensional effect can be achieved to some extent in the photograph through skillful arrangement of near and background situations. Lighting also plays a very important part in creating this illusion when the foreground may be kept darker than objects in the background in order to give a feeling of distance. The most direct way in which to approach this subject is to actually take many pictures, set up the situation, and try as many variations as may be practical. After all, composition is simply the most economical method of creating picture impact.

I have specifically mentioned the need for better picture quality and composition as just one example which requires more intensive study. After all, photography deserves more serious study along with the real fun of taking pictures. In doing this, you will naturally cover a broader field of interest.

The photographer of tomorrow must be world-minded in his thinking. No longer can he continue to think of his own community to the exclusion of other states and countries. You, or some of your friends, will soon be flying to South America, Europe, or Asia. It will only be a matter of hours when oceans are crossed and these new world relationships are established. To prepare yourself for a broader local and world viewpoint, you will find ample material in this volume covering the photography of peoples. At the same time the material on lighting will be invaluable for your black and white as well as color work. Color will be even more important during the coming years with the many new color improvements which are at hand. In this preparation for your own photographic thinking, do not overlook the valuable information found in this volume covering the subject of action photography. This latter subject points the way to still another method for improving the quality of your photographs.

My final suggestion is that you learn to coordinate all the subjects contained in this volume in such a way that the information will quickly become part of your picture routine. For example, if your main interest lies in photographing people, you can correlate all the related subjects, such as composition, action, lighting, color and others around the one dominant theme. Naturally, other subjects will take on new interest as the scope of your photography is extended. The comprehensive index will be a valuable aid in laying out a course of study based on the articles in this book.

Willard D. Morgan.
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PHOTOGRAPHY OF PEOPLE

Robert Disraeli
Writer and Photographer

Pictures of people—real pictures of real people—can be the most universally interesting product of the camera. This article, by a well-known author and photographer, covers the informal photograph of human beings in their environment—family pictures, crowd pictures, people in motion, at work, at play. We are told about technical problems—what camera to use and type of lighting; we are told also about psychological problems and their solution—how to cope with both the camera-shy and the camera-wise.

After ourselves, we are interested in other human beings—first, our family; then, our friends; lastly, all others. Our normal curiosity about people radiates outward. Consciously or not, we speculate about our neighbors. There is the woman across the street whose two boys are in the army. Why has the genial man up the street such a vicious dog? How does a mother with five children manage in a three-room apartment? What kind of people live in that furnished-room house?

It is indicative of a civilized being to take a broad interest in others, even those whom he may never see, the people in his nation, and in other parts of the world. How do they look, dress, behave? What do they do? What are their beliefs?

Place a beautiful or startling landscape photograph near a competent photograph of a human being and our interest will linger on that photograph while the landscape print will receive only cursory attention. Photography of people is an extension of our basic

NAVAGO. Landscape can be very important to a picture of people, just as people can be important to a landscape picture. Here is a combination of the two showing an Indian, his horse (representing his livelihood), and his environment. Notice, too, the effective profile treatment of the foreground subjects

Photo, Will Torbert
and universal interest in the human being. It is the most vital of all camera work.

Many photographers severely limit the pleasure of their hobby by avoiding material in which the human being predominates. Most landscape photographs are vapid because they lack the emotional appeal that they would have if a human being were part of their composition. The next time you photograph a landscape, first try a shot without a figure, then include a figure in the second. See how much more alive, more interesting the landscape becomes. We are, after all, not living on a deserted planet and there is hardly a spot in our world today that is not traversed by people. Some photographers are actually annoyed if people get into their photographs. What fun they are missing! The human being is the most colorful, varied, complex, and wary of all creatures. He is a chameleon that puts to shame the few changes of that little creature.

WHAT MAKES AN INDIVIDUAL

Consider for a moment the changes that Bill Smith undergoes during his typical day. He is a factory or office worker:

(A) During work hours: His dress, behavior at work, conversations, and his emotions are dominated by his environment which are the machine or office, the type of work he does, the men he works with, and what he gets paid.

(B) After working hours: On his way home he becomes a particle of a crowd in a transportation medium: bus, street car, subway. He must accommodate himself to the movement of the crowd.

(C) As a commodity purchaser: He stops at a drugstore to make a purchase. His reactions will be according to his desires, his sales resistance or lack of it, the necessity of the article he buys, and the amount of money he has to spend.

(D) At home: As a family man he will act according to many complex relationships. A few are the following: the steadiness of his income, good or bad housing, the relationship with his wife, and as a parent.

This is only the sketchiest outline of the many changes in behavior that Bill Smith assumes during one day. There are others such as his recreation, his reactions to community events, public opinion, what he reads, and so on. All these physical, social, and economic factors make up his environment. They impress themselves upon his thinking and motivate his behavior. He strives to find a balance between the environment and himself so as to make the best of it. He attempts to influence the environment so that it pleases him. In short, the environment acts upon him and he acts upon the environment. The sum of all these actions and reactions make the individual named Bill Smith.

Considering all this, we must come to the conclusion that there is no one Bill Smith but many Bill Smiths in one person. It is unfortunate that the limitation of our medium, still photography, can show only one of these at a time. Our problem is to consider which of the Bill Smiths we want to show in our photograph. Is it the family man, the workingman, the consumer? Essentially this is a problem of selection.

TECHNICAL PROBLEMS

The Camera. Before we proceed any further in exploring the photography of people, a word about equipment is necessary. Any camera is practical. However, the simplest appearing equipment will make the photographer's work easier. The wrong camera may become a barrier to achieving a good photograph. The camera, by its very size, may attract the attention of the subject to such an extent that the result might be entitled: "Mr. Bill Smith Fascinated by a Large Camera." A small and very shiny camera with a lot of tricky gadgets attached to it will also arouse the excessive curiosity of the subject. It is wise to use a camera that does not frighten by size, nor attract because of its machinery. The camera should be simple and unobtrusive.

Lighting. Since high speed panchromatic films have come into common use, the problem of light is today not one of quantity but one of quality. It should be axiomatic that the simplest lighting is the best. Simplicity in lighting does not mean a great quantity of flat light, but such an arrangement of light that will help to tell clearly what our picture is about. Light is only a means to an end.
A good guide to the right light is to study the natural light that falls upon the subject, and to disturb that as little as possible. Boost its quantity when necessary; make the shadows transparent or flatten them down; introduce your boosting light from the same direction and from the same height as that of the original source. The light for the shadows should never be as intense as, nor conflict with, the main light. All too often a photographer spoils the soft daylight falling upon a subject by introducing the direct light of a flashbulb. Yet all this should not be taken as a hard and fast rule. Lighting has more variables than any other phase of photography.

Composition. As with light, composition should be simple and direct. A successful composition is always one in which the main subject or action is so spaced that the eye goes to it without having to overcome hurdles. Many photographers neglect the background which in any good composition is unobtrusive. When it begins to clash or shout for attention, a photograph is weakened.

As in any other creative art, the technical means with which a good photograph has been made is not apparent.

THE APPROACH

The basic failure of most photographs of people is not technical; nor is it due to lack of effort on the part of the photographer. Certain factors arise and come between the subject and the photographer. They must be overcome before there can be any measure of success. Most photographers are not aware of them and are puzzled over why the people in their pictures do not look at ease. We all have had these failures. What are these factors? They are a set of behaviors of which one or more will crop up in every subject. They are: shyness, exhibitionism, curiosity, embarrassment, suspicion, wariness, and resentment. Most people are still, unfortunately, camera-conscious and this builds a barrier between the photographer and the subject which is a real obstacle to the true photography of people.

Our endeavor in photographing people is to make pictures of them as they are. If we photograph Bill Smith at work, the picture should show him working and not posing at work. If we photograph the sweet smile of Mary, we often get a picture of Mary posing a fixed grin. We made a photograph of grandmother because she looked charming as she sat comfortably in her rocker knitting and smiling at a quip of mother’s. Yet the picture shows her sitting primly with her hands tightly clutching the needles, and a frozen smile upon her face. Something was lost.

How do these factors arise? It is quite normal that one of these behaviors will be aroused in a subject simply by seeing the camera. Let us for a moment consider Bill Smith. For years he has followed a daily routine. Suddenly this is disturbed by a camera in the hands of a stranger. His reaction will take different forms, depending in what part of his routine the camera and pho-
ENGINEER. The engineer of The Champion, a diesel-driven streamliner, is shown at work. People's jobs are always interesting—and the train engineer's has a traditional fascination.

Photo, Hans Knopf

tographer crop up. At his place of business, its appearance is a break in the daily monotony, and arouses, at first, a lively curiosity. If a camera is trained upon him exclusively, his curiosity will merge into embarrassment or even shyness as he finds himself in the spotlight. At that moment Bill Smith, the steady worker between eight and four of a machine plant or office, disappears and another person takes his place. The photographer will get a posed, wooden picture of Bill Smith—not the reality he is after.

On his way home, Bill is in a crowd waiting for a bus. When the vehicle arrives at the corner the doors do not open. A photographer from the company is photographing the crowd before they enter the bus. Bill may show impatience and resentment because he wants no delay in getting home, or he may

COAL BREAKER WORKERS. Taken in 1911, this documentary photograph shows boys bending over the constant stream of broken coal, picking out the slate. Symbolically, the boss stands over them. Here is a striking example of an economic and sociological condition seen in terms of human beings.

Photo, Lewis W. Hine
PHOTOGRAPHY OF PEOPLE

GERTRUDE STEIN. Portraiture can be stereotyped or it can be thoughtful—as with this pair of photographs of the famous writer, Gertrude Stein. A straight portrait of the authoress would not have been in keeping with her character, so the photographer caught something of her humor and of her originality in these pictures.

Taken by the author of Publicity Pictures of Radio Artists
Photo, Ray Lee Jackson

stare into the lens with a vapid grin on his face. These behaviors, if multiplied by many “Bills”, will be a hindrance to a natural picture of people entering a bus.

All of us are apt to put on a false face before a camera. We are afraid of the camera. There is something magical, something mysterious about that lens pointing at you. We hide our real self and substitute a facsimile. All these reactions result in pictures that are artificial and bear little resemblance to the real person.

The creative photographer who wants the best from his subject will be tripped up by this behavior toward the camera unless he follows some very simple precepts. With minimum equipment and maximum efficiency the photographer can devote more of his attention to the subject than to the camera. He can concentrate upon the behavior of the subject. First he must have an attitude of quiet friendliness. This will put the subject at ease and tend to break down any pose. The subject will relax and his muscles and mind will assume a normal behavior. At that moment the photographer makes his picture.

The time it takes to get the subject back to normal varies with the individual and the circumstances under which he is being photographed. Some take a longer time than others and the photographer must have patience. Impatience will be transmitted to the subject and ruins the photographer’s opportunities. Be calm. You cannot hurry the subject. And don’t let him attempt to hurry you. You can soothe him and divert his attention from the machine and what you are doing with it. Stop fussing with the camera. Sit or stand near him and talk about his interests. Get him to take over the conversation. Let him feel he is cooperating with you. You are successful when the subject says: “I didn’t know when you took the picture.”
FAMILY PICTURES

There are two chief categories of the photography of people: (1) the formal or portrait; (2) the informal photograph of human beings in their environment.

We do not concern ourselves here with portrait photography but with that of people in their environment. To develop our technique, to refine our methods of approach and control over the subject, we should start within the environment that is familiar to us, our own family. There is an infinite amount of rich material in the family which the photographer all too often overlooks. Before he attempts the larger world, let him first seek with imagination the treasures that are at home. Let him become aware of the drama and the comedy in the daily life of his own family.

The principal cause of disappointing family pictures is the infrequent use of the camera. Pictures are made only on special occasions, the picnic, the birthday party. The normal life of a household makes the

HOMEWORK. Lackadaisical concentration is shown in this pose—part of the small drama and comedy which characterizes daily family life. Lack of posing and consciousness make this a pleasing shot

Photo, Carola Gregor

most interesting pictures. When the sight of the camera becomes as common as that of the salt shaker, the family will go right on acting out its normal life as the photographer proceeds to make pictures. They will not feel called upon to act differently before the familiar black box. They will not pose any more. However, the photographer should not presume too much by making a great to-do with lights and other equipment. The normal life of the family will not wait for him and he may discover when he is ready that the charm of a scene which attracted him will have disappeared.

There is one danger in frequent photography of the same persons for which the photographer must watch out. They will assume positions they know will please the photographer and the family. This is unconscious posing and must be counteracted. They have become camera-wise, which is as bad as being camera-shy. Both tendencies make unnatural pictures.

Let us hint at only a few of the many possibilities of family pictures:

How mother manages the household—one part is her struggle every morning to get the family up, dressed, fed, to school, and to work on time. How many small things constantly threaten to upset her schedule? The late arising of one, the button that drops off a shirt at the last moment, the misplaced book. It requires patience, humor, and generalship on her part to achieve a daily
victory. . . . When junior reads the comics on the floor. How a child can ever get into those sprawling positions is one of the mysteries of nature! . . . Bridge evenings with friends. . . . Baby at play. . . . Father falling asleep over the evening paper . . . . Supper time. . . . The children coming home from school. . . . Mary jumping rope with her friends. . . . The children sleeping. . . . The family going to church . . . . Sister and her new dress, and so on.

By using the camera frequently and daring himself to fail, and with the courage to endure tough family criticism, the photographer will have in time a beautiful collection of family pictures that will be treasured and become more priceless as the years go by.

The family has been his school. By studying its life he has become sensitive to detect the real emotion from the false, the natural position from the posed. He has become aware of the multitude of nuances in postures, movements, and facial expressions that every human being is capable of. He will find that his horizon has widened. He becomes sensitive and observant of the life of others beyond his family. Perhaps for the

CAUGHT IN THE ACT. Wide-eyed innocence in the presence of overwhelming contrary evidence—that is the humor of this home photograph. Simple on-the-camera synchroflash equipment caught the child's expression before the moment had gone

Photo, William Stahl
THE COMPLETE PHOTOGRAPHER

TOWN MEETING. Citizens of Woodstock, Vermont, meeting to decide on whether or not intoxicating liquors should be sold in the town. This is a fine study of faces—and an interesting documentary photograph showing democracy in action. F.S.A. photo, Marion Post Wolcott

BALL FANS. Human emotions are seen in the faces and actions of these ladies, attending a baseball game. Taken on different days, these photographs show four of the same fans. Notice that the two on the near end are real fans, carry megaphones, and keep score on the program. The others are interested, but not so demonstrative. Used in the Boston Globe. Photos, Arthur Griffin

First time he will really begin to see the thousand and one variants that the world is capable of producing in human beings.

EMOTIONAL EXPERIENCES

In the wide field of photography of people pictures showing strong emotions—laughing, crying, anger, and other emotional experiences—are of greater interest to us than any other kind. It seems that a high intensity emotion can transmit itself through a photograph to us. Looking at such a picture we are not in doubt about the emotion, and we react to it.

The expressions on the face of a person are sometimes a great deal more interesting than the cause of the emotion. Fires at night are photographically more or less the same, patches of intense black varying with white, but if we turn our camera on the spectators at the fire, there is variety. Many emotions are depicted in their faces and attitudes. The youngsters show a mixture of childish delight and shivery fear. The older people have a kind of detached curiosity about the conflagration. Some become exhilarated and express themselves in a loud and boisterous manner. The women tend toward a giggle and shivery stage. A fire seems to be a place that calls forth flirtations among the late teen age males and females. Altogether it brings out a sort of joviality among the spectators.

This is only a hint of an approach that is still to be thoroughly explored. Here are a few places where emotional effects on people can be observed and photographed:

People at a theater, their reactions to the performance. . . People meeting or parting at a railroad station. . . People reacting to the progress of a game (baseball, racing, etc.) . . . People waiting for a parade.

There are problems of composition that are peculiar to this kind of picture. The tendency is to get the face as large as possible, to isolate an emotion completely without at least hinting at its origin. This has its dangers. Don’t cut out too much detail around it. If the picture of a woman in tears shows only her face, we do not know the reason for her outburst. Tears are caused not only by sorrow, but also by joy, vexation, jealousy, tiredness, and other causes. We
PHOTOGRAPHY OF PEOPLE

want to know why she is crying. Perhaps she is only peeling onions. Some hint must be given of the cause of her crying. If she wears a mourning dress, we know one cause. If in the background are the columns of a railroad station, we know another cause. If we see her sitting on a rubble heap that was once her home, we know that cause.

camera. We admire the grace of a boxer, the stance of a baseball player as he is about to strike the ball, the movement of the pitcher, and the player tossing the ball into the basket. These movements generally repeat themselves as the person is in action. They form a rhythmic pattern which in its variety and complexity may be called a dance.

CROWD AT A GANG MURDER. A study of the faces of children who were witness to a gang murder. The photograph shows a relative of the dead man, as she leaves the scene. Photo, Weegee

A repetition of the same emotion may also hint at its cause. Rows of laughing children will tell us immediately that they are seeing something very funny on a stage or screen and we are satisfied to see only their reactions.

MOVEMENT PATTERNS OF PEOPLE

The movements of a human being from moment to moment as he follows an activity of play or work is a fascinating field for the}

All of us, when engaged in an activity that uses most of the muscles in the body, make rhythmic patterns. And many are equally as beautiful and interesting as those of the athlete. Watch a tracklayer drive a spike into a sleeper, a bricklayer place one brick after the other with clocklike regularity, a group of children jumping rope or other group game.

It is quite difficult to make good pictures
of any movement unless one first studies and analyzes it in every detail. Only then can we decide which part of the movement is the one that will express the whole. Let us consider the well-known movement of a man swinging a club at a golf ball. The movement of the

WEST POINT CLASS. A perfect example of a "crowd" picture, this shows a group of men apparently completely unaware of the camera. The foreground instructor gives a mental focus and reason to the picture.

Taken for Life Magazine
Photo, Alfred Eisenstaedt
PHOTOGRAPHY OF PEOPLE

club is in an arc which is composed of an infinite number of positions assumed by the club. At the same time the position of the body of the man is constantly changing. The very beginning of the movement does not express what is to follow, the club hitting the ball. The center of the movement is static. The end of the arc, after the ball has been hit, is uninteresting. Somewhere between these three points is the spot which will express the force of the movement, where it came from, and in what direction it is going. At the same moment the body of the player will express all of its power and action. This is the manner in which movement should be analyzed to enable the photographer to choose that part of it for the picture which will express its entire flow.

THE CROWD

"The face with a thousand eyes." There is nothing that requires more patience than to get a picture of a person not looking at the camera. How much more patience is required when that person is multiplied by the hundreds and even the thousands. A successful picture of a mass of people is one in which no one is looking at the camera. To get this picture is easier said than done. At the moment a camera is pointed at a crowd, someone will discover it, and in a flash dozens if not hundreds will be looking straight into the lens smiling broadly as if their very life depended upon it. For one who turns away, two dozen will keep on staring. How can this be overcome? The method we use if the crowd is in one place, (that is, seated, or standing still), is to show the camera obviously, and to go through the motions of taking a picture. This begins to wear out their interest. It comes down to a tussle between the patience of the crowd and that of the cameraman. If he can afford to wait for five to ten minutes the crowd will eventually forget him. Then is the time to make your picture.

When the crowd is in motion there will always be several persons who suddenly stop near the camera, covering most of the picture and staring into the lens. This is the very same person who immortalizes himself by cutting his name on the rocks of Niagara Falls. To get rid of him is not simple, but it can be done. The photographer suddenly loses interest in what he is doing and looks in an entirely different direction. Our seeker for immortality begins to fidget. He will be nervous and wonders whether he was not mistaken that he had an opportunity to be in a picture. Some have the courage to come over and ask what you are taking. If you are shooting north, tell him you are taking the west and then calmly point your camera to the north. This will confuse him to such an extent that he leaves. This wait is almost always worthwhile, because nothing is quite so disconcerting in a crowd picture as the lack of "direction" caused by one camera-conscious person. Sometimes, however, he may be helpful standing where he is. If he is staring into the camera, look up and he

INAUGURATION. Here is a truly revealing photograph of a celebrity, showing Eugene Talmadge (right), defeated Governor of Georgia, and the new Governor (left), Ellis Arnall. The grim expression on the defeated candidate's face is contrasted to the confident face of the speaker, and an unmistakable story is told.

Photo, Press Association
will follow your example. That is the moment to make the picture. Wherever you go you will find one or more of this species. The professional photographer calls him a "lens louse." With patience and cunning you can get rid of him.

"Children on the streets." City children are perhaps the most camera-wise, therefore, aggravating subjects to take. But they make charming pictures. They have an exasperating habit of clustering before a camera and woe to the man who wants to shoo them away by threats or sternness. He is completely lost. Only guile, cunning, and charm exuding out of all your pores can help you. We have had occasion to photograph children on the streets of New York and a method had to be worked out for this. Once we were asked to photograph children dousing themselves at a fire hydrant during a hot day. When they saw the camera they jumped up and down in front of it within two feet of the lens and cried: "Mister, take my picture." They were of all ages and sizes from the infant in arms to fourteen years old. What to do? It was obviously impossible to manage the crowd alone and to get them to do what we wanted. There they stood, some posing in the most ludicrous manner, others laughing, some forward, others shy. As in every group, there were leaders. Two of the older boys, about thirteen or fourteen had shouldered themselves well forward and were pushing others out of the way. We asked them to come forward and we walked a few paces away from the crowd who attempted to come nearer. My confreres importantly shooed them away. We talked to them as man to man. We appealed for their help. They were flattered and in no time at all organized everything for us. Everyone entered into the spirit of the game. Dozens of youngsters ducked themselves in the water, played games under the spray, and within a few minutes completely forgot about us. We made several good pictures of which not one was posed, or in the slightest degree unnatural. Without the help of these leaders it would have been impossible to get any pictures. Their reward? Oh yes, a 15¢ soda apiece!

**CONCLUSION**

We have attempted to bring you a few guides to the photography of human beings. These are rooted in failures and successes. However, experience transcends advice.

Photography is not easy. It is one of the most difficult of all arts. One never stops learning. It does not begin with the opening of the shutter. That is simple technic. It is really the unimportant part of photography. What precedes the exposure is much more important.

The photographer who can make people forget that they are in front of a camera, that they are vain, shy or impatient, that they are curious or wary, the photographer who can control one or a thousand people and make them do what he wants, has acquired a great gift.
SIMPLE PORTRAITURE
Stanley Hoke
Superintendent of Photography, Olan Mills Studios, Springfield, Ohio

Every photographer who is interested in people will eventually want to make formal or semi-formal portraits of his friends and relatives. This type of work, so often approached with elaborate ideas in mind, is apt to lead to failure—unless the basic steps are understood. Here is an article which starts the photographer off in the right direction. As a guide to simple portraiture it should be valuable to all photographers.

All photographs by Stanley Hoke.

So much has been written on the subject of portraiture that any further treatment of the subject would necessarily seem repetitious. Yet, I have read numerous treatises and books on the subject without finding one that starts right from scratch, so to speak, and explains how to start and what to start with, the number and size of the lights, where to place them, what to do and what not to do after they are placed, and the corresponding results. To buy a volume on photographic portraiture and find yourself in the middle of chapter two involved in a dissertation on the "Esthetics of Portraiture" or in chapter three run afoul of some highly complicated jargon regarding moods in portrait photography or even some meaningless algebraic formula—well, without a master’s degree of some kind or other, little can be accomplished.

So, let’s eliminate the debatable features of portraiture and anything smacking of the esthetic and get right down to an explanation of the simple, elementary kind of photography that may be termed fundamental.

BASIC NEEDS

Now, let’s clear the junk from a room and see how much space we have. It’s exactly ten feet wide and fourteen feet long. Here’s a plug-in on the floor and that’s luck—saves a bunch of electrical connections hanging in the air. The fact that the floor is fairly level is also good. The lights won’t fall out of position and the camera angle will be level. These are minor things, of course, but can be important. The paint is a little light and can cause a lot of trouble with reflection, but a good lens shade will help this. Now that we have a fairly presentable room, all we need is equipment. We are minus everything, including background, so the best thing to do is to make a complete list of all items needed:

1. Background
2. Electrical Connections
3. Camera Room Paraphernalia (posing bench, etc.)
4. Lighting Equipment
5. Camera Equipment

BACKGROUND

Care must be exercised in the choice of a background, as the background against which any portrait is made plays a most essential part unless the background is done entirely by hand (this we shall leave to the professionals who have the time either to work them in or to print them in). Learn to photograph the proper kind of background in your portraits from the beginning and you will have one less worry.

A figured background will be very distracting in the average portrait and is never good except for special effects, in which it may easily be the dominating theme. In any good portrait, made purely as a portrait, the background must be in no way distracting. If this point is kept in mind, a great many disappointments will be avoided.

Too dark a background cannot be used at all times, and is best applied when using special lighting effects such as low keys.

The wisest choice and the most easily manipulated background is a window shade five feet wide and seven feet long. One end of it should be fastened securely to a wooden rod with a hole in the middle for insertion of the tripod, and the other end weighted with a small rod to hold it taut. This can be attached to an ordinary photographic
tripod and moved to any part of the room. A background of this type should be of two colors, white on one side and green or any dark shade on the other, and for all practical purposes these two shades will be sufficient. The green side can be used if an absolutely black background is desired. Any desired variation in the shade of the white background from pure white to gray or medium dark can be obtained by working with the subject at varying distances from the white side of the background. When the subject is posed close to the background, and the lights are necessarily close for proper lighting, the background will be light. Moving the subject out further and lights out correspondingly will naturally produce a background of a darker shade. Thus, it can be seen that a white background or relatively light background is of good use in portrait photography. However, care must be exercised in using a white background in order to minimize flare-back or objectionable reflection. It is easy to get too much glare, which makes the background look too pasty or white to be attractive. By directing a light, or two small reflectors against the background, the tone of the background may be controlled.

ELECTRICAL CONNECTIONS

Electrical cords should be heavy enough to guard against burning out, as the current necessary in shooting some set-ups may be quite heavy. Plug-in sockets should be examined to see if they are safe, and, in some cases, if the ordinary fuse is not quite heavy enough to carry the added current, a fuse of higher amperage may need to be installed. Attention to these details may prevent trouble later on.

CAMERA ROOM PARAPHERNALIA

The necessary props are very simple. A vanity bench for the subject is necessary and possibly a chair or two. It is much better to use the small vanity bench in most portraits, or some bench that doesn’t have a high back on it. Posing a subject in a high-back chair introduces several difficulties such as the back sticking up in part of the picture without any explanation, and it is sometimes difficult to get the subject to do anything but slump when placed in a chair.

Different props may be used later if one is interested in special effects. Simplicity is the theme now and, in fact, isn’t a bad idea at any time. Exaggerated poses and unnatural angles are very often too difficult to reconcile with good taste. Let’s discard the idea of cluttering the camera room with a lot of posing paraphernalia. Our vanity bench will do the job.

LIGHTING EQUIPMENT

Lighting equipment is somewhat like camera equipment in that it is going to be up to the individual’s discretion as to what kind he wants and how much money he wants to spend. The kind of lighting equipment matters little, however, as long as the proper lighting and the proper density of negatives can be obtained without setting the light in the subject’s lap. One reflector with a mogul base, permitting the use of lamps with wattage from five hundred on up when needed, should be bought. The other reflectors may have the standard base using the Number 1 or Number 2 photoflood or regular Mazdas.

Many companies make suitable reflectors for portraiture the prices of which are within the range of everyone. The reflectors carrying the standard base bulb should be about 12 inches wide and the one for the mogul approximately 16 inches. One 16-inch reflector for the front and two 12-inch reflectors for the side and back lighting are sufficient.

Later a spotlight may be purchased, but its use is chiefly for special effects. Compare with Figure 2.
Some workers may prefer several spotlights, but only after getting a better-than-casual acquaintance with the properties of photographic lighting. It is the normal tendency of beginners to overdo a spotlight due to the fact that they fail to realize how much brilliance they are getting. A spotlight uses a condensing lens and the light thrown by this unit may easily overbalance the rest of the lighting, so let’s start with a simpler lighting set-up.

**The Right Bulb.** Now, we have three reflectors including the one with the mogul base. The type of bulb that should be used is important. A consideration of the properties of light in relation to the film used is necessary for the best results, so let’s analyze the three main types of bulbs. First we have Mazda bulbs of the ordinary kind. These burn at a certain color temperature or degrees Kelvin. This may sound slightly complicated and out of place in a discussion of portraiture, but a knowledge of the light properties of the particular kind of light you are working with is pretty essential for best results. This light burning at approximately 2850 degrees Kelvin has a color radiation considerably different from one burning at a higher temperature. Its chief peculiarity, as far as we are concerned, is the fact that it is very high in radiation in the red portion of the spectrum or red rays. Bearing this in mind we can readily see the possible results if we are using a panchromatic film highly sensitive to red. Using a light with an over-abundance of red radiation and a film highly sensitive to just that portion of the spectrum, we are quite liable to get a rather radical over-correction, producing such results as white lips and flatness in general. However, some workers prefer orthochromatic film which is not sensitive to red, in which case the above factors would not be true. But most workers nowadays prefer pan film, especially on women, so let’s see what can be done about the problem.

Filters could be used, of course, but this is not a logical choice, so we need a different light source. We have two left, one of which is a Mazda light that burns at a higher color temperature and is called a 3200-degree Kelvin, which will help materially. The higher the color temperature at which a light burns, the less the red radiation.

Next, of course, we have the photoflood light which, perhaps, has a wider use among both professionals and amateurs than any other kind. This burns at a color temperature high enough to eliminate worries of over-correction in the red. Photofloods are possibly better than the 3200-degree Kelvin light for several reasons. They give an abundance of highly actinic (photographic value) light using a relatively small amount of watts and they are of portable size. Their chief difficulty is the fact that they are not too long lived, burning only a few hours. This, however, stretches into a good period of use when we consider that lights are never left on for long periods in portraiture. So, if you are using panchromatic film, photofloods are possibly best.

**Other Light Equipment.** Now, we must take into consideration the fact that photofloods in open reflectors will produce harsh, raw light and shadows and should therefore be diffused. Most companies furnish diffusion hoops which fit over their reflectors. Tracing cloth or tracoline is one of the most effective materials for diffusion and can be easily placed over the reflector.

Tripods should be light and relatively inexpensive, permitting an easy placement of each light. Heavy tripods are a definite nuisance and should be avoided.

**CAMERA EQUIPMENT**

One of the problems facing the beginner in portrait photography is the choice of proper equipment for portrait work. The mistake frequently made is in assuming that expensive and complicated equipment is absolutely necessary to produce anything worthwhile in portraiture. Many beautiful por-
traits and scenic shots are being produced with the simplest equipment. The opposite, though, is very frequently true when expensive and complicated equipment is in the hands of someone who may know the manipulation of his expensive equipment but has yet to be introduced to anything but the barest essentials of photography. The camera you use is certainly going to have some effect on the portrait you make but very seldom will it determine whether or not it is going to be good. The simpler camera naturally will not have all the conveniences and adjustments that the professional may learn to think of as indispensable, but these same conveniences and adjustments may prove, in the hands of a novice, to be just elements of confusion contributing only to worse results.

Reflex. The most logical decision to make regarding the type of equipment is to use just what you have at present, or, if you haven't any, confine your initial purchase to one of the simple reflex cameras. A reflex camera offers certain definite advantages in portraiture that the ordinary box or folding hand cameras do not offer. The image is easily viewed right side up as it will appear on the negative. This is accomplished through a mirror system within the camera. Some of the models employ a secondary lens to project this image that is easily watched, up to and during the time of exposure. This is a decided advantage in contrast to the type of camera that does not permit visual focusing.

Another popular reflex camera, the Graflex, employs only one lens to do the whole job and permits viewing the subject on the negative right up to the time of exposure. The idea that viewing the subject during exposure is advantageous, however, has but little to support it. Once the release is pressed, the job is done and the eye should be on the subject and not on the camera. The image does not disappear until the shutter is actually released. One very definite advantage in a Graflex is the shutter employed. Other cameras, in most instances, employ the between-the-lens shutter, while the Graflex uses a focal plane shutter permitting a much greater range of exposures. Its many shutter speeds from time on up to 1/1000 second make it an ideal instrument for portraiture and speed work on the outside. Withal, it is one of the most versatile cameras other than the Speed Graphic, which is principally designed for news, outside work, and flash shots, although it can be used just as well for portrait work. Neither type, as far as that goes, is designed principally for portraiture as are the regular professional portrait cameras.

Another advantage presented by the Graflex or the Speed Graphic is the fact that it is focusable for various distances, including extreme close-ups. In other words, a Graflex such as model "D" has a bellows extension that will take care of a fairly long focal length lens. This is one of the factors that must be taken into consideration in making a choice of a camera to be used principally for portraiture. Ordinary box or folding cameras have lenses of such short focal length that head and shoulder portraits are not possible. This is due to the fact that the closer to the subject the camera is worked, the further the lens must come out from the film to maintain focus. Cameras of the hand type, or ordinary box or folding cameras, have lenses of such short focal length that when worked at the closest possible distance (which may be as close as 2 feet) the head of the subject will still appear relatively small on the negative.

Two methods remain to those unable to buy a camera with a longer bellows extension. One, the camera can be worked at a distance from the subject that will not introduce too much distortion or false perspective. Necessarily, a negative will be produced that will show much more of the subject than just head and shoulders. In most cases even the knees and other objects, usually undesirable in a good portrait, will show. An enlargement will then have to be made many times greater than would have been necessary if the negative had been correctly proportioned in the first place. The disadvantages in portraiture of this method would include retouching difficulties and several other inconvenient factors. There is not much point in using a negative of 21/4 x 31/4 size if the actual area in the negative utilized may be only that of 35mm. However, fairly good results can be obtained.
SIMPLE PORTRATURE

The other method most frequently used is that of using one of the many kinds of portrait attachments. This is simply a secondary lens that is slipped on the front of the lens on the camera. This will increase the focal length of the lens on which it is used and will avoid working too close to the subject, insuring a somewhat better perspective. The manufacturers include specifications, giving distances at which to work cameras which are not visually focused.

LENS

While using the simpler forms of equipment there is not much use in giving a great deal of consideration to the lens, but after progressing to the more expensive types of equipment, a lens will naturally become a major consideration. The finest camera will be of little value if it is equipped with a cheap lens of the wrong type.

Let's discuss for a moment the relative importance of the speed of a lens. A lens of high speed is sometimes convenient in photography but is by no means a necessity. In fact, most professional portrait photographers seldom use their lenses at maximum apertures or speeds. In baby photography, where rapid movement of the subject must be taken into consideration and the shutter speeds must be fast enough to stop such action, a fast lens is sometimes of definite value. Even this statement has to be made with certain reservations. For instance, a fast lens used at its maximum aperture in order to utilize all its speed has a very shallow depth of field and will allow little movement of the subject backward or forward.

Certain salient features should be considered in the choice of a lens, however, that are more important than the consideration of speed. First—the make of the lens. It is best to stick to the lenses of known reputation such as Wollensak or Eastman Kodak, made for portraiture. Do not, however, choose one of the lenses put out for portrait exclusively with a diffusing element or attachment on the front. Buy a regular portrait lens and if any further diffusing is desired it can be obtained during enlarging or by attaching a separate disc to the lens.

Next (and this is definitely necessary if any degree of working ease and success is to be attained) get a lens of the proper focal length. Most lenses found on cameras that have been used for general purposes will not be satisfactory. There is no lens that can be used for all purposes and the shortcoming of the usual lens on the smaller cameras is its short focal length, introducing the disadvantage of improper or unnatural perspective if close-ups are desired. A good illustration of this is the fact that if we stand at a certain distance from a tree we may perceive both its height and its width and even see behind it, so to speak. The closer we get, the more exaggerated its height and width become until finally we can see neither the top nor around its side. To some extent this is true in portraiture. Suppose we have a subject with an exceptionally large nose. If we have to work very close to such a subject in order to get a headsize in proportion to the size negative we are using, we are going to further emphasize the size of the nose. It is possible to work further back and get a smaller image and enlarge it to the correct proportions. But, as we mentioned before, why nullify the size or capacity of your film and further hamper yourself by having to do possible retouching and then have to make larger blow-ups in which such hand work will be all too apparent? The only alternative, unless one resorts to a supplementary lens or portrait attachment, is to buy a lens of the proper focal length.

Other aspects must be considered in the choice of a lens depending on the intended uses. Color photography brings into consideration the correction of a lens. Inexpensive lenses, especially older makes, are the least corrected for the various aberrations, such as color aberration. These aberrations are many and varied but most of them aren't important in ordinary portrait photography. Spherical aberration, as in the old rapid rectilinear lenses, which distorts the linear perspective or straight lines in a photograph, has quite a disturbing effect in architectural photography but is not noticeable in portraits. These lenses, though, are slow and if color photography is contemplated they are of no use because they are not corrected for color and will give color aberration. Color aberration means...
that the various color radiations or various wavelengths of light are not brought to focus on the same plane, causing an out-of-focus or blurry effect in color transparencies. This is not as true in black and white photography so a color-corrected lens will not always be necessary in portraiture. As far as that goes, most of the good anastigmatic lenses are sufficiently corrected for color to produce good transparencies.

The following rules, if adhered to in the purchase of a lens, should insure getting a good, workable lens.

1. Purchase a lens made by a reliable manufacturer designed principally for portraiture.
2. Do not buy a lens with the primary objective of getting all the speed possible, as this will cost you more and frequently offer you less.
3. Get a lens of the proper focal length for the size film you are using. If you are using a 2½ x 3½ size film, anything from a 5-inch to a 10-inch focal length can be used. An 8-inch lens at 6 feet from the subject will produce an approximately correct head and shoulder image on a 2½ x 3½ film.
4. Be sure your lens is of a fairly late type and not one of the old types, such as the rapid rectilinear.
5. Do not spend too much money for a lens that is supposed to have none of the aberrations.
6. Do not buy a lens of very soft or diffused focus.
7. Be sure that your camera has the proper bellows extension for the particular focal length of the lens you purchase.
8. Consult your dealer on all points.

SHUTTERS

Shutters fit into three classifications—between-the-lens, behind-the-lens, and focal plane. Between-the-lens shutters comprise all those shutters that are built into the lens, between the front and rear elements of the lens. The shutter is made of metal blades shaped to form an iris and they are operated by a mechanism which opens and closes them at a pre-set rate of speed.

The focal plane shutter operates in the focal plane, immediately over the film. It is sometimes referred to as a curtain shutter because of the fact that it is really a series of various sized slits or openings in an opaque cloth or metal curtain which is operated by spring tension across the face of the film. The size of the opening and the rate at which it is passed across the face of the film determine the time or amount of exposure. Focal plane shutters usually operate at greater and higher speeds than between-the-lens shutters or behind-the-lens shutters and can be procured only on certain special cameras, such as the Graflex and the Speed Graphic.

One other shutter widely used by professional photographers is the behind-the-lens or Packard shutter. It is composed of blades or wings which are activated by a compression mechanism and may be operated at "time," or so-called instantaneous (which is about 1/15 second). Its chief advantage is its ease of operation, as it does not have to be reset after each exposure. It is opened by a slight pressure of the hand on the rubber bulb and remains open until the bulb is depressed and suction created by capping the opening in the bulb with the thumb. This shutter is comparatively cheap and can be installed and replaced quickly; however, having only two speeds, it does not offer the many advantages of a between-the-lens shutter. It is the most logical choice, though, if a shutter is not incorporated in the lens or camera.

FOCUSING

Now, we have our camera, lights, background, and a suitable lens. We have chosen our shutter, in case it isn't included in the lens. Before proceeding with the first shot, let's take into consideration an operation that is seldom considered from a technical standpoint, yet one that is very vital—focusing. Focusing a camera is not merely a matter of getting the image sharp. A portrait image can be focused sharply and still be incorrectly focused. Correct focus is obtained by placing the focal depth of field in the proper position.

Let's consider for a moment just what is meant by the focal depth of field. Place a numbered card six feet in front of the camera, set your diaphragm on its widest opening,
FIG. 3. The focal depth of this portrait is wrong, throwing the near eye out of focus. Compare with Figure 4.

FIG. 4. The photographer has figured the depth of field correctly here, and all important features are in sharp focus.

and focus the card until the numbers appear sharp. Place another card in front of this slightly to the side so that the numbers of both can be seen. Move this card slowly toward the camera until the first signs of blurriness appear in the numbers. At this point it is on the front edge of the focal depth of field. Place a third card behind the middle card and move it to the position where the number begins to blur slightly as did the second card. Now, we have three cards one behind the other—the center one sharply focused and the other two showing very faint signs of blurriness. Measure the distance from the front card to the back card and you have your focal depth of field by actual measurement. This varies with different lenses of different construction and focal lengths. The diaphragm setting naturally affects the focal depth of field and is the most important function of the diaphragm other than its control of the amount of light permitted to pass through the lens at certain exposures. The depth of field increases as the diaphragm is cut down.

As stated before, correct focusing is accomplished by correctly placing the focal depth of field in relation to the subject. Consider Figures 1 and 2. In both cases the focal depth of field or plane in which all objects are in sharp focus is the same. However, in focusing the image in Figure 1, the focal field is from the nose to just behind the ear. All objects out of this field are blurry and indistinct, or out of focus. In Figure 1 the tip of the nose is very slightly blurred; the eyes, face, ear, neck, etc. are critically sharp, as they are well within the focal field. However, this is not the correct way to focus in portraiture. If the subject slumps a bit, the eyes are out of focus, and this will spoil the shot. The ears and neck will be so sharp that they will be detracting, whereas they should be slightly out of focus in order to give enough softness to be secondary in emphasis to the front portion of the face. Focused correctly, the focal plane assumes the position shown in Figure 2. Notice that the ear is out of the focal field and the neck is partially out. The emphasis, therefore, is on the front portion of the face. The front portion of the face and the eyes are in sharpest focus or in the center of the field. The subject may move either forward or
backward and still the eyes will remain in the focal field.

Now, the question arises as to the correct method of getting the focal field in the right position. This is easy. Suppose we are using the type of camera where the lens is stationary and the film position must be adjusted. In focusing with this camera when the film is moved more closely to the lens, thus shortening the bellows extension, the focal plane can be imagined as traveling forward. First throw your camera out of focus by racking the film carriage backward, or further away from the lens. Thus, the focal depth of field rests between the camera and the subject. Now, watch the subject closely while slowly racking forward. The nose suddenly will become sharp; therefore, you know that the nose, is on the edge of the focal plane. However the eyes are still not sharp, so we must continue racking forward until they are sharp. This is about the correct point to stop, as the ears and neck should not fall within the focal field. This can be done in the reverse manner, but is somewhat more difficult. By bringing the nose in focus first and then the eyes, it is comparatively simple.

In cameras focused by moving the lens, throw your subject out of focus by racking forward, then slowly bring the lens in closer to the film until correct focus is obtained.

Remembering this simple rule and the importance of the focal depth of field being in the right position, you will avoid shots such as that shown in Figure 3. Here the focal depth of field was just enough out of position to cause the eye nearest the camera to be blurred and indistinct. Compare the eyes here with those in Figure 4. Attention to this detail will save many wasted efforts.

LIGHTING

Now, we are ready to experiment on lighting. This should be thoroughly worked out before we go into posing. Otherwise, you will waste a lot of effort and effective poses by bad lighting technic. Lighting should be so thoroughly mastered that it becomes second nature, and the interpretation of your light, therefore, will not become too confused with the technic. Master the technic as far as the actual photographic process or results are concerned and later your lighting interpretations, or what you wish to convey in lighting, will not be muddled by too much attention to technical points.

The accompanying illustrations were made with a very simple lighting set-up, as previously outlined. The main light is a 16-inch Victor Reflector with a No. 2 Photoflood. An extension socket was used to bring the bulb out in the center of the reflector; otherwise, a spot occurs. This light is used to the right of the camera in most instances. A light is used to the left of the camera and is generally referred to as an auxiliary or knock-off light. This is used to supplement the main light, in other words, to fill in or lighten the shadows, serving to balance the main lighting. This auxiliary light is a 12-inch Victor Reflector with a No. 1 Photoflood. Both lights are covered with tracoline to avoid harsh shadows.

Variations of this method of lighting are frequent. One method employs the main light as an over-all flood. A smaller unit is used closer to the subject as a modeling light to produce the highlights and shadings, or so-called modeling. For our initiation to lighting we are using the simpler lighting set-up of the two. Most lighting effects are produced by using our main light to the right of the camera. Some variations on this are necessitated by certain poses. The secondary, or auxiliary, unit is used as a fill-in to lighten the shadows. These two lights will be referred to throughout as the main and auxiliary lights.

In conjunction with these two units, when necessary, a back light, or hair light, is used. In some cases this light may be called upon to do a little effect lighting by illuminating the side of the face to produce depth and roundness. As a rule, it is used on the hair alone to avoid lack of detail and to produce a certain amount of highlighting to accentuate the beauty of the hair. This may be any light unit that can be confined to a relatively small area. A spotlight is suitable, but care must be used to avoid "burning up" the areas lit with this light source. A spotlight is, in most cases, very concentrated and one will have a tendency to underestimate the photographic value of
such light. It may look beautiful on the subject or groundglass, yet in the negative or final print it will dominate the other lighting effects. Gray hair is usually the result produced when the desired effect would have been soft and modulated. If a spotlight is used, start with a low wattage bulb, or if using one of the types where the bulb can't be changed, diffuse it with a couple of thicknesses of tracing cloth. The back light, or hair light, in the accompanying illustrations was furnished by a small open reflector using a 250W clear bulb. This unit was not so expensive as a spotlight and produced good results. The only possible objection to using an open light of this type may arise from the fact that it is not so easily controlled from the standpoint of spill-over on facial areas as is the spotlight, and necessarily has to be used closer to the subject. In bust shots, however, this is not a disadvantage. Three lighting units as simple as these may appear insufficient, but the reverse is true. More lighting units would serve only to complicate the operation, and if the desired lighting effect can be obtained with one light unit, then use one. Why confuse yourself unnecessarily? The process of lighting should certainly begin with a minimum of light sources, adding only when absolutely necessary in order to achieve a desired result. Remember, superfluous light sources will give superfluous lighting effects, serving only to create a hodge-podge of lighting in the final result. Simplicity is the key to effective portraiture—both in lights and in lightings.

LIGHTING ILLUSTRATIONS

Portrait lightings fall into two primary classes—low key and high key. The word "key" is used to define the tonal range and effect of a portrait. High key designates a portrait where the tonal range is compressed into a very narrow range of very light tonal values showing no heavy masses of shadows but all tonal values are delicate and in a light shade. In other words, a high key portrait is one having tonal gradations but of a very subtle nature showing very little contrast. The delicacy of this lighting makes it suitable for women, particularly blondes and children.

Low key is the very opposite. The tonal values range from heavy dark masses of shadows through the intermediate tones to highlights. The tonal range in effect is very great. This lighting is most effective on shots of men portraying character and ruggedness.

For our lighting illustrations we are going to compromise between the two types of lighting. They will be neither high key nor low key. To begin with, we will make a shot with our main light source only immediately over the camera. Figure 5 was made with the main light unit immediately over the camera on Agfa Triple "S" cut film. It shows, perhaps, the simplest of lighting set-ups and is commonly referred to as "flat lighting." Note the lack of modeling about the nose and also the catch light in the center of the eye. A lighting such as this is not suitable for delineation of features. The breadth of the nose, for instance, is rather hard to determine since there is no shadow on either side and it is difficult to see just where the nose and cheek line meet. The distance from the base of the nose to the point where the cheek curves, however, can be determined, as the angle of reflection

FIG. 5. An example of flat lighting. Notice the lack of modeling around the nose and lips
FIG. 6. Harsh sidelighting characterizes this set-up, where the only light source comes from one side is different, thus producing some shadow. The roundness of the lips is not easily seen with a lighting such as this, nor is it easy to determine whether the eyes are deep-set or prominent. In some cases, though, this type lighting can be used effectively, in high keys and particularly in shots of children a flat lighting is not necessarily objectionable and where the one big catch light gives a brilliance and animation that is desirable.

In Figure 6 the main light is kept at approximately the same distance, but is moved straight around to the side of the subject, using no other light. Thus, only one side of the subject is illuminated by the main light. This is obviously incorrect.

Suppose we were to put our auxiliary light in the very same position in which we now have our main light—but directly opposite. The lights are straight across from each other with the subject between them. This also would give a more or less “flat lighting” with a little less on one side than on the other. Naturally no rendition of facial structure is possible with this type of lighting because the light units are at the extreme sides of the subject. The eyes would be in fairly heavy shadows with no catch lights.

FORTY-FIVE DEGREE LIGHTING

We will eliminate this lighting step and bring our main light toward the front of the subject, each light occupying the position shown in Figure 7. This is what is commonly known as a forty-five degree lighting, giving the effect shown in Figure 8. The main light is in a position to illuminate fully the left side of the subject’s face and also illuminate the right side of the subject’s face from the base of the nose to the curve of the cheek. The nose doesn’t throw a shadow on the subject’s right cheek but the light is worked in such a position that a shadow is evident from the bridge of the nose down on that side. A cap of light is thrown by the main light on the cheek opposite the light. One side of the nose is in shadow as previously stated, the shadow stopping where the nose structure stops on the cheek line. This gives a very accurate visual rendition of the size or depth of the nose from the bridge of the nose to the cheek line. The distance from the base of the nose to the curve of the cheek, as stated before, is accurately rendered by the cap of light thrown by the main light on the subject’s right cheek. The cap of light continues from the base of the nose to the curve of the cheek, stopping there, and from that point back to the ear there is slight shadow giving an accurate rendition of depth. The height of the main light is such that the nose casts a slight shadow to the edge of the mouth. This also gives a slight shadow where the lower lip curves, throws a

FIG. 7. Diagram of the 45-degree lighting set-up. For results, see Figure 8
SIMPLE PORTRATURE

slight shadow into the eye sockets, and a shadow under the chin.

The side or auxiliary light must be worked at just the right distance in order that sufficient shadow, but not too much, is evident on the subject's right cheek. Working the auxiliary light too close will flatten the lighting, not giving enough shadow to give a good rendition of depth. The height at which the main light is worked is very important. Too low and the lighting is flattened; too high and there is no light in the eyes—not enough to make them brilliant. Working the light too high will give the effect shown in Figure 9. Notice that the eyes look sunken and, to some extent, like holes in the head. The position of the main light is shown by the position of the shadow under the nose. The forehead here has also received more exposure than the lower part of the face.

Too low a position is equally bad. Figure 10 was made with the main light very low and in front of the camera. Notice the position of the catch lights in the eyes and the glary effect thus produced. Notice the two shadows on each side of the nose. Notice also the lack of roundness or depth. No division line is perceptible between the chin and the neck, making it difficult to tell where they separate. The lips are just a smear in a white expanse and, as a whole, this light position produces a most unsatisfactory effect.

VARYING THE SCHEME

The exact height at which a light is worked depends greatly on the features of the subject. Deep, sunken eyes will require a lower main light source. Bulging eyes will require a somewhat higher light source. A subject with thick lens glasses will require a very high light source, possibly somewhat to the side. On ordinary subjects a 45-degree lighting, such as the one shown in Figure 8, is correct.

To further clarify the use of the main light in relation to the subject or the pose, let's reverse the position of the subject to that shown in Figure 11. The shoulders are turned just the other way but the head is turned back toward the main light so that the nose is in the direction of the position usually occupied by the main light. The subject, in other words, is turned to the right but the head is looking to the left. Instead of illuminating this as we did in
FIG. 9. If the main source of illumination is too high in relation to the subject, the eyes will tend to have an unpleasant sunken look and the forehead will receive more exposure than the features of the lower part of the face. This will tend to make the chin and mouth seem smaller.

FIG. 10. When the main source of light is too low, an effect takes place which is quite opposite to that shown in Figure 9. The result is a staring eye effect and a general all-over lack of delineation. This type of low lighting is reserved for special effects where a mysterious mood is desired.

FIG. 11. When compared with Figure 8, it will be seen that here the main and auxiliary lights have been changed—that the main light is on the right cheek this time, resulting in a flat lighting scheme.

FIG. 12. This is the exact reverse of the Figure 8 pose, and the results are a good deal better than the halfway effects achieved in Figure 11. An idea of depth and roundness has been achieved.
Figure 8, let's reverse the position of the two lights, putting the main light to the left of the camera and the auxiliary light to the right. The main light is then in a position to illuminate the right side of the subject's face which is turned rather full into the camera. This produces a very flat lighting on that portion of the face. In other words, the lighting is of the same over-all intensity, showing no shadows, highlights, or gradations. This has very obvious disadvantages. Look at this illustration and try to determine where the base of the nose meets the cheek line. The shadow on the opposite side shows, to some extent, the structure of the nose, but if the shadow had been reversed and on the side of the nose or face exposed to the camera, better visual rendition of the nose structure, the contour of the cheek, and the breadth or width of the face would have been given. Notice also the neckline. The large neck tendon or leader is exposed to the main light source and so the majority of the neck, causing the leader to be accentuated and the neck to appear broad or thick.

Now, let's reverse the positions to approximately that used in Figure 8, putting the main light back on the right side of the camera and the fill-in light back on the left. Notice the difference as shown in Figure 12. The neck looks thinner because of the shadow thrown on it by the main light and the leader is not at all prominent. Notice how definitely the base of the nose stands out from the cheek line giving a very good visual rendition of the nose structure. The most important phase of this lighting to observe is the white cap of light or highlight extending from the base of the nose to the side of the cheek where it curves abruptly back toward the ear, thus giving an accurate rendition of the width of the cheek. This highlight stops abruptly where the curve of the cheek begins. The small subdued highlight begins with the shadow and continues back toward the ear. This, combined with the shadow at the curve and the definite white cap of light on the cheek, gives quite a pronounced feeling of width and depth. Now, notice how the shadow thrown by the nose from the main light continues to the edge of the lip and notice, too, how the structure of the chin and its separation from the neckline is very accurately portrayed by the slight curving shadow at the bottom of the chin. Lighting of this type followed through, regardless of the pose, will give a fairly accurate photographic rendition of the facial structure of the subject. But it is plain that your lighting will depend, at least to some extent, on the pose.

It is not intended to convey the thought that the lighting must be such that the structure of the face is accurately rendered, as some very beautiful portraits are made

![Figure 13](image-url)

FIG. 13. Backlighting has been overdone and the light has "spilled over" onto the right cheek

that convey very little of the width or breadth of a person's features. This lighting, however, should be reserved for more advanced work and falls into the realm of interpretive photography. Your average subject will prefer a good, clean, structurally correct lighting. In the previously mentioned flat lighting, as in Figure 11, no idea of depth, roundness, or width is given, and that type of lighting can hardly be called good from any standpoint—interpretive, literal, or surrealistic, if you wish.

**THE BACK LIGHT**

Now, let's consider the back light, or the light that is used to illuminate the hair.
FIG. 14. Improved backlighting. Notice that the spotlight has accented the hair and forehead, but has not cast shadows on the cheek.

This light can very easily be over-played as is shown in Figure 13. Here the back light, instead of being used to illuminate the hair, has been worked too far forward and has spilled over on the side of the face, striking the end of the nose and leaving a deep shadow in the eye socket. This produces an illusion of deformity on the lower cheek line and causes the nose to be broadened out on one side. One eye has the appearance of being very deep set, whereas the left eye seems to protrude. The shadow in the eye socket is also objectionable, giving the appearance of a black eye.

Figure 14 shows a better type of lighting for this particular shot. Notice the spotlight is still on the subject's hair, a wee bit on her forehead, but none spilling over. The lighting here could be termed slightly flat but is not distracting. One eye is at least given as much emphasis as the other. The cheek is not butchered with an inter-play of light and harsh shadows. Notice in Figure 14 that the main light is worked from the right side of the camera rather than the left, although the shoulders are turned to the left of the camera. If the subject's head had been turned more to her right, it would have been necessary to move the main light to the left of the camera to avoid giving a flat lighting on the fullest part of her face but, due to the fact that neither side of her face is emphasized in the pose, the light is about as good from one side as it is from the other.

THE CATCH LIGHT

One thing to be watched in all lighting is the position of the catch light in the eye. It should always be thrown by the main light, therefore coming in the area of the eye nearer the main light. The main light coming from one direction and the catch light coming from another is rather distracting.

This also brings up the discussion of whether or not two catch lights should be in the eye. Normally, when you look at a person there are three or four catch lights in their eyes. It is not abnormal to show this in a portrait, nor is it necessarily distracting. Too many, of course, will divide the attention and one serves to center the attention. Usually two should be the limit and, in most cases, one brilliant catch light would be enough. Catch lights are more easily removed in the negative or print than in the lighting. Whether you use one catch light or two may depend on the mood you wish to convey in your portrait. One dominating catch light would best portray a stern-visaged man with an intent expression. A portrait of a vivacious young girl may be better with a sparkle lent by two or perhaps three catch lights, if not too large, as in Figure 15. The fact that too many catch lights from various directions is not good is a point in favor of a simple lighting set-up.

GENERAL POINTERS

Now, we have established a fairly correct method of lighting covered by the following rules: The main light must be in such a position that it illuminates one side of the face fully, shining across the nose and leaving the side of the nose opposite the main light in partial shadow, but striking the opposite cheek just at the base of the nose, giving a brilliant cap light on the opposite cheek. The auxiliary light should be placed fairly close in to the camera so that it does not throw cross shadows and is just for the purpose of illuminating some of
the shadows thrown by the main light that would otherwise be too pronounced or dark. The height at which the main light is worked should be such that a downward shadow is cast by the nose toward the corner of the mouth. This height will depend, to some extent, on the features of the subject, the eyes, etc. It should never be in such a position that only oblique shadows are thrown. The position of lights in relation to the subject will depend on the pose. The back light should not be allowed to spill over indiscriminately.

The preceding pointers on lighting should be sufficient for preliminary work on head and shoulder shots. One should follow a simple plan such as that outlined and avoid any attempts at the dramatic until thoroughly conversant with cause and effect in lighting. Learn first to produce a negative of correct printing density and correctly modulated highlights and shadows with a certain amount of system in the manner in which they are produced, and leave the pyrotechnics for more advanced stages.

POsing

Since we have learned a system of lighting, the next step is to establish a few rules in posing—or should we say correct positions for the subject? This more correctly describes our preliminary work. Later when one wishes to attempt the dramatic in lighting and is able to do so with some success, posing will become the vehicle for the drama in your lighting. At present let’s be content to call them positions.

Figure 16 shows probably the simplest of positions. Here there has been no attempt at properly placing the subject. The position is perhaps as static or lacking in movement as any position could be. The shoulders form a straight line across the bottom of the picture. The subject is placed squarely in the center facing squarely toward the camera and the position must necessarily remain static. The position of the image in the final print must remain centered, as any other placement of the image simply causes unbalance. This type of pose is most often used for purely record portraits—for passports and passes. If correctly handled, the pose may result in a good straightforward likeness.

The shoulders fill the base of the picture and the neck looks too broad when the subject is placed in this position. By referring to Figure 8 we can see the correct position of the shoulders. The shoulders are placed so that they do not entirely fill the base of the picture; thus this area is not so entirely

FIG. 15. Catchlights in the eyes will lend spontaneity to a photograph, but they must definitely be kept under control.
17. This pose has a very uncomfortable and therefore unnatural look because of the exaggerated angle of the shoulders and the tilt of the head. A general lack of balance is the result, making a picture of unsatisfactory composition and unflattering to the subject as a whole.

18. Here is an absolutely straight pose, with very little feeling for the best interpretation of the subject's best expression.

This would have been a satisfactory portrait from the point of view of pose if the composition had not been upset by a disconcerting direction of the eyes. The effect is unnatural because a person does not normally look out of the corners of his eyes in this manner.

Previously we mentioned that Figure 16 was static. Any portrait balanced in the middle of the picture space is likely to be static or lacking in movement. To convey movement the image must be so placed that it does not conform too strictly to the boundaries of the photograph. By the opposition and relation of the border lines of the picture to the lines of the image, composition and movement are gained.

Another example of bad position is shown in Figure 17, practically the same pose as Figure 16 with badly posed shoulders, too high a camera angle, and the head tilted in the wrong direction. This composition is out of proportion to the area occupied by the head. The neck is less pronounced and the subject has a slight inward tilt into the picture space giving an idea of movement. There is enough of the subject's opposite or left shoulder showing to keep from giving the impression of an armless person, as so many shots of this type do when a shoulder is sticking out of the picture space with the arm drawn back.
FIG. 19. Here is another case of bad eye direction, similar to the one shown in Figure 18. In this portrait, with the head turned to the subject's left, the eyes should have been turned in that direction too. If the eyes stay on the camera lens, then the head should have been moved.

FIG. 20. In this portrait, the camera angle in relation to the subject is too high, making the forehead—as a result—unpleasantly large in proportion to the rest of the face. A fore-shortening effect is achieved which is not flattering to the normal face, though sometimes used for certain effects.

Another basic mistake is easily made in a shot such as shown in Figure 18. The shoulders are posed correctly, the face is in approximately the right position, but the eyes totally upset the composition. Too many cameramen, after centering the image in the groundglass and focusing correctly, will move over to one side, throwing the subject's eyes off and getting something totally unrelated to what they would see if they looked again in their groundglass before making the shot. This is true not only in the case of the position of the eyes as shown here, but in any pose. Do not fail to remember that the photograph is made from the angle of the lens and that it is difficult to judge just how this is going to look from any static, although the shoulders are more correctly placed than in Figure 16. The height of the camera gives a slope to the subject's right shoulder that gives an impression of deformity. Notice the left shoulder. Here we gain the impression that the subject is armless. Compare the shoulders, the position of the head, etc., with those in Illustration 3.

FIG. 21. Compare this picture, taken from too low an angle, with Figure 20. Notice that here the jaw has been given undue emphasis.
other angle. In getting the correct eye direc-
tion in your sitter, keep in mind the fact
that a person normally does not turn his
face straight toward the object to which his
attention is called, but only partially so, and
the eyes always go a bit further than the
angle of the head in order to look at the
object. This is important to remember, as
otherwise the eyes will be detached from
the position. The direction of the eyes, in
other words, is supposed to be comple-
mentary to the position. Figure 19 shows
a case where the head has been turned
in one direction and
the eyes back toward
the camera. This
gives a rather unnat-
ural angle to the
eyes in relation to
the angle of the face.
Refer to Figure 12
which shows how the
eyes should have
been in this particu-
lar pose.

It is not intended
to convey the im-
pression that the eyes
always have to be
strictly related or in
natural relation to
the pose. To portrav
serious moods such
as coquetry, bash-
liness, or perhaps a
me-hither-look in
the young lady’s portrait, the eyes may
deliberately thrown off from the angle
of the head, but this again falls into the
field of interpretive photography which is
best to try later after becoming thoroughly
acquainted with the more fundamental
cases. Portrait photography is, of course,
interpretative to a certain extent. But your
model should not be “acting a part.” Simple
smiling or serious eyes will be expressive
even for the average portrait.
Here it would be well to consider for a bit
the importance of the angle of the camera
on the subject. Two shots are shown—Figures 20 and 21. Figure 20 shows a
high camera angle—much higher than the
subject, causing the top of the head to look
big, the chin to look small, and the subject
somewhat top heavy. The chin is silhouetted
against the neck. In Figure 21 the chin and
lower portion of the face look larger and
the chin is not silhouetted against the neck,
but the area under the chin is clearly shown.
In Figure 21 the nostril openings are promi-
nent, and in Figure 20 you see no nostril
openings. Also notice the difference in the
shoulder effect pro-
duced by the two
angles.

ANGLE
A few principles
should be remem-
bered in the choice of
camera angle. In us-
ing a camera other
than at a natural
angle, there must be
a purpose, such as
using a low angle to
minimize a very long
hooked nose or a
high angle for a pug
nose. A high camera
angle would silhou-
ette a hooked nose
against the upper lip,
accentuating its
length, and a low
angle would naturally
further emphasize
a pug nose. Other
facial characteristics
can be minimized or altered in this manner.
No rule can be established for camera angles
other than this one admonition—in everyday
life we seldom look at a person when talking
to him from a position five or six feet above
him or with our head on the rug while he sits
in a chair. A natural angle is usually best,
giving the most natural results. So when in
doubt, the normal position can be chosen.

Much can be done with variation in angle,
and a subtle use of these variations will often
help. From the purely psychological point of
view, for instance, the low angle suggests
power or even hauteur. The high angle tends
to make the subject diminutive.
SIMPLE PORTRAITURE

THE SUBJECT

Having established a working basis for lighting and posing, consideration should be given the subject as an individual and the interpretation of his individuality or characteristics into photographic terms.

It is possible to be too literal in our approach and interpretation of the subject, especially so with women. The photographer should use his imagination and do a little glamorizing. The subject’s clothes, hair, make-up, etc., should all be considered and possible changes made. Interpretive posing and composition then enter the picture and when these things are accomplished, the camera and lights must become instruments of interpretation as well as the tools to achieve the final result.

The difference between the literal and interpretive approach to a subject is illustrated in Figures 22, 23, and 24. The subject in Figure 22 has received just enough consideration to make a straight shot. No changes in hair or make-up, listless pose, camera angle literal or prosaic—no imagination has entered into the making of this shot. Contrast this with Figure 23 of the same subject, after the proper make-up, pose, lighting, and a certain amount of camera angle dramatization have been applied. This same interpretive approach to a subject was used in the shot of the man (Figure 24).

CONCLUSION

Portrait photography should never be approached on too literal a basis, nor should we attempt to be too interpretive until we have a fair mastery of its mechanical and literal phases. The camera and its manipulation should become second nature, thus insuring a minimum amount of wasted time. Mechanical arrangements should always be of secondary consideration—the subject primary. Many portrait photographers forget this and become so embroiled in special effects and in the capabilities of a new lens of light unit that they hardly have a chance to study the really important matter at hand—the subject. On the other hand there is the other extreme—the photographer who has so simplified and standardized his technic that all portraits tend to look alike.
The actual technic or interpretive approach to the subject will naturally depend on the subject. As we mentioned previously, a low key lighting is seldom employed on a woman unless she is a very decided brunette type. A lighting showing delicate tonal gradations will serve to effeminize the subject. A lighting having heavy dark masses of shadow placed effectively and lighting with a long range of tonal scales will most effectively portray a man, serving to emphasize masculinity and ruggedness. The camera angle, as we have previously mentioned, may be expressive or interpretive.

The exciting thing about portraiture is that there are no hard and fast rules. It is important, though, to have a working basis founded on experience—and then variations from this can come with each new subject and problem. Delicate tonal shades in lighting, the sprightliness or subtle nuance of a pose, the beauty and temper of an expression, are notes that blend to produce the harmony of a beautiful portrait.

ANALYSIS of . . . JOHN GREENLEAF WHITTIER

Mathew Brady's portrait of the New England poet makes the most of photography's expressive capabilities. With remarkably fine definition, considering mid-nineteenth century film and lens, the photographer draws the eye to the center of attention, namely the personality of the sitter as expressed in Whittier's face. Here we may see the friend of William Lloyd Garrison, the supporter of abolitionism, and the advocate of labor, a trinity of New England humanitarianism. Wrinkles of old age enhance the implied character, as do abundant though prim whiskers. Pattern of the floor—in focus at hand, out of focus farther away—plus draped table laden with Harper's Universal Gazetteer, supply a material environment which the figure of Whittier dominates.

Relying on the simple esthetic convention of his period, that the human element is the prime consideration in portraiture, Brady posed his subject in a natural attitude, balancing fullness of detail in foreground with empty space in background. Whether consciously or intuitively, he has also made full use of the photographic capacity for rendering textures, posing the highlight on Whittier's congress boots against the dull surface of his suit. If this is not an action shot, as it certainly is not, nevertheless it has the quality of candor which we seek in the portrait, the sense of revelation of humanity which is engrossing because the depths of human character are always infinitely various. One might add that the masters of the "primitive" phase of photography, Brady, Hill, Nadar, and Julia Cameron, set a mark which present-day portraitists of the camera would do well to aim at.

Elizabeth McCausland
JOHN GREENLEAF WHITTIER

From the Signal Corps collection of original Brady negatives in The National Archives
In the photograph above, smoke is pouring from three large buildings of the Renault Works at Le Mans. Taken during the attack of March 9, 1943 by Mosquito bombers. In the center is a reconnaissance picture of the same buildings, showing damage. And below is a British photograph of damage done to a Paris tank factory and nearby gas tank.
WARTIME PORTRAITS

Above left: Sapper John McKay, whose job it was to lay and lift thousands of mines for the British 8th Army during the desert offensive. Above right: Air Raid Warden Henry Burrows, aged 60 years, who saw duty in the London blitz and is still serving. Below left: Merchant Seaman Thomas Blunden, who has been at sea for 41 years. Below right: Jimmy West of London, who is helping to convert blitzed city areas into cultivated allotments. Close-up portraits like these speak volumes in terms of a people at war.
When American soldiers visited Harlesden, London, they were invited by the mayor to a special showing of an American movie. Among their guard of honor was an earnest British lad, marching along with his typically dirty boyish legs in perfect step. Here is wartime human interest, showing how pictures of people can represent whole groups and sometimes entire nations.
This portrait of an English statesman was taken with a simple photoflood set-up. And instead of omitting or subduing the effect of the glasses, here they have become a major part of the portrait—a gratifying change. The picture becomes, by its choice of emphasis and composition, not so much a portrait of features as of thoughts.
SIEGE OF STALINGRAD

The two scenes at the left were taken from a captured German propaganda film, showing the destruction of Stalingrad and its environs. At the right are two scenes from a Russian film showing the surrender of German troops at Stalingrad. Newsreels as well as stills have done much in this war to bring home the meaning of war in terms of people—in their homes and at the battle front.

STALINGRAD (page opposite)

Made during the vicious bombardment of Stalingrad by the Germans, this picture reached the United States through neutral sources. The heavy cloud of black smoke provides a wartime backdrop to the whole scene—making a dramatic picture of a dramatic event.
INFORMAL PICTURES OF PEOPLE

Samuel Grierson
Secretary-Treasurer, Pictorial Photographers of America; Author of Outdoor Photography; Photographer, Vocolium, Inc., New York City

Pictures of people can be fascinating and fun to take and any photographer who wants to improve on the casual snapshot technic will find this an interesting article. The home and local small town or big city subjects can be captured on film to make the family album really a joy to look at. And so here is advice on how to picture children and adults in their everyday lives.

A FAMOUS PHOTOGRAPHER once said that a photograph, such as a landscape, a marine or street scene, in which no human being was shown was to be compared to a beautiful stage setting in the theater without actors.

The world is filled with people and they are interesting and do interesting things. Include these people in your photographs whenever possible and fitting. We of the human race are an inquisitive lot. We like to see what the other fellow is about. We carry this trait into our appreciation of pictures. Thus, those shots depicting other people doing things are quite apt to interest us the most. Assuming that the technical work is perfect, photographs with people in them are very likely to gain popular favor.

The outstanding popularity of the illustrated news magazines, such as Life, Look, Pic, and others, is due to the fact that their editors and owners realize that people make news. One rarely finds a beautiful landscape or a well done still life reproduced in the pages of these publications and when one does find such a picture, there is a definite reason for its inclusion.

The amateur photographer might do well to copy the style used in the photographs

ANALYSIS of . . . HANDS

The title of this photograph can easily lead to false expectations, since the light and shadow treatment is not favorable enough to give a careful modeling which would show hands in their functional beauty or give a clear demonstration of their anatomy. The photographic result does not put this print into the category of sharp-focus objectivity nor does its more or less soft treatment of details mark it as a "pictorialist" achievement. It also misses as a composition of silhouettes, although some masses of shadows are compact, heavy, and without benefit of detail gradation.

The actual objects in front of the camera were a man and his animal plowing a field. The man behind the camera was in this case not interested in this particular man and his individual animal, nor in this special plow. He wanted to express the "idea" of plowing as a fruitful life-producing and life-sustaining work. He did not attempt to illustrate this idea by showing the whole multitude of facts and details of the complete scene or group. He demonstrates in an unmistakable way his intentions and his rare ability to think in terms of essentials. Two hands. One holding reins, just enough of them to suggest that an animal is being directed. There is no animal in the picture nor is there a face or figure of the plowing man showing. Of the plow we see merely the handle plus the immediately adjoining sections. In the distance is an indication of the soil, growing plants, and air somewhat cloudy. The plants again are not individually recognizable. They could be reeds, grasses, or grain. They are out of focus and thereby reduce themselves to a movement of growth.

The composition arranges most of the dark masses into a simple picture-plane pattern seen against a soft spatial background. The left and the lower parts show a strong respect for the presence of the frame. The upper border is much less prominent, whereas the right-hand border line seems completely ignored so as not to stop the movement of the whole theme which leads towards the right beyond the limit of the picture. The light areas cut by the dark parts are simply and carefully divided without creating a feeling of cold abstraction which, in this case, might contradict the living warmth of the scene. The desire to say much with a minimum of means is always a sign of strength.

Leo Katz
The complete photographer

Photo-journalism and the picture magazine have had a great influence on the technic of photographing people and their approach can be carried over into pictures of friends and relatives in the home. This informal home portrait of Helen MacInnes, authoress, was taken for a picture magazine and it shows the new technic of intimate informality.

Photo, K. W. Herrmann

Illustrating the news magazines. One will note that the pictures are well done, that the important part of each picture is sharp and clearly recognizable, and that each picture tells its story without confusion. In the case of a series of pictures, the complete series also tells the story without confusion. In taking the most casual snapshots the amateur should follow this technic and keep these news illustrations in mind. If this is done, the amateur will soon find out that his friends and relatives will ask to see his snapshot album rather than consider looking through its pages a task.

Advancing from the snapshot to those pictures that are to be seen on the salon walls, that win prizes in contests and competitions, and that appear in the pages of the photographic magazines, the idea of including people in the picture means success in these fields. Here the technic differs in that the human figure is not of necessity the important point in the picture but is used in a decorative sort of way, such as the focal point of the composition, or to create an atmosphere of reality. A Mexicanpeon sitting in the sun would, for example, give more local atmosphere to the picture of a Mexican landscape than merely the landscape minus the peon.

In this type of work it is well to have your people fit your subject. For instance, an Eskimo in costume, rowing in Central Park, New York, would be nothing more than an oddity or a comedy picture, whereas the same Eskimo in his native land beside his igloo could be an authentic masterpiece. A well done picture of Times Square
showing a nude figure, gracefully posed and prominently placed in the scene would be ridiculous, even if it were possible to take. On the other hand, the same nude figure, gracefully posed in a quiet woodland dell could easily be a work of art.

It might be well for the photographer to make a study of faces even at times when his camera is not at hand and he is not making pictures. Watch the faces of the people as you ride in a street car or bus. In doing this you will discover some interesting things about your fellow man. A person whose facial expression is absolutely blank may be seated opposite you. Suddenly, and for no apparent reason, his face lights up and there is an entirely different expression to be seen. Of course there is a reason for this change in expression but the photographer is not so much concerned with causes as he is with facts, and the facts are that many expressions are to be found in a human face. Knowing this, the photographer should work to get the expression suitable to the mood of the picture he is making at the time he makes his exposure.

While we may have no reason to picture everyone we photograph as sad or serious, we certainly do not wish to have all of our subjects grinning like apes. There is a happy compromise. In making formal and informal portraits, for instance, an excellent formula for securing a pleasant smile, rather than a silly grin has been made available to photographers in general by John Adam Knight in his New York Post column on photography. Mr. Knight writes that if the sitter utters the word "cheese" at the instant of exposure a very pleasant expression will result. This is a fact. Try it yourself in front of a mirror. The facial muscles used to say the word "cheese" convert the mouth, lips and teeth into a very pleasing position.

SUBJECT MATTER IN THE HOME

And now for subject matter! Worthwhile subjects are all about us no matter where we live. The trouble is that we are apt to overlook the commonplace—the distant fields look fairer. There are pictures to be found in and about the home, on the farm, in the small town, and in the large city. Let us touch upon some of these possibilities now.

We shall start with the home, for here we have our family—those we love the most. Surely this is the place for our best photography. Why? Because good pictures made at our own firesides, so to speak, will be precious to us in years to come. Today our brothers and sisters, our fathers and mothers are here together under one roof. Ten years from now there will be a change. Children will be grown up. Certain members of the household, unfortunately, will have passed away, while still others will have moved to distant places. Through the medium of our photography we can preserve for the future, happy reminders of the present. Forget the formal portrait for the time being. Instead make a picture of Dad in his easy chair. Do not make him dress in his Sunday best. Have him comfortable—smoking his pipe, perhaps, or reading his evening paper. In this type of work, which is really informal portraiture, do not get your subject nervous or uneasy by fussing too long in the placing of your lights and

This fine portrait was taken at home, while the dishes were being washed, and it proves that there isn't much necessity in posing people while using the miniature camera. DATA: Ikoflex III, fast pan film, f/6.3, 1/50 second. Photo, Peter Stackpole
it should be simple. Have one light brighter than the others and place this near the camera but a little to one side of it. Have this light raised slightly higher than the sitter but directed at the sitter. A weaker light or a reflector can be placed so as to throw some light into the darker areas on the shadow side of the face.

Daylight combined with flash gives interesting results. This is true for pictures made both indoors and out. In using flash indoors at night, make your subjects stand toward the center of the room instead of close to a wall. If they stand or sit close to a wall you are apt to get a heavy shadow on the wall, which is not always pleasing to the eye.

To the beginner it is well to point out the fact that it is not necessary to have the people you are picturing stand in the glaring sun and, worse still, facing it. Such a procedure will make your people look far from natural. Instead of such a grouping, have your people in a good light but out of the glare. Remember it is possible to point the camera in any direction in making a picture providing the direct rays of the sun do not fall upon the lens.

Some people tend to bring out the camera only for “occasions” and because of this many of the normal every-day pictures are neglected. Some events call for photography, though, and for these, the photographer can “cover” his event like a newsman.

If there is a party or a wedding in your home, do not neglect the opportunity of making a good pictorial record of the affair. You will enjoy looking at such pictures in years to come, and your enjoyment will be greater if the pictures are well done. The cameraman must work fast, as the merry-makers will not want the fun of the party
broken up for too long a time by picture making. Employ the technic of the news photographer. Use your flashgun attached to the camera, for here lights on stands will only be in the way. A nice picture story of any home social affair can be made without disrupting the party. In fact, the less the party is disrupted, the better the picture story will be. A few pointers on this sort of photography may not be amiss.

It is well to remember that, while one picture of the entire group may be fun to take, the pictures that everyone will like best of all will be of very small groups. Kate and George ducking for apples. Bill, the life of the party, sitting quietly in a corner, caught by the camera in an unguarded moment so to speak. The guest of honor cutting the birthday cake. These are the photographs that really capture the spirit of any party. On the other hand, do not make pictures of your guests that will tend to embarrass them at a later date.

Watch the background. Look beyond the people you are picturing and be sure that nothing is visible which will be jarring to the eye in the finished picture. This, by the way, is a good habit to get into for all types of photography. While party pictures are made in haste in the sense that the party is not to be held up, nevertheless the photographer keeps his head and should have a good idea of what he is about. Have the composition in mind before asking anyone to pose and do not ask anyone to pose if it is possible to secure the desired picture without this formality. It is a good idea to take more pictures than you may need so that you may be certain of having a good set when the party is over.
A trip to the zoo or local park will provide fascinating shots of children unconsciously enjoying themselves. Taken at the Children's Zoo of the Bronx Zoological Park in New York. Photo, Jerry Cooke.

CHILDREN

Children in pictures will give the photographer a set of interesting and joyful photographs and if he or she specializes in this sort of thing, fame and fortune may follow. Here we are not writing of child portraiture in the formal studio sense of the term, but of children in their schools and their homes and at play. The average amateur will have to content himself with the child away from school unless he has a special influence with the local Board of Education. However, a great deal of film can be used on the child away from school at play—or in seriousness, confronted with some childish problem.

The public playground is an excellent place to visit with a camera. Do not walk in and, by your manner or way of going about your photography, frighten and annoy the children. Take time, watch the games, talk to the boys and girls; in short, make a day of it and make friends. In this way the children will not jump into rigid positions when your camera is opened. Remember that four boys intently playing marbles make a better picture than four boys looking at the camera, interrupted in their game. Making friends with the children will give you the opportunity to snap their pictures without interrupting their games.

If you do picture four boys down on all fours, playing marbles, make it an angle shot looking down. A girl high on the swing is another good subject. Make this shot when the swing is at its highest point. At this point there is a slight pause of the swing before it starts its downward journey and this pause is an insurance against a blur in the picture. Of course, this subject, and similar subjects call for a fast exposure and nothing less than 1/100 second is recommended. This, and others of the type, would be angle shots, looking skyward. Don't get the girl on the swing and half of the playground all in one picture. The girl with the sky as the background and enough of the swing ropes showing to identify the swing should be your picture. Use a filter in this type of work. This will give a tone to the sky and make the picture hold together better.

Smaller children in the sandpile, intent upon their play, offer many subjects to the photographer. Very interesting pictures can be found where the shower baths are in operation and the boys and girls in bathing suits and makeshift bathing suits are having a grand time getting all wet and splashing one another. Be cautious at this spot. Don't get your camera or film wet.

Away from the playground, children still prove interesting as subject matter. The little girl on the telephone talking to her daddy in his office. We can't hear what she is saying and we don't really know that she is talking to her daddy, but proper lighting, correct facial expression, and a necessary title will convince us that she is talking to her daddy when we look at the picture. The young girl or boy busy with homework is also a factor in child life worth picturing. Two barefoot boys, fishing poles on their shoulders, walking down the country lane is another subject. Others could be groups of children on their way to school, a little girl skipping rope on the city street, a newsboy selling his papers, or, in fact, anything a child or youth might do.
INFORMAL PICTURES OF PEOPLE

SMALL TOWN PEOPLE
The photographer in a small town has so many interesting subjects to take that he is to be envied. It would be nice if this statement would put an end to the complaint of many country and small town photographers to the effect that nothing ever happens in the town worth photographing. The trouble...
is that these photographers have become too used to their towns and forget that what is commonplace to them is rare to others. The small town generally has the group at the country or town store. Some of the finest character study portraits imaginable can be made of the men of these groups. The hustle and bustle of Main Street on Saturday afternoon is something to photograph. The documentary style will always be interesting. Documentary photography is nothing more than a forthright record of the times in which we live.

There are two distinct branches of documentary photography. One portrays merely the conditions and buildings of the times, with no stress whatsoever on the people that go with the conditions and buildings. The second branch includes and emphasizes the people that go with these things. The second type will be discussed here.

Let us consider a sample subject. A gateman at a railroad crossing, lowering the gates by hand. If you come upon such a subject, be sure to capture it with your camera for this great American character is fast disappearing; electrical gates and grade crossings are spelling his doom. A picture of him on his job, will be both interesting and valuable within a short time.

That is the idea of documentary photography. You preserve for the future that which is commonplace today. Other suggested subjects would be the shoe-shine man in the street, the pushcart peddler, any small shopkeeper in front of, or inside his store, the hurdy-gurdy man, the street band.

In a sense, most family album photographs are documentary and it is not much of a step to go from showing “how we live” to “how our neighbors live.” By adopting an attitude which is impersonal and personal at one and the same time, we can see the lives of people around us and show it to others by means of the camera.

BIG TOWN PEOPLE

Because so many things are at hand for the small town photographer, let no one
Local workers make fine subjects for any cameraman and their pictures will fit right into a collection of informal pictures of everyday life. Here is a Minnesota farmer, photographed by The Farm Security Administration.

Photo, Vachon

conclude that the big city is barren of photographic possibilities. To merely scratch the surface, subjects that come to mind at once are two men in a heated discussion on a street corner, arms waving in the air; a lost child asking guidance from a policeman; a gay group of four young ladies walking down the avenue; a poorly dressed person admiring the display in the jeweler's window; a crowd watching something; homebound workers buying papers at the corner newsstand. These subjects and many others await your camera.

The photographer will want to take many of his city pictures without attracting attention to himself, especially the attention of those people whom he plans to include in his picture. By not attracting their attention, his finished picture will be natural and life-like. To accomplish this aim one must be patient. It is an excellent idea to stroll about with the camera open and set for the exposure, thus the opening of the camera will not advertise the fact that a picture is to be taken. The writer has often looked intently in a direction in which he had no intention of taking a picture and, with everything set, swung to the right or left at the precise moment and exposed for the desired picture. This trick generally works, for people assume that a picture is to be taken in the area toward which the lens of the camera is pointed. Those who get in front of a camera at every possible opportunity rush to the wrong spot, while those you wish to include pay no attention as they assume they are not being considered. The user of a reflex camera can work this trick even better, for he does not even have to make the half turn. To do this the operator of the reflex camera faces one direction but holds his camera so that it takes the picture to his side.

GENERAL POINTERS

A few general pointers on pictures of people might not be amiss, especially in connection with outdoor work. Use a tripod whenever possible. By using it you will be able to compose better, you will get sharper pictures, and, if the tripod is a good one, there will be no camera motion. Unless a definite angle shot is to be made, do not have your camera anything but level. When it is not level, buildings and other upright structures

Crowds are fascinating because each face means something in terms of both the individual and the mass.

Photo, Samuel Grierson
will seem to be falling over. Do not have your people standing in a direct line with flag poles, telegraph poles, or posts of any kind. If you do, these will seem to come right out of the tops of their heads in the finished picture. This can be avoided by looking beyond the subject—an excellent habit to cultivate.

Pictures taken before ten in the morning or after three in the afternoon, when the shadows are long and can be used as part of the composition, may turn out to be more pleasing than those taken at high noon or on overcast days.

Emphasize the subject you are picturing by including as little as possible of anything else. For example, if you are picturing a friend drinking a soda at a boardwalk soda fountain, do not include the entire length of the fountain, the cigar store next door, and the store next to that. Instead, get as close as possible so that only your friend and a bit of the counter will be included. Follow this principle in all of your photography and better pictures will be the result.

Pictures of people, in which the people can be recognized, cannot be sold for advertising illustration without a release from each and every person in the picture. For editorial illustration the rule is not so stringent, though some publications do request a release. If you plan to commercialize your photography, full information on releases can be had from a lawyer or from photographers' associations.

It might be well to suggest that people be photographed when they are happy or when they are about their business. When they are distressed or in trouble, put the camera away. Don't photograph a man being led off to jail. Unless there is a very definite purpose, don't photograph deformed people. Do not, under any circumstances, picture them when they are under the influence of liquor. Leave that sort of thing to news cameramen, whose business it is. We can be informal without being uncomplimentary. So-called candid photography is not the photography of people with their mouths open, but the picturing of people in a relaxed mood.

A TOUCH OF TECHNIC

In making pictures of people it is of prime importance that the photographer understand his camera. Do not jump to the conclusion that a good camera will produce good pictures merely because it is a good camera. A good camera will produce good
INFORMAL PICTURES OF PEOPLE

pictures only when the person using it knows just how to operate it and knows just what it will do. It makes little difference what type, make, or model camera you possess, but it is important that the camera be in working condition and that the operator know how to work it and what to expect from it. The best photographers in America make this point one of their basic principles and it is suggested that the reader do likewise. A good start in this direction is to read and digest the book of instructions that comes with every camera. Too often these books are thrown away unread. If you have done this, try to secure another copy from the manufacturer.

For pictures of people, use the type of film that you like the best. Be familiar with the film that you use. The writer has used the faster films for indoor work with any type of lighting and always the fastest films when using flashbulbs. For outdoor work, any good pan or ortho film has been found satisfactory.

In processing the film, stick to the developer that has given satisfaction in the past. If you are a beginner and have not yet found a developer that suits you in every way, sooner or later you will come upon a formula which will be your pet. Meanwhile it would be best to follow the developing recommendations given by the manufacturer of the film.

In all matters of technic, though, remember always that if you are too concerned with gamma, characteristic curves, and complex theory in general—this fact will reflect in your pictures. It is important to know about your hobby, naturally, but the photograph of a person which has no warm human feeling behind it is a cold thing, in spite of perfect technic.

MODERATION AND FUN

In picturing people, strive for moderation. Occasionally spectacular things may come your way and when they do take your camera out and make a picture. However, spectacular things are rare in life and, in photography, should never be forced. For example, a picture of little Mary coming out of the school house door, books under her arm, could be a very charming thing. On the other hand, should you go to the barnyard, drag out a reluctant lamb and lead it to the schoolhouse in order to picture Mary leaving the school with the lamb behind her, having the old nursery rhyme in mind of course, the resulting picture certainly would not be true to life and might be very, very silly. Too many such pictures will make your album a dreary thing.

Being silly in photography is one thing, but being happy in it is quite another. Have fun in your photography. Keep your camera a source of pleasure and happiness. This ideal can be realized if you remember that you are making pictures to please yourself. If someone you know admires a certain type of picture, or pictures of a certain size, or pictures processed in one certain way, pay no attention to this person unless you, deep in your heart, agree. Don't make work out of your hobby. Don't take out the camera unless you are in the mood. Keeping your photography a pleasure will reflect happiness in your pictures. Pictures of people whom you know take their place when they are away. If these are happy pictures, they will bring happy thoughts and memories. Pictures of people will give you a set of lively and interesting pictures and may even make you well known in the salon, exhibition, and illustration fields of photography if such is your desire. In short, the subject, pictures of people, is a fascinating one with unlimited possibilities.
CAPTURING PERSONALITY IN AMATEUR MOVIES
Russell C. Holslag
J. A. Maurer Corp., New York; Co-author of Making Better Movies

New interest can be injected into home motion pictures if friends and relatives are thoughtfully presented as personalities. The cine camera gives every photographer the chance to create living portraits—portraits which actually move and tell the story of a person. An expert cameraman gives, in this article, practical advice on the use of the close-up, on developing a scenario, and on handling children and groups. Read it for ideas on how to make movies which your friends and family will really appreciate.

The still photograph, according to the skill of the picture maker, can show at a glance the subject’s familiar aspect—or it can catch only a “frozen instant,” which aspect may seem utterly foreign to his personality. We shall not refer to the art of making successful portraits with the still camera, although this has points in common with the making of “living portraits” in the motion picture medium. But there is this fundamental difference: the still picture must be captured at precisely the right moment to be effective, whereas the movie portrait covers a definite period of time which has a beginning, a middle, and an ending. To put it succinctly, it has “flow.” This is an important and unique attribute of the motion picture and, if constantly kept in mind, will help us mightily in giving our living portraits interest and meaning.

The whole question of making movie close-ups reflecting the personality of the subject, need not be mixed up with high-faluting discussions in which the word “art” is freely tossed about. What concerns us here is a practical series of ideas by which the personality and characteristics of the subject can be re-created on the screen.

There are certain lines of thought which, if followed, will almost automatically put us on the right path and so, in considering the subject here, we can do no better than to outline these procedures and the reasons therefor. They will apply equally well in setting forth the personalities of the baby, the youngster, the girl friend, the adult—or even the dog.

TELLING THE STORY

Why is it that so many amateur movies of the family, of relatives, or just of people generally, turn out to be tiresome on the screen? Simply because the movie maker is inclined to take so much for granted. In most cases, he himself is so thoroughly familiar with the subject that, on its simple appearance, a host of memories immediately comes to build up a composite picture in his mind. Every one of us has this experience many times daily in meeting friends, in coming home at night to greet the wife and children, and so on. Thus it happens that we unconsciously associate the subject’s outward appearance with his inner personality.

Yet this casual outward aspect may or may not be a revealing indication and, in fact, is usually not so in the ordinary run of human beings. We make a movie close-up which does well enough in presenting this appearance of the subject, and, on the strength of this, we confidently expect such a presentation to translate to the screen all of the subject’s real personality. Of course, it usually doesn’t—not unless our subject happens to be a trained actor. And we are pained because our audiences are politely bored. To us, the subject is there, complete with well-remembered background. But, to the audience, it’s just another person, probably doing nothing or, at best, something uninteresting.

Just a moment’s thought will give us the key to improvement of the kind of movie shot described. Instead of showing the subject vacantly smiling for want of something better to do, or forced to pose without warning, or obviously penned within the confines of the camera field until the ordeal is over, can’t we stop for a moment to try to analyze just what it is that makes the subject attractive to us? Following out this idea will open up brand new vistas and even a hint of it, echoed in the movie portrait, will be received with joyful interest by
any audience. It’s the old story behind any good presentation: if your own interest in the subject’s activity is shown, an immediate response is reflected by your audience.

Here is the right place to get down to a good, concrete example. All of us have seen miles of films of our friends’ young hopefuls, and perhaps have inflicted a few leagues of our own. One young couple entitled their baby film, “Did You Know That . . . ?” Note how neatly this fits into the recommended presentation scheme. What super-salesman has not held our attention by fixing us with his hypnotic eye and saying, “Did you know that the Eikelberg Eyeless Needle has been adopted as standard by the International Sempstresses Association?” Or something else equally apropos. At any rate, the title of our baby film started off by commanding attention in the same way. This title gave the interest link to a number of close-ups which would have otherwise been unrelated. But all of these shots were taken to show some active aspect of the life of a lively youngster. None were static; all showed him in the act of doing something he was accustomed to do (this is another factor to be remembered, but more of this particular matter later).

The film went on to say, “Did you know that Junior exhibited his first tooth at six months?” Close-up of Junior trying to “gum it” on a cookie; closer shot of Junior with the cookie taken away; result: his mouth wide open to give out a wail of woe—excellent for exhibiting the infantile incisor.

Another title: “Did you know that Junior won the International Plunge Title for Eight-Month-Olds?” The inevitable shot of Junior splashing quantities of water out of
the bathtub. This ended (by way of variety) with a close-up of mother’s hand, sopping up water with a cloth from the bathroom floor.

Another example: “Did you know that Junior became a mountain climber at one year old?” Close-up of papa looming up under the bed-clothes in a somewhat portly fashion. Junior scrambles up on top of the mound and proceeds to bounce up and down. After something more of the same, the film closed with the title, “Did You Know That Audiences Sometimes Get Tired of Baby Films?” Shot of Junior asleep in his crib. And here was the surprise. This was followed by another shot: Papa himself, complete with movie camera on tripod, pointing right at the audience. He has just finished shooting; with an air of accomplishment, he proceeds to dismantle the outfit and pack it away. Fade out.

At this point, the reader will probably say to himself, “That’s maybe a nice little idea for a baby film, but all that makes it really different is a few clever titles. Just what has this to do with capturing personality in movies?”

Granted that the titles and the general idea did help; still these were only details which contributed to the main result. But note chiefly that the film always made an attempt to show some characteristic activity of the subject. The pictures taken were really not made at random, under any chance circumstances. Actually the makers, by taking a little thought as to what the baby liked to do, succeeded in making a film that well reflected the child’s personality. The kid wasn’t just placed within a fixed area and told to “do something.” Instead, he was encouraged naturally to engage in some activity that he liked: to splash in the bathtub; to sit in his high chair and munch on a cookie; to bounce on papa’s tummy. Note also the wily plan which arranged all these things so that Junior would have a conveniently photographed area of activity—a most desirable condition to be achieved when making movies of small children, who are often seized with a sudden desire to be somewhere else.

Thus personality is usually reflected in what people like to do. And the key to capturing a true record of this personality is to get the subject to engage in the activity he likes. Automatically, aimless posing is eliminated. He engages in his action in a purposeful way that appeals to the audience; he is less conscious of the camera and, best of all, he is giving you his most characteristic aspect for your movie record.

This principle is really the basis of all good movie shots of people and, in following it out, we shall often find that we ourselves discover new facets of character in our subjects we hadn’t suspected before. And be assured that such discovery will result in an interesting film, because most people are interested in what their fellow humans do.

**THE CLOSE-UP**

At this point, a practical consideration arises which can always advantageously be kept in mind. This has to do with the use of the close-up. Aside from the obvious fact that a living picture which includes the subject alone—and which excludes most of a possibly distracting background—is plainer, there is a more fundamental reason why the close shot is desirable. If people are interested in what you are doing, they will try to come close to look. When the camera concentrates on a close-up, it beckons the audience to come and share its intimate interest. It is, as it were, a confidential gesture and, as such, it helps a lot in putting over the details of a personality.

In a practical application of this rule, it will often seem difficult to work in close-ups. But this problem will be found to solve itself if we consider basically the kind of thing we want to show. What is the revealing thing about most people? Some big, sweeping action, or a combination of small, significant gestures which go to make up the picture of movement? Usually, the latter.

To take a specific example: suppose your subject is greatly interested in golf. You can, of course, stand off with the camera and take a long shot of his complete swing and the excellent form shown in his follow-through. But this hobby, too, is made up of small, interesting details. One of these, for example, is the grip, on which golfers set such great store. Will a close-up of our enthusiastic subject’s hands help to put over his personality? Decidedly yes. If you don’t believe
CAPTURING PERSONALITY IN AMATEUR MOVIES

The close-up is an important part of any movie sequence or picture story—and by close-up is meant not only a view of the face or some characteristic gesture, but also perhaps a real close-up of the hands, or even feet. For these, it is best to exclude all distracting backgrounds.

For these, it is best to exclude all distracting backgrounds.

Photo, Fritz Henle

this, try it. Such things are certainly what he would talk about and try to illustrate to a responsive friend. If the man is a hardworking professor of his hobby, his performance will be interesting, if not for its excellence, at least for its earnestness. To carry out this particular subject to its conclusion, we have the position of the feet, or stance, the appealing little coax to the ball in a short putt, the follow through, and so on.

It isn't necessary to go into a complete movie exposition of a man's hobby but, even if the indulgent cameraman does do this to some extent, it is certainly better than a
grinning, meaningless close-up of a person’s face.

The point is, you don’t necessarily need to take pictures of peoples’ faces to show their personalities. In fact, let their faces be incidental to what they do. Here is an advantage of the movie over the still picture. In the still, everything must be told by a single pose; one doesn’t often see a series of sequence pictures in which the subject starts an action, continues, and finishes it. Yet such a sequence is perfectly natural in the movie because the film bestows life and activity—and the most satisfactory interpretation of life is to have something going on. If the action is aimless, the picture is less interesting. If it has a purpose, it is more interesting.

Does every movie have to tell a story? Insofar as it has purposeful action, yes. But this does not mean that a separate set of elaborate ideas has to be concocted every time we wish to make a picture of a person. In fact, the less elaborate the amateur movie as to special arrangements and “plot,” the more sincere it will be. And the more sincere it is, the better it will hold the interest. A screen personality is most vivid if it is made to stand out with relation to its environment. And an environment provided by the subject’s favorite activity will make the average personality stand out best.

This principle gives the cue to the produc-

Interesting movies—indoors and outdoors alike—can be made if the subject is doing something which is familiar to her. And the use of a mirror image will also add interest to home motion pictures.

Reading “the funnies” is a well-known and favorite pastime and so a sequence showing the daughter of the family in this pose will tell its story quickly.

F.S.A. photo, Russell Lee
shown and, second, his _participation_ should
be emphasized, rather than many details of
the activity itself.

To make clear the meaning of this, let us
turn to a couple of representative examples.
If a man's hobby is stamp collecting, we
might show a glimpse of him sorting and
arranging his items, or of carefully rearrang­
ing a page in his album, or of examining
some detail through a magnifier. This will
give us plenty of opportunity to put over the
absorption of the subject engaged in one of
his most interesting occupations. We need
not make it a film of stamp collecting.

There are few individuals who will not
respond well to this treatment; in fact, there
is no one who is without some kind of ab­
sorbing interest that cannot be drawn out in
some way. And this interest is precisely the
key to a correspondingly interesting screen
picture. Suppose our subject is a young man
in the service, training to be a pilot. Let
him point out and explain the working parts
of a model plane to some interested young­
ter. No better recipe for spontaneity could
be worked out.

Having given some standard examples of
applying the underlying principles which
make a film interesting, we can begin to see
how to fit it to all sorts of subjects. It will
often happen that conditions occur under
which it would seem unusually difficult or
impossible to apply the formula. This is
sometimes the case when the movie maker
finds he has to shoot without much prepara­
tion, or when the time element is such that
it is "now or never."

Even when the opportunity for physical
preparation is limited, there is still a chance
for the brain to function and, with the funda­
mental principle on tap, usually an idea
can be whipped up even on short notice.
Possibly the most difficult subject of this
nature is an active child, of the kind that
never will stay put anywhere. Smaller
children and infants present comparatively
easy problems, as they can be limited in
movement in one way or another, as we have
seen. But the growing child of later age who
is "into everything" is not usually managed
so easily. Let us take a typically difficult
shot of this kind, occurring on some such
occasion as a picnic, where excitement runs
wild with the younger element. Observe
what the child is interested in most—
usually it is food; sometimes a certain kind
of game. If the small fry has some particular
scouting accomplishment which he can
demonstrate, you are fortunate. Or, there is
always one of the grown-ups who is a card
with the kids and on him will devolve the
duty of exhibiting his most fascinating feat
of legerdemain to hold the youngster spell­
bound for a few minutes. Above all, don't
let the kids get the "take-my-picture" com­
plex. Nothing is so ghastly on the screen as
a child showing off, doting parents to the
contrary notwithstanding. If the young
Hollywood aspirant signifies his desire to
mug for the camera, tell him that you want
a couple of special shots of your own first,
and after that you will take his picture any
way he wants. If you are then tempted to
go through the motions with an empty
camera, your conscience must be your guide.

Teen-age maidens are apt either to giggle
or to assume a haughty indifference to older
gaffers who request them to cooperate in a
movie shot. They are usually interested in
something, however, and can often be en-

When children are given something to do—no matter
how simple—the "take-my-picture" look of self­
consciousness will be almost immediately overcome

![Photo, Carola Gregor](image-url)
encouraged to put on a favorite swing record and perform a couple of steps for the camera, if nothing better is at hand.

Groups of people, of course, are harder to arrange and to manage than are single individuals, unless it happens that the subjects making up the group have a strong community of interest. This binds the group together as a unit and sustains the attention. Such a group (for instance) would be a bridge foursome, a subject which would lend itself well to some mighty interesting personality shots. Another example could be found in the case of a father and son working on some project. A very pretty and effective personality shot can be made—usually in color—of a young mother and her small daughter, where the child's dress is a miniature copy of her mother's. The classic example, naturally, calls for both to be working in the garden among the flowers—or cabbages in a victory garden.

So there is the most successful formula for good personality movies evolved so far for the amateur. Engage the subject in poseful activity in which he is interested. Use close-ups, not only of the face, but of details of the activity. Have, if possible, a start, a continuance, and a completion of some phase of the activity. This does not mean that it is necessary to account for every instant of time taken to complete the activity. It is only necessary to show the highlights you choose as involving the subject's most interested moments.

As to placing, close-ups will generally solve that problem by emphasizing only the center of interest on the screen. Do not forget that, in making large close-ups, one must always remember the necessary correction for view finder parallax.

It goes without saying that, however interesting the story, the type in which it is printed should be clear and sharp. The simile is plain but, in order to make sure that it cannot escape attention, it should be emphasized that care in the matters of exposure, focus, and camera holding will complete the picture. These are subjects which cannot be forgotten when advancing to the new applications of living portraiture.
THE LANGUAGE OF PHOTOGRAPHS

Earl Theisen

Staff Photo Reporter, Look Magazine; Chairman, Historical Committee, Society of Motion Picture Engineers

The resourceful photographer will find many ways of expressing himself in the fascinating language of photographs and a well-known photographer here discusses some of the tools with which he works: angles, props, pose, lighting, and timing. Each point has been fully illustrated and the article should help any camera owner to see people in terms of the final print, in terms of what is to be said in this pictorial language.

All photographs by Earl Theisen.

Photographs of people must tell a story. It is demanded of the photographer today that his pictures talk. Just pretty pictures or fine compositions are not enough. And whether it's the man behind a typewriter or a cameraman, both must use the tricks of his profession to create exactly the right slant and story values for the subject matter. The photographer of today is on a threshold of a new medium of expression and story telling. In the dim historic past, man chiseled on cave walls, then came papyrus, then printer's type, and now narrative photos. They are entirely new, and the thinking involved in their creation has not yet been organized. But it will, and in a distant future, historians...
will consider the photographer of this day as the originator of these photos that had something to say.

He says it with the language of photographs. The writer has his punctuation to handle word mass, while the photographer has composition, lighting contrasts, timing, camera viewpoints, and props with which it is possible to create story values and ideas. There are no “one-two-three” rules in producing narrative photos, nor are rules possible—because they presuppose the use of words in setting them down.

A writer may use either a passive or active verb, while a photographer may use either a passive or active camera angle to get the story across. Besides words, the man at the typewriter uses punctuation to get the desired nuance; he uses the tricks of his craft to make what he has to tell more inviting and interesting.

A photographer is not much different from a writer. He has an idea, but instead of words, exclamation points, or periods, the man with the camera has composition, lighting, and camera angles. He says things with these. And the proper use of these factors makes crisp narrative pictures. Abuse of any one of them will seriously hamper the effectiveness of the picture.

A photograph is a streamlined presentation of an idea. The successful picture is not fussy, but easy to look at, and automatically the composition and lighting must be correct. It is impossible to defy the laws of composition or of camera angle and produce a boldly effective story-telling photograph. By proper framing of masses and lines, the attention can be thrown into the factors of the photograph that make it talk. Elimination of non-essentials must be considered if story confusion is to be avoided.

By varying the shooting position, it is often possible to control the placement of masses and direction of lines that attract the eye toward the narrative components, at the same time eliminating those factors, such as detail, where they are not needed. Confusing lines make the picture hard to look at and other distracting elements interfere with the story idea.

Leading press photographers consider the angle, or camera viewpoint, as the basic controlling factor of either a passive or active photo. The difference between a crisp and dynamic result or a static result lies in the camera viewpoint. One camera angle will present the pseudo illusion of movement, while the same subject photographed from another angle will seem less active. For example, the stride of a subject walking toward the camera seems more brisk the nearer the camera is held to the ground; a low camera angle also makes the subject seem taller, particularly if tops of buildings in the background break to give the effect of heads and shoulders above the background masses.

The low camera viewpoint in photographing fashions punctuates and plays up the style detail and line because the eye usually endeavors to look at the center of the picture first. In “bathing suit art,” it makes the subject’s figure dominate the result and subordinates the character.

In photographing close-ups of people, the camera angle adds much to the final effect. Leading photographers usually photograph President Roosevelt at eye level, because such an angle is more friendly, but the same
photographers would—and do—shoot up at Mussolini and Hitler from a low angle. Low angles suggest the abstraction of empiric power. Children seem more like children if photographed down on. Too, full-length figures may seem taller from a low angle, or shorter from a high angle.

Other factors, of course, add color to the final effect of the photo. If photographed in front of shrubbery, a person is lost because he blends into the foliage pattern. A background of sky or architecture may make the result more simple and bold. Proper selection of background and placement of masses

BATHING SUIT ART. A low viewpoint is essential in this "art form," where the subject's figure is more important than her face

with crosslighting may be used to attain the effect of depth and pseudo-third dimension.

PROPS

More than any single factor in good picture reporting is the necessity of including props that relate to the story, aiding the narration and making the picture colorful. Such props, whether a bouquet or wedding cake in a bride's picture, or bars in front of the criminal's face, enhance and elaborate on the story values. Props add to good reporting by suggesting objective values in the story idea. For example, the idea that an automobile wreck is caused by breaking a law is advanced when a policeman is photographed with the wrecked auto.

Through the use of props the photographer is given the opportunity to instill innuendos and give direction to the ideas in his photos. And often the docu-
ROSE HEITNER. The additional prop of the umbrella has added a note of privacy and improves the "cheesecake" angle of a pose which would otherwise mean merely "girl lying on beach." Good variations on stock poses will do much to "sell" your pictures.

mentation of the story is lost without them. The props or story materials should be carefully selected to suggest the character of the person or to formulate an idea and round out the photo idea. Sometimes the prop may be a trinket in the hands of the subject or a toy with which a child is playing; sometimes a prop may be considered to be the entire setting in which the subject is placed.

Celebrities are often known by trademarks which may be considered under this classification of photo props. Churchill would seem unnatural without his cigar, or Hedda Hopper without a striking hat. Veronica Lake has become well-known for wearing her hair over her eye, although she prefers to wear it up or in pigtails. So what might be called a prop of Veronica Lake's has become an essential part of her character, and the photographer should consider it in his photo work. However there are times when such photo props may become commonplace and at this point the creative photographer tries to develop a new angle of interest for the personality. Always be on the alert for a new twist of the basic idea.

POSE

Editors demand—and editors dictate in a large way the demands of good photography—that pictures give the illusion of movement and leave the impression of frozen action. To achieve this, the camera must be a habitual part of the photographer. His thought processes concerning its operation must be entirely automatic, so he may devote his full time to the problem of capturing the emotional feel of what is happening in front of his camera. If he is handicapped with the problem of camera opera
THE LANGUAGE OF PHOTOGRAPHS

DON AMECHE. This candid shot, taken during a radio broadcast, would be almost meaningless without the all-important microphone—here a vital story-telling prop.

Photographers should prefer to have their sittings flow smoothly. Too many people feel the same about having their picture taken as they do about visiting a dentist. If the photographer doesn’t know his equipment, or is ponderous in operating it, his contacts with the subjects are forced, his pictures lack good characterization, or the “real” in people.

The cameraman today who is trying to satisfy editorial demands must make his pictures of people chatty. They must suggest movement and give the illusion that the photo has captured, or “frozen” a cross-section of life.

LIGHTING

The eye naturally goes to brighter objects first; this may be used to point out narrative features. Light and contrast are the prime

GINGER ROGERS. Editors today demand pictures of people which are “chatty” and the posed candid shot is the answer. Here is a fine one of Ginger Rogers about to serve, an example of good timing to avoid the stiff pose.
Hard and fast rules cannot be applied to lighting; it is largely in the hands of the photographer who, by observation and study, knows how to force a desired response.

Even though the average photographer does not have at his disposal the elaborate lighting equipment of the motion picture studio, it is possible to conform to the same moods using only sunlight or a combination of sunlight and flash. Shooting against the sun, and filling in the shadow with flash or reflectors, will result in an enviable photo where the subjects bounce out from the background matter.

His lighting must keynote the whole effect. The lighting—whether flat, or soft, or harsh—must be in keeping with the characterization. When the finished photograph has been effectively lighted the seeing public should not be conscious of any bad unbalanced lighting.

Many lessons for the photographer lie in a critical study of the lighting in motion pictures. The cameraman literally uses light to paint his scenes, and it's a major tool in his hands to direct attention and to control the audience's attitude. His leading characters are more brightly lit than other members of the cast. Gayer moods of comedies are depicted by a higher key with sparkling catchlights, while horror pictures are photographed with shocking contrasts, deep shadows, and strong highlights. Ideas of beauty are never presented in contrasty lighting.

Factors in depicting emotional feel. Lacking proper lighting, the photo seems phoney. Photos of criminals should be harsh and more contrasty than, for instance, a bride, who should be lighted so the total effect is one of high key and general whiteness.

CONCLUSION

While color photography is a study in itself, there are many basic points which the photographer can carry over from his black and white technic. Color photographers must not carry over all the old rules for black and white.

There are few specific rules that can be laid down as a universal guide for the photographer. The resourceful man with a camera in his hand endeavors to capture what is happening in front of his camera. The finished picture should be a reflection of his feeling towards what was happening. He will take the tools of photography and will make a documented picture of his experiences. Coupled with imagination and colored with feeling, the picture is stamped by the photographer himself.
While most camera owners make pictures of people at play or at leisure, they miss one of the most compelling of all photographic fields—people at work. Men and women at work make fine subjects, from the small craftsman and worker in the home to the operator of a giant crane or of a complex precision instrument. A photographer who has gone into the oil fields, down the mine shafts, out on the ocean, and hundreds of other places in search of people at work tells about how to approach workers, what equipment to use, and how to avoid some of the common troubles.

All photographs by Robert I. Nesmith.

IT SEEMS TO BE the natural instinct of many photographers—particularly amateurs—to photograph people at play. And yet one of the camera’s most exciting and absorbing subjects is found in people at work. Man spends more of his time at work than in doing anything else, and his work is interesting and important.

When tackling this huge subject, small beginnings are always good—so before trying to picture a diamond cutter at his specialized job or a surveyor taking complicated sights, try the people nearer home. Try the people in the home, in fact. Get a good shot of your wife or mother washing the dishes, or of your husband or father mowing the lawn. If they are really working, then the picture will be good. Falseness enters in immediately when we can spot a tense body or a self-conscious smirk—or a concentrated face with the hands and body in a completely relaxed position.

Then try the fireman on the next block and the shoemaker, blacksmith, or dairyman. The small crafts and industries, the local banks and schools and stores will give endless chances for real studies of people really at work. Then you will be ready to picture the industrial worker and his machine—important parts of social and economic America.

THE WORKMAN IN INDUSTRY

In the “Romance of Industry” the workman is the hero, and plays a very important part. He may be shy or loud-mouthed, young or old, but on the job with his tools or at the streamlined machine, he is certainly interesting. And don’t forget women—part of the drama is being played more and more by a woman, even in heavy industry.

Not only are women to be photographed in industry, but there are increasing opportunities for women photographers to interpret the industrial world through the camera lens. The basic principles are the same.

Industrial photography has progressed as rapidly as inventions in small cameras, new
lenses, fast film, and synchronized flash apparatus. With that progress has come more employee magazines, technical publications, and industrial advertising—all using photographs. The machine builder wants his equipment photographed on the job for which it was designed. The manufacturer needs a picture story of how his product is put together. The magazine wants to illustrate an article on what the men and women in the industrial battle look like, what they do, how they live. For educational or publicity purposes it is hard to beat a good photograph that shows modern methods and improved working conditions.

Many wonderful compositions of machine patterns or designs of parts have been shown in pictures, but the writer is interested in both the man and the machine together. Show me a miner, a machinist, an oil driller, a draftsman, or a railroad builder, each at his own job in action, and I will show you an interesting photograph, which also has the basic qualifications of a good picture.

**BELL MAKER.** The operator of this drill press is shown with his machine, making parts for signal bells. Here the photographic interest, by careful choice of lighting and angle, has been equally divided between the worker's face and hands and the tools with which he works. As such, it is an ideal picture of "man at work." From Nation's Business

**AERIAL PHOTOGRAPHER.** The director of the McLaughlin Air Service is shown at work. Every community will furnish people like this who have interesting and unusual jobs, providing excellent camera opportunities.

**PREPARATION AND EQUIPMENT**

To take the picture, it is necessary to get into the factory, shipyard, or mine, which nowadays is impossible unless you are sent in after a series of photos by the owners or on some legitimate request with their permission. You should have proper credentials identifying yourself, and written passes. I even carry my fingerprints and Navy discharge papers. Every plant is protected with a guard system which will check you in and out. Before you get this far, the head man will undoubtedly ask whether his machines will be stopped, his production lines clogged by large cameras on tripods and cables, or his workers delayed by posing while photographs are shot. My answer to this one is "No" because with simple equipment, I can get in, shoot fast with no hold-ups of production, and get out. Do this and everybody will be happy. It is one secret of being asked to come again. Another one is come out with good photographs that please your client. Once in a while a shot will appear that even you will think is good.
RIVETER. Some occupations are, by their very nature, extremely photogenic—and among the most fascinating picture-taking opportunities are found on a half-built skyscraper. This photograph, taken during the construction of Rockefeller Center in New York, is remarkable in its factual and pictorial details.

This brings up the subject of camera equipment. After going through the 35mm miniature era and discarding it for all around work, then using a \( 2\frac{1}{4} \times 2\frac{1}{4} \) outfit which did not stand up under the continual punishment, I believe the answer is the Speed Graphic. With a range finder and synchronized flash gun, I have found the \( 3\frac{1}{4} \times 4\frac{1}{4} \) an ideal outfit. It withstood temperatures from \( 30^\circ \) below 0 with surveying crews in the Rockies, up to \( 110^\circ \) in the shade (and no shade) on the metal deck of an oil tanker at sea. It has spent days underground in mines drenched with copper water, had its lens poked into furnaces full of red hot metal, been plastered with lime dust, oil, bauxite, zinc, salt water, been parboiled in steam, smoke and fumes and come through dirty but still clicking. It is tough.

After every big job the camera goes to a first class repairman (name on request), is completely overhauled, checked, and polished. It is insured and has an understudy in case it suddenly goes overboard, but in two years the extra camera has filled in only twice.

Twenty-four cut film holders, film pack adapter, flash gun, 40- and 20-foot extension cords with reflectors, exposure meter, lens shade, wide-angle lens, and small box of plugs, screwdriver, etc. all pack into one leather case with shoulder strap and weigh around 35 pounds. It is handy enough to carry around in autos, trains, airplanes, busses, and rowboats. The outfit can be easily carried in one hand practically anywhere, and with a case of flashbulbs on inside work, it is not bulky. Generally some obliging chap will grab one case and give a hand if the going is tough.

On the job the camera is small enough so that angles are not limited. From the top of a step ladder or the edge of a platform down shots can be taken without breaking your arm. From the floor in a corner or under a machine tight spots can be shot. With the range finder there are no worries about always being in focus and the shutter speed of \( 1/100 \) or \( 1/200 \) will stop action on prac-

OILMEN AND MAP. A high camera angle has served two purposes here—to eliminate much of the confusing interior background, and to focus attention on the map as well as on the men. This was taken as part of a picture story on the oil wells of the Mississippi delta for the Texas Co.
tically anything in this type of work. Some fast machinery will show motion, but the movement generally looks better than it would if stopped dead.

The 20- or 40-foot extension cords with flashbulbs furnish back or side light with a Press 40 or 50 flashbulb. Only occasionally is it necessary to string more than two cables to light up a large area.

Maybe you like to work from a tripod. Frankly, I hate to have the camera tied down. I sometimes carry one but only resort to it when the scene is a large area inside a plant or a big machine. I generally try to steer clear of this kind of photograph covering a whole room. Three or four times recently I have had to shoot a room full of draftsmen or one end of a large machine shop. In these cases I tip off the workers, get things set for a ½ or 1 second exposure, with or without flashes to help, and then signal or shout to the workers to hold it.

HANDLING MEN

Don’t misconstrue that statement about that shout at the men. This seems like a good place to mention the workmen’s reactions to being photographed. They are naturally curious but too busy to stop to ask questions. If they do have a chance, they will ask nine times out of ten, where the pictures will appear and can they get a print?

Don’t promise prints to everybody you shoot unless some arrangement has been made with the firm ahead of time to supply them. It is almost a “must” to tell the worker to keep at his job, that if he sneaks a peek at the camera, he will look very bad in the photograph. If he stays on the job and pays attention to what he is doing, we will get along all right and he will make a swell picture.

I have found that it is better not to take anybody along from the head office or what is termed one of the “brass hats.” A safety engineer, a foreman, even a helper whom the workmen know personally is better than anyone from the executive offices.

When the bulbs go off you can be sure that there will be a couple of catcalls from the rear and “Hey, Joe, who do you think you are, Clark Gable?” or “That shot broke the lens sure.”

Don’t get the idea that because a workman is covered with grease and grime, he is a lowbrow. I have met poets in copper mines, artists in boiler rooms, and professors in factories. One quiet chap in the oil fields of Louisiana had been on jobs around the world and had several degrees. Plenty of men in plants are college graduates and in work clothes they all look like ditchdiggers. One grey-haired man with spectacles, in a corner of a plant, was champion rifle shot of about eight states. Many of the workers I have photographed have a better darkroom than mine and a larger investment in cameras and apparatus. Don’t think that some of them haven’t tipped me off to good usable picture ideas, also.

So go slow, take it easy, don’t try to tell them how to do their own job. If you twist them into an artificial pose, you may make a good negative but it will be thrown out later for being industrially wrong.

TROUBLES

If you watch for such things as pop bottles, rags, or odds and ends that should not be in the picture, headaches will be saved. An empty milk bottle appeared in one of my negatives in a paper mill shot and was a nuisance to retouch out of the print. The foreman, safety man or helper with you can tell whether the scene should be cleaned up before you shoot. The safety element is particularly important. Be sure that the workers’ safety goggles or skull cap are correct.

Backgrounds are generally confusing in detail unless they are part of the picture. Sometimes the sun will stream in through a high window and help to backlight your subject. Dust, smoke, or steam in the air is tough to shoot through, although steam is the worst problem on close-up shots.

Underground in mines, humidity will form a heavy dew all over your camera and lenses, so give the camera time to warm up, take off the lens and front board, wipe both the front and rear lens with a soft handkerchief, be patient, and the fog will go away as the lens warms up. Of course if the water is running out of the mine roof like a summer shower, and the air is full of fine spray from the exhausts of one or two drills or jackhammers, and you reach in your overalls for that hand-
PAPER MILL WORKER. By directing a strong and concentrated spot on the worker, the photographer was able to achieve a dramatic effect which makes the photograph almost Grecian in its artistic implications. Note the fine muscular movement, the fluid action of the pose, the excellent pattern of the whole picture. A result such as this is indeed a gratifying reward for the effort expended by the photographer. Here, as always, however, authenticity has not been sacrificed for the sake of pictorial dramatics. Taken for National Gypsum
kerchief mentioned above and find a pint of water and a wet rag, just pray and use your shirt tail if it is still dry.

EXPOSURE

For general all-around work of this kind, where lighting conditions cannot be foreseen, I think very fast film is best. It allows you to shoot at f/16 or f/22 and develops with plenty of contrast. It will also pick up flames in furnaces, red hot and molten metals, and sparks from grinding tools. Too much light from a flashbulb will kill the effect of sparks flying from welding and grinding operations and too fast an exposure will miss the effect of sparks flying. Just enough light to help the picture and let the sparks or flame make the exposure will give the drama you want.

The arc made by an electric welder will give you light enough to take a picture, but it will make rings on your negative if shot at directly. The welder will be glad to set up a small piece of scrap iron between the spot he is welding and the camera, unless you can find an angle where the direct arc is just hidden from view. Don’t be fascinated by the light and gaze at it through your finder for too long—or you will not see to focus for some time. Try to coordinate the actions of the worker with the actual job of welding and thus avoid any awkward posing which would give the final photograph a false appearance.

Natural light sources will now and then help you out. An overhead skylight will sometimes give you a break by lighting up a bench or worktable. A large doorway will make a frame for a silhouette. A row of windows will give the sidelight for a line of machines.

Many effective shots can be made by shooting at the worker through the machine, or between piles of parts. The back or side light on an extension cord can be shielded by the machine itself so that it hits the workman. However, many times this type of shot will not show what the worker is doing because the actual operation is hidden. Whenever possible try to include the full story of the action in one picture.

Designs formed by rows of parts, pipes, gears, cranes, or pill boxes are helped by the human interest of the worker. If the parts are minute, like watch springs, screws, or pretzels, you may only want his or her hands. If you want a catalog photograph, that’s all right, too—take a shot of machinery while the crew is off to lunch. But I would rather be taking the workman eating a bologna sandwich.

CONCLUSION

Off duty the workman is harder to photograph than when he is at work. Away from his tools he is self-conscious like all of us (except actors). He is no prima donna. But at work he is swell, hospitable, interesting—a real person. When he finds you don’t mind the mud, grease, or heat and that you are after a real picture, he will recognize you as a workman yourself and help out in any way he can.

Some other photographer can take the deb's at Pierre’s, the table top set-ups, or the male models trying to look like machinists. I’ll take the muckers on the 4200-foot level, the smelterman, or the sardine fisherman—and like it.
PHOTOGRAPHING PEOPLE IN COLOR
Nickolas Muray
Professional Photographer, New York City

In advertising and illustrative photography, color work has been thoroughly accepted—and the result has been that many new fascinations and problems have been added to the job of professional photographer. A photographer whose work is well-known to magazine readers tells how to take pictures of amateur or professional models in color—the special technics, equipment necessary, methods of posing. The work which goes into a typical Chesterfield or International Silver advertisement or a McCall’s cover is explained.

All photographs by Nickolas Muray.

The pioneer stages have passed, and the era of color in photography has established itself. Years of experimentation have borne such valuable and appealing fruit that from now on the path is well defined toward more and greater achievements in this field. Already a degree of perfection in technic has been attained sufficient to revolutionize magazine illustration—where ten years ago one would discover only an occasional color page, now virtually every food advertisement is in color, and every sizable advertising campaign includes some use of color. As a commercial photographer, more than 80 per cent of my work is in color—and this includes work with fashions, cosmetics, cigarettes, travel, and industry.

America has always been picture conscious, and business has learned that bright, lovely colors enhance merchandise and make it doubly attractive to the public. From the photographer’s point of view, color offers an increasingly fascinating and challenging medium. His artistic and esthetic capabilities may create a thing of beauty, or may prove wholly inadequate and yield only a flat, dull picture. There are innumerable reasons for success or failure, but all of them are controllable.

In the last ten years new inventions have brought color photography within the reach of everyone. Although it is still several times as expensive as black and white, there is an ever-widening market for color work. Advertisers have found that enormous returns make the cost nominal. And although the photographer’s work becomes more complex, this serves to stimulate his interest and to urge him on. Few painters who have worked with color ever return completely to black and white.

For those who are satisfied merely to make the exposure, Kodachrome has produced superb results. For those who are more interested in the intricacies of creating a color print, there is a choice. They may do it themselves with any one of a number of processes, from carbro to chromatone. For those who find it too much trouble to learn the technic, there are print services (including Eastman Kodak) which will supply both the amateur and the professional with a satisfactory print.

USE OF COLOR

For many years, photographers have been accustomed to seeing in terms of black and white. Color calls for a new way of looking at people, at things, and a new way of looking at color. It calls for an understanding of these in relation to each other. For practice, I should advise work with still life. Many of the set-ups photographed at my studio are food spreads, either for advertisements or for editorial illustrations. Such still life arrangements give an excellent opportunity to experiment and study the color of individual details in relation to each other and in relation to the whole composition. Work on more or less simple and inanimate subjects will do a lot for the photographer by helping him to see, in terms of color, the tonal variations that occur, covering the range from highlights to shadows. Most photographers are well acquainted with this range in black and white. It will be a new experience to observe the color changes which occur in a still life. Let us, for example, set up a breakfast scene near a window, with a raffia table
the usual silverware, a coffee cup, sugar bowl, cream pitcher, a plate of hot rolls, a small vase of flowers, a napkin, salt and pepper shakers, and two soft boiled eggs, one opened. The background is light cream, and we use a large white sheet as a reflector on the shadow side. The tonal range which now appears for black and white becomes far more important and complex when considered in variations of color. Such a set-up is well worth studying.

If it is a question of photographing live subjects—be it for advertisements, personal use, or from a purely esthetic point of view—one has to study the coloring of the person and of the clothing worn before deciding what kind of a background to use for the proposed picture. Complementary colors, judiciously used, will enhance a color print. A pink organdy dress is effective against a delicate green, a bright yellow, or a turquoise blue background; or a brilliant red against a medium gray. Backgrounds are also selected according to the coloring of your subject. Colors can express personality, and the colors which you choose to emphasize should be in keeping with the personality before the camera. I would put a blonde young lady in a raspberry red sweater, and photograph her against a summer sky broken with cirrus clouds.

For a male subject, I often use a medium gray or brown background, usually of painted beaverboards with two or three joined at right angles so that the main source of light will create several different shades of the gray or brown.

There are no set rules or examples which anyone can follow or on which I could give advice. I have found photography and photographers just as personal as the palette and brush strokes of one painter or another. With practice, each develops his own style, so that even photographs will have a stamp of personality on them, and one can easily recognize the individual work of a well-known photographer.

In most of my pictures I am trying to simulate sunshine, and it is a rule with me to have negatives of normal density—about gamma 1—with full shadow details. The effects which can be produced by a happy selection of colors must be sensed until they become part of the color photographer’s mental equipment. Good taste can be learned by constant observation. I do not mean that one should copy others, but that he should learn as an apprentice does from his master—then, if he has talent and energy, he may even pass his master in the race. If one could reduce good taste to a formula, it would be fairly simple to make good pictures.

Perhaps it will help to consider every picture as consisting of two main parts: subject matter and background. These are almost equally important, particularly in color photography. I would never put a fashion figure of a large patterned flower print dress against a screen or wallpaper decorated with birds of paradise or cherry blossoms. Rather would I select a cool color to match a shade in the dress, paint the flat with it, and light the subject so as to break up the evenness of the background with its own shadow.

Once the technic of exposure and development is mastered, color is actually easier to follow through than black and white, for the simple reason that you are translating color into color, and not color into black and white. There is no such thing as being photogenic or not; everything that has color is photogenic in a good composition.

**FIGURE WORK**

Figure work is a very general term in illustrative photography, and includes every conceivable situation in which anything living is incorporated. Today I may do a straight head and shoulder picture of a pretty girl for a magazine cover; tomorrow it will be an illustration of a worker and his power drill fifteen hundred feet underground in an ore mine. Another time it might be the President of the United States for a matter of public record; or a mother admiring her baby in a crib; or Joan Crawford in a studio setting, endorsing International Silver; or an Easter cover of a pretty girl holding a lion cub tucked under one arm and a lamb under the other. I may be called upon to do a location picture backstage in Katherine Cornell’s dressing room; and the following day to set up a campus scene in my studio, although it might be infinitely less complicated to reverse the procedure and reproduce the simpler

(Continued on page following insert)
Credit goes to an alert *Milwaukee Journal* photographer who saw a pretty youngster and a beautiful horse. The color combination produced added dramatic interest.
This color photograph was taken outdoors, before a paste-up background of planes in the sky. A flash was used to fill in the shadow on the face cast by the hand, but the sunlight effect is real.
Skillful posing of well-known people offers many fine color possibilities. This picture of Joan Crawford was made for McCall’s Magazine. The photographer tells how to make such color photographs in this issue.
HELLDIVER (above)

The Curtis Helldiver, one of the Navy's newest dive bombers, photographed on the new Aero Kodacolor film. This film has a Weston speed of 32.

FAMILY SCENES (on opposite page)

Family activities and photographic subjects in the home are often much more vividly portrayed in color. The range of subject matter is endless with so many possible combinations.
Good posing together with close-up photography is the secret of this interesting outdoor color shot. When children are given something to do, it is much easier to discover good poses.
PICKING DANDELIONS

The familiar and brilliant color of dandelions has given accent to this appealing child photograph
This photographer's model was serving as a volunteer farm worker when the photographer was out looking for some good farm scenes in California. A timely outdoor subject, given added interest by the use of color.
PHOTOGRAPHING PEOPLE IN COLOR

set, using an authentic locale for the college fashions. There may be a bridal picture taken in Mrs. Astorbilt's music room; a farmer loading potatoes in front of his barn, with all the attendant rural atmosphere; Rita Hayworth handing Chesterfields to a dizzled group of sailors; a Florida beach scene: a naughty-but-nice bubble bather in a modern bathroom, using the soap that "makes your skin glow with beauty." Nor can I neglect to mention the hundreds of war and defense pictures, which are often the most interesting of all—an Army photographer or mechanic taken at a flying field; a girl spotter on a rooftop focusing her binoculars on a group of flying fortresses; a Red Cross nurse in action; camouflaged soldiers; machines and their operators by the score. You dream it, we'll photograph it—all in the day's work.

Every picture which is made, either for editorial or for advertising purposes, is the combined work of editors, art directors, and copy writers, who have to please their client. The client may be the editorial staff of a magazine, or an individual or group of individuals in the case of an advertisement. Usually the idea is conceived between the editor and art director, or the copy writer and art director. Once a layout (usually selected from many) has been okayed, the art director discusses the situation and any peculiarities or problems incident thereto, with the photographer. He, in turn, proceeds to create a picture which until then has been in the form of a very rough sketch. In my studio I personally supervise the assembling of props and building of backgrounds, the selection of clothes to be used. With the approval of the client or art director, a model or models must be chosen. Then the photograph must be composed to fit the layout, with allowances for any captions or headlines which may later cover some part of the picture. It is always the photographer's job to make his picture as attractive and dramatic as possible. Usually six or eight exposures are made, with changes of expression and position. The next step is to submit black and white proofs, from which the final picture is selected.

The make-up of models is extremely important because the amount of light, usually ten to fifteen times that required for black and white, will photograph as colorless faces with only normal make-up. Therefore, we must exaggerate and use much deeper flesh tones than those ordinarily used for street make-up. We have found Pancake, in the "natural rose" shade, most satisfactory. This is applied with a clean sponge dipped in a mixture of water and glycerin, so that it will not dry "dead mat," but will have the natural sheen of a healthy skin.

DIRECTING MODELS

The majority of photographic illustrations for advertisements have very simple situations to portray. Therefore the average model will follow very easily the direction of the photographer to produce just the right expression—this need not be held longer than half a second. The exception to the rule is the story illustration in magazines, where the expression has to have a definite dramatic quality to fit the caption. For this type of picture, it is wise to select an intelligent model, with perhaps a flare for the theatrical.

In the endorsement line, the models are meant to "be themselves." A sailor from the local Navy yard, for instance, has been permitted to pose for a well-known cigarette company—all he need do is put a cigarette in his mouth and grin at the camera. He is posed as himself—a sailor who smokes a cigarette. The same applies to the bride who likes a certain silverware, or the opera singer who uses a particular kind of vanishing cream. Let the "endorser" be himself as much as possible—do not show him how to pose, or force an unnatural position on him.

Children and babies, like animals, must be handled with great care and infinite patience. This type of picture is invariably photographed with flashlight, and the photographer must be on his toes to capture the very moment which suits the purpose of the picture. Often, in these cases, the first picture will be the only one possible to take—the animal or child may be startled by the flash of light, and may cease to be tractable.

EQUIPMENT FOR STUDIO AND LOCATION WORK

A commercial color photographer must have enough lighting equipment and studio
TRIAL SERIES. Before taking the final set of color photographs, it is often wise to make a trial series, showing various poses. These can be presented to the art director in black and white and a great deal of time and expense is likely to be saved. Here are six poses, each printed from one of the trial separation negatives.

space so that he will be able to build and light any scene or set which he is called upon to photograph. Each type of sitting will require a different amount of light—just how much will be learned through experience with many and varied sets. Suppose, for example, you were to photograph a library scene in which you cover two of the library walls—the half of a 14 x 20 room—with a French door and a large window opening upon a garden in which calendulas and rose bushes are seen to be growing. This would require an enormous amount of light in comparison with that necessary to photograph Baby Snooks enjoying her Toasted Tootsies in a high chair. A victory garden, with a pretty girl planting a dozen rows of different vegetables would take more lighting than a moonlight scene on the deck of a boat where the stars shine down upon a young woman showing off her homemade evening dress from the latest Vogue pattern, put together with her own little hands on her Singer sewing machine. You must have lighting equipment enough to answers all sorts of moods required.

Location equipment, naturally, must be less complicated, and we absolutely depend on sunny days for the main source of light, unless the location is indoors, where we carry along adequate flashlight equipment to duplicate, as nearly as possible, the studio lighting. And that is a lot of equipment! We prefer to shoot outdoor pictures not on the brightest, but on a slightly hazy sunny day, and either just before or just after midday. In this connection, I do not use silver reflectors at any time. Instead, I have found it far more accurate to use daylight flashbulbs.
I use one of three cameras: a one-shot 5 x 7 color camera, a 4 x 5 Speed Graphic, or an 8 x 10 view camera. The particular circumstances, of course, determine which of the three will be most suitable. The quantity and complexity of equipment is very necessary, because of the nature of present-day color material. Kodachrome has the speed of Weston 10 outdoors, and Weston 5 indoors. The one-shot color camera has a Weston 4 indoors and 5 outdoors. You will readily see the difference between this and the fast film speeds of 80 to 100 Weston generally used for black and white pictures.

For simple portrait work with one, two, or three models on a single plane, we use a 300-watt floodlight with two or three 100-watt spotlights to accentuate highlights, and probably two 100-watt floods to fill in the shadows. This usually measures from 18 to 22 foot candles on the Junior Weston meter. Obviously, as much light as this is far from comfortable for the models. Therefore, all the lights are on dimmers, and the full intensity of light is used only when the exposure is made. This is seldom longer than one second, and most professional models can hold a natural expression for that length of time. The f-stop is usually f/22.

I have a special and very simple system for calculating flashlight exposure. I use only No. 3 flashbulbs. Before exposure, each reflector contains a 150 watt—120 volt frosted bulb. This light source is measured directly, with the Weston Junior meter closely in front of the subject. In other words, I am not measuring reflected light, but the light source itself—at a distance from the subject to the light. By trial and error, I have found that if this light source should measure, say 22 foot candles, I will move 22 to a film speed of 64; and at 1/25 of a second, which is the average speed of No. 3 flashbulbs, the meter will read f/32.

Color photography offers a variety of ever-challenging problems over and beyond anything encountered in black and white. There are some eighty-two steps from taking a color photograph to finishing a carbro print, and any one of these, not perfectly performed, may result in failure or near failure. To triumph over these is an achievement.
PHOTOGRAPHING MAIN STREET FOR STOCK SHOTS

Charles Phelps Cushing
Photographer, New York City

A photographer who has made and sold thousands of stock photographs of city and country scenes tells about his work. And from this article, every camera owner will find that it is possible to tell the story of people by showing where they work, live, and play—by showing environment. Here is a sensible approach to the picturing of a small town or large city for documentary recording.

All photographs by Charles Phelps Cushing.

My wife and I are candidates for the Club of Odd Trades, for though we operate a photographic agency, we have scarcely any interest in what is called spot news and almost none in pictures of people.

News is the unusual, the extraordinary, the freakish. We are concerned with the plain and ordinary, the normal phases of life. We prefer a good picture of a wheat field to a "hot" snap of a fatal accident. A close-up of a politician snipping a silk ribbon to open a new state highway is a fit dish for a news agency, but a much better picture for us is that same highway in normal operation. Strange as it may sound, it is also our policy not to pay much attention to celebrities. The newest movie star isn't half as interesting to us as a good shot of the skyline of Los Angeles or of the main street of Hollywood. The stars dazzle suddenly and then just as swiftly go dim; we prefer to handle a type of picture that is not so perishable.

This non-perishable quality is necessary to a stock picture and it explains why we avoid pictures of people like the plague. It is not necessary, as some photographers appear to believe, for the cameraman to take innumerable close-ups of people when he is portraying the life of a community. The houses in which the average American lives, the schools that his children attend, even the public buildings in the town square reflect human life just as truly as portraits. Our stock file is an album on the life and times of John J. Jones of Main Street—and there is hardly a picture of John Jones in the lot. The human image has been avoided for business reasons, because a picture without the human figure does not age so rapidly. But the file, as a record of John Jones' environment, also shows that people can be portrayed not only by images of their faces, figures, actions, attitudes, and clothes, but also through their buildings, factories, monuments, fields, street signs, places of amusement, and homes. An important part in the story of people is the chapter on where they live, work, and play. The age and architecture of buildings, the relation of build-
PHOTOGRAPHING MAIN STREET FOR STOCK SHOTS

ings to natural surroundings, the size and
general activity of a street—these and coun­
tless other things make up the life of people.

Once an order came from a magazine to
cover a big convention in Kansas City. We
took a good enough set of news pictures, as
assigned, and collected our pay. On the same
trip we shot another picture—a night sky­
line of Kansas City from the terrace of the
Liberty Memorial. It shows the Union Sta­
tion in the foreground and the skyscrapers of
the downtown business section in the back­
ground. Not a smirch of news in it. Yet
when the convention stuff was laid to rest, as
dead as a mackerel, the skyline shot was still
alive. It still is. Newspapers, magazines,
and school books have used it. It is not the
highly perishable type of picture; it is a
staple.

MAIN STREET

For our part, we'll continue to jog quietly
up and down Main Street and leave the spot
news alone. Suppose the place happens to be
just a tiny burg, only a whistle stop or a wide
place in the road: what will we find there?

A general view of the town, first of all—
something in the nature of a bird's-eye view
or a skyline. Next a picture of the stores
along the main street and some “human
interest” stuff. And right here a word of
cautions. If you want to build a collection of
stock pictures, don't overdo the human in­
terest candidates. The point is this—styles in
clothing and hairdo change swiftly. If the
foreground of your picture is filled with this
perishable sort of thing, your stock is just as
ephemeral as the haberdasher's. Women's
wear is especially perilous. Those curious
things they do to it, those adornments that
pass as hats, even the variations in skirt
length are all expensive items to the photog­
rapher. Today they may attract the eye;
next year they may make a picture passè. And
though men's clothes are not so fickle in
style, they make trouble too. Also, if you
can avoid it, don't shoot street scenes where
men are wearing straw hats or overcoats, be­
bcause these items make the photograph sea­
sonal and limit the potential sale.

If there is a prominent building, such as a
court-house or a town hall, we'll make a shot
of that. Then the railway station or some
other transportation subject. Then the lead­
ing industrial plant, if any; perhaps it's only
a sawmill. Then a glimpse of the homes and
churches of the residential section where the
Joneses and their neighbors live in Elm Street.
Then the World War or the G.A.R. or the
C.S.A. monument. Then start all over again
and imagine that an editor has asked for a
single characteristic picture of the place.
He has space for only one picture; so try to
catch an outstanding view of the town to fill
that order.

Learn to do this kind of thing systemati­
cally and in a workman-like way and you
won't be buffalooned if the next place you have
to cover is New York or Chicago.

New York is a somewhat bigger town than
Centerville, but covering the larger place
isn't a different kind of job from covering
Centerville. Just as we have to obtain a good
general view of the whistle stop's "skyline,"
we have to get the equivalent for the metrop­
olis. New York has several skylines, some
of them uptown and some of them down­
town. New York has more than one Main
Street, so we shoot Fifth Avenue and Broad­
way and Wall. Instead of Centerville's lit­
INDUSTRIAL VIEW. A big rubber establishment at Akron, Ohio—the Goodrich Rubber Company—is shown in this view of a smoke-filled and busy industrial scene. Here is the answer to the question: "Where do they work?"

tie red depot we take the Pennsylvania Station and Grand Central Terminal, a few bus stations, some docks and the airports. New York has five borough halls, a lot of courthouses, a city hall, and a skyscraping municipal building. But don’t let that kind of thing stump you. New York’s industries are numerous, but they are merely Centerville’s sawmill if you are keeping your eye on the ball. Ditto for the residential sections: Park Avenue, Flatbush, the lower East Side, Harlem, the Bronx, and Suburbia must be check-ed off and you have the parallel for Elm Street. New York has dozens of monuments and statues, including such famous fellows as the Statue of Liberty and Grant’s Tomb, but they all add up to nothing more than an equivalent for the soldier statue in Center-ville’s Courthouse Square.

CITY OF MEDIUM SIZE

Naturally, the principles about which we’ve been talking will hold as good for a city of medium size. Let’s sample Salt Lake City, with a 1940 population of 150,019. Let’s pull out the Utah folder from the files and check up on how our performance matches with our plan.

Of the skylines, one of the best appears to

SUBURB. Here is suburban America, typified by a view of Glen Rock, N. J.
PHOTOGRAPHING MAIN STREET FOR STOCK SHOTS

be a panorama taken from the roof of a downtown hotel, showing the Utah State Capitol Building in the place of honor at top and center. Another is shot from the Capitol and features the Tabernacle and the Mormon Temple. And there is a “bird’s eye” from the top of a tall building—a long perspective down South Main Street.

For business section views, we check off another Main Street picture made from not so high an elevation; some “human interest” sidewalk candidis, a street level view framed by the marquee of the hotel, and a “camera angle” shot downward at the traffic that swirls around the statue of Brigham Young.

Among the outstanding buildings is the Capitol, which we did inside and out, backlighted and frontlighted and by day and by night; and, as best we could (for this wasn’t any too easy) we covered the Tabernacle and made day shots and night shots of the Temple.

We did some residential pictures, a few things on transportation, and covered the most important monuments and memorials.

But on one item we slipped up; we neglected to check off Industry. And many a time since we’ve bitterly regretted the oversight. Nearby is a famous open pit copper mine; we should have found time to make pictures of it, but we let that opportunity slip away.

As a matter of fact, oversights of that kind occur often. For example, it’s a lot of trouble sometimes to find a good viewing spot from which to make a first-class general view or skyline panorama. We spent half a day in Spokane trying to locate such a place. Luncheon interfered and something else happened later so that we didn’t return to the hunt in the afternoon. Other business came along the next day and the item “skyline” was forgotten after that. Then we left town without obtaining what would have been our most valuable single view of Spokane.

SCENARIO

Eventually we learned in the tough school of experience that one of the best ways to avoid such slip-ups and to insure a good coverage is to take a little tip from Hollywood. Nobody in the movies ever would dream of starting out to shoot a film before he had done some research and drafted some sort of scenario. Why shouldn’t a “still” cameraman take the same simple precautions?
KANSAS CITY AT NIGHT. A dramatic night skyline was taken from the Liberty Memorial, showing the Union Station and plaza. A picture such as this retains its timelessness long after shots which show season, people or clothing in them.

Before shoving off on a trip, it is wise to study up a bit on the story of the place. Then make a check list of the most important scenes to be photographed. After you arrive, carefully look over such “locations” to determine at what hours activity is best and at what time the light should be most favorable. Our own practice is to draw a crude map of where such “locations” are and to note alongside of each item the time of day when it can be shot to best advantage.

Now would you like to see how this works out?

Some of our photographs on Kansas City, Mo., are getting a bit moth-eaten, so we are going to make a trip out there to refresh our stock.

After a little research at the public library to brush up on the city’s history and economic status, the first thing we do is to draw our map of “locations.” Down at the bottom of the sheet is the airport at which we shall arrive. Adjacent is the Missouri River and two bridges. A vertical line up in the middle of the sheet indicates the course of Main Street. The airport itself is Item No. 1. There’s a notation “afternoon” alongside if we wish sunshine on the west façade of the Administration Building. There’s also a notation “night”—because a few good night pictures are possible, too.

The old railway bridge isn’t photogenic, but is interesting historically: it is the first bridge to be built across the Missouri River and it helped to put Kansas City on the map. Another item is the levee at the foot of Main Street, for here was the site of “Westport Landing,” the little settlement where the first pioneers established a trading post. Up the steep slope of Main Street and over the crest of the hill is old Market Square, around which all business centered in a later generation. City Hall has moved to a new site farther south, but the city market continues to sell tons of foodstuffs from the truck farms. Make a notation here “early morning.” (If you drift around too late in the day all activity is ended.)

For a good retail business section, Main Street between 10th and 12th is important. Notation here is “noon hour.” (It’s a North and South street, and at noon you’ll avoid heavy shadows.) Another shopping scene is 11th Street between Main and Grand, once
known as "Petticoat Lane." This is an East and West street, so mark it "early morning" if you seek good sunlight on the scene.

Twelfth Street, being something of a "White Way," is another story—this makes its best showing in a night picture. A little to the East looms a 30-story skyscraper; it is a good stock shot of an up-to-date City Hall.

Next we'll go to the West of Main to shoot the city's big Convention Hall. It has a North façade (so mark it "early morning"). Also note "wide-angle lens" if you hope to get much of the rest of the building onto your groundglass.

The huge newspaper plant of the Kansas City Star is easier to photograph—it has a wide street and a yard for its foreground. Notation here "afternoon shot."

Union Station, near the middle of the map, is one of the largest passenger stations in the U. S. The front façade of the building faces a broad plaza. At the top of the slope beyond the plaza sits the million-dollar Liberty Memorial, an impressive daytime shot and even more dramatic in a night photograph. From the terrace of the Memorial or from the observation floor at the tip of the shaft take panoramas of the city's downtown skyline.

Enough has been said already to show you how our scenario operates. We might go on to Westport (long since absorbed into Kansas City and now almost forgotten) or still farther south to the residential Country Club section—or west to the Stock Yards and the packing houses and grain elevators. ... But you have seen how the plan works, and this should suffice to guide you when you come to prepare a similar plan for someplace else.

Always keep in mind what it is that you are trying to do, and you won't be led astray by the untypical or the ephemeral.
PUBLICITY PICTURES OF RADIO ARTISTS

Ray Lee Jackson
Photographer, NBC Studios, New York

Celebrities like radio artists have to have their photographs taken repeatedly—because the camera is one of the most potent means of keeping people's names and faces before the public. A man who pioneered in the field of radio publicity work tells something about his job in a profusely illustrated article.

All photographs by Ray Lee Jackson unless otherwise credited.

The voices and music of radio artists are known to millions of listeners throughout the country. And it is the radio photographer's job to help round out those "voice personalities"—to keep the artists' faces and figures in the public eye through publicity pictures. Photographs of radio artists advertise the personality, the program, and—indirectly—the product which is advertised by the program. They help to give a "backstage" to America's most familiar medium of entertainment.

Years ago publicity photographs were supplied by the artists themselves, and they were usually of the "arty" portrait type, varying one from another and not uniformly reproducible. Our photo studio was set up to take simple, dignified pictures which the editors of many publications would accept and reproduce. The department has expanded until now hundreds of papers all over the country get 8 or 10 pictures every week. And these pictures include not only portraits (which make up the bulk of the releases), but also candid backstage shots, news or pseudo-news photographs, and technical record pictures of radio procedure. One of our photographs may be used hundreds of times, may be seen by literally millions of readers and potential radio listeners.

THE ARTISTS

Listeners like to see what performers look like. This is true of the well-known movie, theater, and music artists whom the listeners like to see in the new environment of radio. It is also true of the comparatively unknown "soap opera" actors. Listeners want to see them in simple portraits to get a close-up view of their faces and they want to see them performing in front of a mike. If the artist is beautiful or handsome, then so much the better; but beauty is not the ne plus ultra (as

GLAMOR POSE. In publicizing "soap opera" actresses, it is all to the good if they are unusually beautiful. Ann Eden, actress on the Lincoln Highway program, was very simply posed and lighted with a single broad spot—but the result was a glamorous shot which was used all over the country. These more or less refined "cheesecake" pictures are especially popular with magazines and with newspapers for a full single-column cut.
GINNY SIMS (top left). The star of the Johnny Presents program, a singer of radio and screen, has been photographed many times by the NBC Studio. The set-up for this half-figure portrait was simplicity itself.

CLIFTON FADiman (top right). The well-known master of ceremonies of Information Please is positively identified with his radio role by the inclusion of the NBC mike as a prop.

THIRTY SILVER DOLLARS (bottom left). With the coming of audience participation, radio publicity photography has been called upon to include shots like this.

MERCEDES McCAMBRIDGE (bottom right). Here is a straight publicity portrait of the heroine in Abie's Irish Rose—typical of the kind of photograph which editors want. It has a simple background, strong blacks and whites, and something just a bit out of the ordinary in the way of a pose.
it is in Hollywood), because in radio it is still the voice or musical ability that counts. We have had considerable success, however, in "plugging" some of our unknown artists and have found that publicity pictures help to bring more or less little-known artists not only to the eye of the public—but of the Hollywood talent scout, too. Our studio, for instance, was the first to publicize Dorothy Lamour and Eddie Albert with our nationwide set-up.

We are also called upon occasionally to photograph celebrities outside of the entertainment world—politicians, writers, people...
DELMA BYRON. This ultra-glamorous publicity photograph, showing a feature player of The Mystery Man program, has been used constantly. Its success has been greatly boosted by the choice of lighting and pose. Also note the effective balance of dark and light areas in the picture. The dark lower foreground, the dark microphone, and the dark area in the upper right section give an effective framing to the subject as she performs. The radio publicity photographer has little time for tricky effects, but he makes the most of a beautiful subject for an unusual photograph such as this.
who make one or two or perhaps a series of broadcasts. Their appearances will often be classed as real news and the publicity shots will be readily accepted by more serious papers. On the other hand, some newspapers, magazines, and armed service publications will take almost all of the pretty-girl and name-band publicity shots which we send them.

**THE APPROACH**

In general, the work of the studio consists of: (1) the straight portrait; (2) the tie-up portrait, usually a half-length figure view with the mike as a prop; (3) cheesecake; (4) gag shot. The first is the most common, however, when done with variations. I'm mostly an "eyes, ears, nose, and throat" photographer.

Radio people are easy to work with. Some of them, those who have worked in movies, for instance, are used to posing and respond easily. All of them are accustomed to direction and to working on a time schedule. Temperament is at a minimum here, because most of the radio artists have no illusions about their personal beauty and are willing to cooperate with me. All of this is extremely essential, as my job is a very special one and the artist must be made to realize that I know what is needed—a simple close-up portrait with a simple background and good contrasts. I must have the picture editor in mind, because he is the one whom it must please most. The photographer must have his way in basic things, and that means that elaborate poses and histrionics are out—except possibly for comedians.

**EQUIPMENT AND TECHNIC**

The average photographer is overrun with equipment, and this means the professional as well as the amateur. In my job, there simply isn’t time to play with lights and work out tricky ideas on the spot. The artists are busy people and, what is more, in the time given me some thirty or forty pictures of different poses must be taken. (This is so that each rival newspaper will have an exclusive publicity portrait of the artist.) Any photographer should be able to think creatively with the variety of faces that come before his lens and the variations in simple lighting scheme. With a plain background, very few props, and three lights, I am able to work on portraits all day and every day. That is the challenge of this work—and it’s what makes photographing people interesting.

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**CENTER OF INTEREST**

*When you are taking pictures of people, there are three general approaches: (1) the long view of a person with surroundings featured; (2) the full-figure shot; (3) the close-up. In each case there is a center of interest—whether it is Aunt Minnie at Niagara Falls or the baby playing with a kitten. And the photographer’s high resolve should be to eliminate all waste material from the scene and concentrate on the center.

When dealing with people, it is the close-up which is apt to be most interesting and, strangely enough, it seems to be the hardest for the photographer to bring himself to take. But the average camera focuses to as close as 3 or 3½ feet—often closer. And that should be close enough to eliminate a lot of unnecessary detail. So if you’re taking a picture of the baby and his mother and friend kitten, get up close. Notice that in this version of the scene a close position has left out a lot of excess detail.*

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*A good close-up, showing undivided attention to the center of interest*
PHOTOGRAPHING THE INDIANS OF THE SOUTHWEST
Milton Snow
Photographer, Education Division, Navajo Service

For the photographer, there is almost nothing so fascinating or so difficult as the true picturing of an unfamiliar people. In our travels, we are constantly aiming our cameras at "natives" of a different nationality or race, of different appearance, costume, or philosophy. The sight of an American tourist, camera in hand and looking for picturesque subjects in the local market place, must be familiar to peoples of all the world. And yet how many of us have ever come back with a true story of a people?

The author of this article has made as his life work the photographic study of the American Indian. His is an intelligent approach to the camera recording of a strange way of living. And, what is more, his observations apply to people who are within our own borders. We do not any of us have to go far from home to find an interesting community of people differing from our own. To name just a few, there are the Cajuns of Louisiana, Indians of the Columbia River district, Mexicans of Southern California, Shakers of Pennsylvania, or the Madeira Islanders of Massachusetts—each one with a fascinating story to tell of an unusual background, philosophy of life, or occupation. We must not, of course, approach these people as "foreigners," but we must approach them with an awareness of our own limited understanding.

The real picturing of a people will do much to make them understood—much more than the wild snapshotting of a tourist gone beserk in a maze of new and strange sights. The idea of a careful background study and of a polite and unhurried approach can and should be carried over to any work with unfamiliar nations or races. By so doing—through your lens—these people will become more familiar.

All photographs by Milton Snow.

The earliest photographic records of the Southwest* were made in the 60's and 70's of the last century. That, you will remember, was not so long after the novelty of the photographic process had worn off and its possibilities and values realized. William H. Jackson, representing the U. S. Geological Survey, J. K. Hillers for the Bureau of American Ethnology, and Ben Wittick for the Atchison, Topeka, and Santa Fe Railway were the most notable of these Southwestern photographic pioneers—though there were others carrying about wet plate paraphernalia, risking their necks among the righteously angered aborigines, who were less wonted up over being "put on paper" than they were annoyed at the invaders in general. Jackson visited the Hopis and Utes as well as other tribes, while Hillers' Zuni photographs have preserved much for us. Ben Wittick, first for the railroad and later as a money-making pictorialist, took pictures of Navajos.

*For the benefit of the uninitiated, it might be well to define the word "Southwest." This may be done simply by naming Arizona and New Mexico as the heart of it, with the outer bounds dependent upon personal preference. Today, within these two states are represented 34 tribes of American Indians, these being classified roughly into: (1) Puebloan or Village dwellers; (2) the semi-nomadic tribes, the Navajo, Apache, and Ute; (3) the sedentary desert-dwelling Pimas, Papagos, Maricopas.

NAVAJO CHIEFTAIN AND WIFE. This Ben Wittick photograph was taken in his "gallery" at Fort Wingate in the late nineteenth century. Manuelito, the chieftain, in 1864 placed his thumbnprint on the Treaty of Bosque Redondo, which allowed the Navajo Nation to return to its old land. The photograph is famous for his early Indian photographs.

Photo by Ben Wittick; copy by Milton Snow.
Zunis, Apaches, and other natives of the land. He was a pioneer from the soul out. Born in Pennsylvania, he made his devious way to this other side of the continent and wandered among the Southwestern Indians with a wagon and team and an 11 x 14 view camera. Others have come and gone in the course of years following those who first made the exposure by removing the lens cap. All manner of equipment has graced their tripods.

Others have come and gone in the course of years following those who first made the exposure by removing the lens cap. All manner of equipment has graced their tripods.

NAVAJO MOTHER AND CHILD. The cradle board is still used by the Navajo and Apache Indians and this Navajo mother has made a quaint touch of modernism by the addition of a baby's hat bought at the trading post. Taken while listening to a speech at the opening of a flour mill, this native woman paid no attention to the camera.

Every conceivable type of lens has been pointed with more or less deadly effect at the Indians, until now, by order of the U. S. Department of the Interior, permission must be had before unlimbering the box. Except perhaps at public fiestas and rodeos, the American Indian is protected by an order from his guardian, the United States Government.

Photographing an Indian, then, or something pertinent to him, is a task that should be approached with some thought and consideration.

INDIAN TRIBES AND CEREMONIES

The Navajo is the largest tribe of Indians in the Southwest, in fact, being all-inclusive, this tribe is the largest in the United States and today numbers 48,000. The other of the Southwestern tribes fall short of the Navajo. The Pimas and Papagos are something over 5,000 each; the Puebloan Hopi, Zuni, and Laguna are a little over 2,000 each. Being the largest group and situated as they are remote from Caucasian centers and their routes of travel, the Navajo as well as the Puebloan Hopi and Zuni tribes have kept their culture remarkably free from the taint of their conquerors, though they have borrowed such as fitted their scheme of living. Especially have these three tribes kept out the influence of the well-meaning missionaries from the rituals and ceremonies which have been buried deep in the tribal heart from the beginning of time.

When the white man first became curious about his religious ritual, the Indian paid little attention other than to see that certain sacred concepts and precincts were not violated. He did not even object to picture-taking of the public part of his dances. Photographs of the sacred Hopi Snake Dance were made until about 1915 or 1916. Today pictures of this ceremony simply are not taken.

The fact that the photographing of Indian ceremonials or "dances" is seldom permitted is a fine thing. So few of our own concepts are sacred to the point of prohibiting their being pictured. The experience of the profundity of a Zuni Shalako, a Navajo Mountain Chant or a Yei-bi-chai, or the Hopi Snake Dance leaves one with the dazed wondering of where this civilization of ours is taking us. Most of the "dances" that the spectator sees represent but a moment in the sequence of a very complicated ritual, and I defy anyone to interpret well photographically that which he does not understand or appreciate.

The Navajo Mountain Chant is a nine-day ceremony as is likewise the Yei-bi-chai. The public part of both of these ceremonies is on the ninth day, a culmination of the whole ceremonial which is ostensibly an invocation to the gods to cure the ailing person.
The complete Snake Dance ceremony covers a period of nine days also, while the actual dance part that is witnessed by the public lasts no longer than twenty or thirty minutes.

The most common of the Navajo ceremonies is the squaw dance, a three-day affair, which, in its older original form, was a War Ritual performed after returning from the raid.

Ceremonials are the common meeting ground for young people and old. Boy meets girl, boy loses girl, boy wins girl. Among older women gossip flows and mutton ribs broil and fried bread sizzles in the hot fat. They may mention the fact that Azdzan Sosi (Slim Woman) from the Tsegi Country has placed her husband’s saddle and other effects outside of the hogan door (thus signifying her divorce and independence) or that Dezba’s new rug is nearly woven and she will exhibit it at the Navajo Tribal Fair this fall. Horse trading or horse racing or perhaps politics occupy the man in daylight hours, his jet black hair combed and tied with a wool strand at the nape of his neck exactly as is his wife’s.

BASIC UNDERSTANDING

All of this is interesting and picturesque and may be photographed in such light, but a much more fascinating and certainly a more worthwhile undertaking is to picture the Indian with some understanding—some feeling for his culture which we should see as not lower than ours, but merely different. The Indian should never be judged out of his element where too often we do see and judge him, for in his own he is an entirely different individual. He is this person, or that, with certain accomplishments to his credit. Truly the real Indian is not at all the “Blanket Indian” we see on the streets of our Southwestern towns and if you would photograph him, do so when he is a Navajo, a Hopi, a Zuni, or other Indian—on his own home ground.

It is difficult to pass judgment on which of these peoples are the most interesting in regard to the camera. Each tribe has something that is lacking in another. One person may find the Pimas or Papagos fascinating, while another may be introduced to the reservation in an all-too-frequent sandstorm and come out thoroughly disgusted. One never knows—not predicts—in the Southwest. Generally speaking, however, the traveler finds the Navajo, the Hopi, the Zuni, and some of the other pueblos more interesting from a cultural standpoint. Their arts and crafts are more highly developed and, to some, these tribes seem more virile. The Navajo, for instance, is conceded as unexcel-

WAYSIDE REST. Permission to photograph this subject was forthcoming when a print was promised as payment. The expression was captured by “fumbling” with the 5 x 7 view camera (12-inch lens) until the subject had forgotten herself.

led in his silversmithing and rug weaving, although his ceremonial wedding basket is made by the Utes to the North of him. He has to trade for it. In fact, one might say, “No Ute—no wedding basket—no get married.” But the cagey Navajo would soon find a way around such a state of affairs, even if the entire Ute nation left the country. His polygamous nature could not be so easily subdued.

The Hopi and Zuni are also excellent silversmiths, as are some of the Rio Grande Pueblos. Of the potters, the San Ildefonso,
the San Juan, Santa Clara, Maricopa, and the Hopi are among the best. The Hopis, Pimas, Utes and Apaches are the basket weavers—and each type is beautiful in its own distinctive way. The Pimas really go in for it, making one type, a coiled storage basket, that may stand $4\frac{1}{2}$ feet in height with varying diameter of 2 to 3 feet, while others are so small and delicate that they have no practical use. The large ones are employed in storage rooms as grain bins.

At this point, a warning might be timely: do not expect to find, for instance, in every Navajo hogan, a loom set up or a silversmith at work. Factories do not exist. But the observing visitor without doubt will find something to quicken his interest, no matter how drab the first casual glance may seem.

ENTRÉE

I am often asked, especially since the order has been issued protecting the Indian from camera-minded tourists, how a picture-making entree may be effected. The answer is simple: Ladies and gentlemen have no trouble, others have no success. The same courtesies that would be extended to anyone else should be used in approaching an Indian’s home. If your call is welcome, you will know it. If your call is an inconvenient interruption to one family, perhaps another with more time may be more favorably disposed. There is usually someone nearby who will be willing to interpret for you, in event your chosen one cannot (or most likely will not) understand you in English or, as the Navajos say in “Bellacana.” Once you have found someone willing to become acquainted, the rest is comparatively easy. Genuine interest in your host’s behalf will be quickly reciprocated. One thing leads to another and in no time the way is paved for willing camera subjects.

The question as to whether or not to pay for taking Indians’ pictures may be best answered by Order No. 1432, dated November 25, 1939 and issued by the U. S. Depart-
PHOTOGRAPHING THE INDIANS OF THE SOUTHWEST

SCHOOLROOM. This photograph, showing youngsters from the hogan listening to a Walt Disney story, is one of a series on the activities the Boarding School’s Primary Education. It was taken for official government use in connection with the Navajo Service. Synchroflashed with a 4 x 5 Speed Graphic.

obtained and has been registered with the Superintendency in charge of the jurisdiction, a permit from the Secretary of the Interior is not requisite.

“In all cases, throughout the Indian country, any maker of pictures on tribal lands must consult beforehand the tribal officers. Limitations which they may impose must scrupulously be regarded, and any charges asked by the Indians must be paid. Indians are not landscape or objects, but human beings with their privacies and dignities as such; and Indian places, though bearing no outward sign, may be as sacred in the Indian mind as any religious sanctuary in the white world.

“(Signed) Harold L. Ickes
Secretary of the Interior”

In my earlier days of photographing Indians for the Social and Economic Survey Section, U. S. Soil Conservation Service, I was assigned the task of recording with the camera the economic life of the Navajo in the remote Dennehotso district of the Reservation. Camp was established at my interpreter’s hogan. Hostin Buddy Smith and I set out to persuade the populace that a pictorial record of their doings would ultimately result in great benefit for them, emphasis being placed on the fact that the photographs were solely for the use of Washington (the United States government being referred to by the American Indian as “Washington”). For several days all went well. Then Buddy went to a “sing” or ceremony. I started out alone in the station wagon thinking that a four-word vocabulary and a grin would get me by—but it didn’t. I ran amuck at The Blue Eyes’ hogan where the whole family was engrossed in the fall corn harvest. I grinned all right. And I used my four words supplemented by elaborate gestures. But when my tripod and 5 x 7 view camera was set up, Hostin Blue Eyes walked over to the front of the camera and made his gesture—a sweeping motion with his forefinger—which left my Goerz Dagor lens covered with a gob of old fashioned wagon axle grease.

The next day Buddy accompanied me back to the Blue Eyes’ hogan and we smoked (figuratively) the pipe of peace which resulted in my taking all of the pictures that I wanted. Blue Eyes had taken me for a “money maker.” So many Indians have recognized themselves in postcard views and other photographs for sale at stores that they are prone to take all who come with cameras as such, and have rightfully assumed that if their likenesses bring a price at a store, then why should they not be paid for their time spent in posing. And when pictures are promised as payment for posing, few are ever received.

INSIDE THE HOGAN. With the help of her mother and sister, this little Navajo girl became absorbed in her doll and cradle board and forgot the camera—and it was possible to make several exposures. Taken inside the hogan with the aid of reflectors. DATA: Home Portrait Graflex, 12-inch lens, fast pan film, f/4.5, 1/25 second
Of the ceremonial life of the Indian much can be said—and little photographed. Some of the Rio Grande peoples, I understand, have permitted certain dances in day time to be shot both in still and movies by amateurs. I do not know what the arrangements were. As many of the dances are night affairs, photography, especially movies, are out, except perhaps for silhouette shots. Flashbulbs for stills wouldn’t be tolerated for anything of a serious nature either. On the Navajo I once had permission to record the baking of sacred bread for use in the Kinalda’ “sing,” a four-day puberty ritual undergone by all girls. Fortunately, this part of the ceremony was in daylight and, in spite of a December drizzle which turned to snow, I was able to get the complete sequence from batter stirring to placing it into the preheated corn shuck-lined baking pit. Even with the medicine man’s sanction, the women (who did the work) made voluble as well as visual objections. I had always noted the voluminosness of the Navajo woman’s dress (a hand-me-down from early American times), but until this occasion I had not quite been aware of the difficulty of trying to shoot through the spread of six or eight indignant, many-hued skirts.

The amenability of different tribes to being photographed may be discussed, but the value of such a discourse would be doubtful. The Apache seems to have a decided antipathy towards the camera, as likewise does his pueblo cousin, the Santo Domingo. But with the proper approach, such a statement would seem a fallacy. Similarly a specific formula for an entree to a pueblo or other tribe would not hold water. Sincerity, genuine interest, and plenty of time will in many

THE KINALDA. The women, shown placing the batter in a baking pit lined with corn shucks, objected to the presence of the camera at this “puberty sing.” Hostin Bekini (meaning “man with the house”), who gave permission to photograph the sacred bread baking, stands at the left. Photographed for the United States Soil Conservation Service.
PHOTOGRAPHING THE INDIANS OF THE SOUTHWEST

instances be an open sesame to a photographer's delight.

SPECIAL CELEBRATION

However, if one wishes to indulge in the superficial side of photographing the Indian, there are excellent opportunities to do so at the Gallup (New Mexico) Intertribal Indian Ceremonials, held annually in the latter part of August. Here almost all Southwestern tribes are represented in their gloriously colorful tribal costumes and go through their paces before the grandstand where, in the afternoon, both movies and stills may be taken to the heart's content. The evening performances may be photographed also, but flashbulbs are not permitted and, as much of the illumination is dependent upon wood fires in the area, such light is of value mainly for silhouettes. Each of the three or four days of the event is opened by a morning parade through the streets of the town. This is truly a spectacle. The different tribes in native costume are followed by trains of Navajo horsemen and covered wagons reminiscent of early western pioneer days. In this event no holds are barred, but it is well not to let enthusiasm become crossed with the disposition of a cantankerous Indian pony just off of the range. If he happens to be shod, it hurts worse.

The Navajo Tribal Fair*, also held in the fall of the year, is a haven for the cameraminded. At Window Rock, Arizona, just twenty-seven miles northwest of Gallup, New Mexico, the tribe has a well-laid-out half-mile course, with chutes opening out upon the grandstand fronted arena. Stock pens, a native market, and an arts and crafts exhibit building give the opportunity for individual craft recognition. Here the Navajo is at home, so don't tread on his toes with the camera. He is a clean, extremely handsome American with a costume that is photogenic any way you choose—and if you are a good photographer you can catch a certain sly, subtle humor that shows itself when he is at ease.

The Flagstaff (Arizona) All-Indian Pow Wow is another artificial Indian Celebration. It takes place on the 3rd, 4th, and 5th of July each year and has much the same aspect as the Gallup Inter-tribal Ceremonials—a free-for-all as far as the camera goes.

Each tribe performs in one way or another some time during the year. At the white man's Fairs, Fiestas, and Rodeos throughout the Southwest, the Indian tribes nearest the event are usually well represented, for they love the excitement and gaiety of such occasions. Only the high spots are touched upon here, but more complete and specific information may be obtained from Chambers of Commerce, Travel Agencies, or Tourist Guides which will, no doubt, suit the individual desires much better.

TECHNICAL ADVICE

So far, I have purposely avoided the mention of technical photographic data. I realize that, as far as cameras go, each has his way of working with certain equipment, and certainly if the old timers with 11 x 14 wet plate outfits packed on the back of a mule could take Indian pictures, then there remains little reason why such a question should be brought to issue here. Anyway everyone knows it isn't the outfit, but the man behind it.

For what it is worth, here is some technical data and other information concerning my work, as staff photographer on the 16,000,000-acre Navajo Indian Reservation. For field work, I use a 5 x 7 Graflex (Home Portrait Model), a 4 x 5 Speed Graphic, plus gadgets, and a Leica for Kodachrome. In covering the Tribal Council meetings and other indoor affairs, the Speed Graphic and flash does the work. For field work, all three of the cameras serve, though I find that the 5 x 7 Graflex comes in for a great many of the field jobs on account of the large negative size. And then, too, the lab facilities allow for greater speed in contact printing than in enlarging. A 5 x 7 Agfa View camera is in constant use on the copy stand. Recent acquisitions are two motion picture cameras. One, a 16mm R. C. A. Sound Camera, is to be used solely for Kodachrome, while the Model P Bell and Howell Eyemo will be a more serious outfit with which, besides the regular run of educational and record pic-

*Owing to the large number of Navajos participating in both the armed forces and civilian defense, and due to lack of travel facilities, the Navajo Tribal Fair is to be temporarily discontinued.
TUG OF WAR. Here is an ancient Indian sport, photographed at a barbeque and rodeo on the Navajo Reservation. The determination and earnestness of the game is shown in the expressions of the participants.

Taken for the Navajo Service

tures, I hope to do a long time job of documenting the Navajo Indian during the coming years in the Southwest.

I have two full-blood Navajo assistants, both of whom had never seen a film developed nor a print made when they came to my department. Now almost all of the routine developing, printing, and enlarging, as well as copying and other work, is done by these two boys. With such effective assistance my work is much easier.

In the high clear atmosphere of the mountains and mesas of the Indian country a minimum of exposure may be given with Eastman Super Panchro Press cut film with a K 2 filter. I have frequently stopped down to f/22 and f/32, 1/50 second for a dark skinned Navajo portrait in sunlight. In winter, exposures run slightly greater unless in snow-covered areas. Often a ground exposure meter reading will be greater than a sky reading. This is especially true in the Hopi villages and some of the other Pueblos where the reflection is greatest from the light rocks and house walls.

Some visiting photographers have used reflectors in close-ups of Indian subjects, but I prefer unaltered natural lighting. Kodachrome exposures run more or less on an f/8, 1/50 second basis. My old model G. E. Exposure Meter has proved quite satisfactory in determining both Kodachrome and black and white exposures. And, speaking of Kodachrome, that medium is certainly in its own in the Southwest—from every angle. I think that there is no section of the United States with a more varied riot of color and good picture subjects.
SELF-PORTRAITS

It is safe to say that while people are interested in other people in varying degrees, they are always interested in themselves. This is a natural trait of human nature. And yet it is surprising to find so few self-portraits to prove this theory. In painting, it was and is a recognized art form, and the self-portraits of Van Gogh, Dürer, and Rembrandt, for instance, are famous.

But in photography, self-portraits are still more or less in the stunt field. Of course this is reasonable, because sometimes the photographer is merely experimenting with lights or a new pose or type of make-up, and he is his own handiest model. But it is also true that some photographers are impatient when posing before other people’s cameras, and they can often get a better likeness by posing themselves. Then, there is always the self-portrait which shows “me at Niagara” — the more or less record type of shot. Such outdoor scenes, if handled in the right way, can become excellent landscape pictorials, with the photographer’s own image included.

METHODS

Four simple methods are open to the photographer, the long cable release, the self-timer or delayed action mechanism, the synchronized flash unit with remote control, and the use of a mirror. A modern device is the all-electric synchroflash unit which, when used with a remote control unit, will fire the shutter (with or without flashbulb, of course) at almost any distance. The long cable release is simple in the extreme, but somewhat limiting when it comes to varying the pose (there is always the problem of how to hide the actual release) or the distance. The mirror has the great advantage of enabling the photographer to study the lighting up to and during the time of exposure. And some very effective self-portraits have been made with mirrors where the camera was included as an important prop. The usual problems of photographing a reflected image are involved, though, so remember to focus on the visual image—not on the mirror surface itself. The lens should be focused for the distance from the camera to mirror plus the subject-to-mirror distance. And it is, of course, important that the artificial light rays do not strike the lens either directly or by the mirror reflection. This is apt to be the most important problem, as it is best to light mirror self-portraits from the mirror side, which often throws light at the camera, as well as at the subject.

It is often easiest to use a self-timer, set at 10 or more seconds, so that the photographer has plenty of time to release the timer and pose himself before the lens.

There are other ways of taking self-portraits. You can, for instance, have a simple lamp and reflector 45-degree arrangement and in a darkened room, take your position in the prearranged spot before a camera set on “Time.” The exposure is controlled by switching the light on and off. And then, some very successful pictures have been taken when a time exposure was used which was so long that the photographer could open the lens, take his position, and then move again to close the shutter.

MIRROR PORTRAIT. Peter Stackpole, well-known miniature camera expert and Life Magazine photographer, took this fine action portrait of himself by shooting directly into a mirror. The lighting falls on the face without shining into the lens, the background is interestingly simple, and the composition is well planned, showing that self-portraits can be much more than mere records, if carefully executed.
The unique and important role of the "still man" in the Hollywood motion picture studio is told by one who has worked for United Artists and Samuel Goldwyn, Inc. The technics and problems involved in taking production stills, off-stage portraits, and general publicity photographs are detailed. Everyone sees the work of these Hollywood photographers in newspapers and magazines and on posters—and here is the inside story of how they are taken and used.

All photographs by Ned Scott.

See Also Lighting In Portraiture, Miniature Photography, Publicity Photography

A n estimated $10,000,000 is spent yearly on the Hollywood still man's salary, laboratory work, and the cost of new equipment. This is because his importance to the industry, while intangible, is great, since stills remain the most potent and effective means of selling the motion picture to the exhibitor, of building up soda-jerking blondes into new star material, of keeping established box office names before the public, and last but most important, of getting the public inside the theater to see the finished film.

A still man's job can be divided into two functions—to "sell" the movie and to aid in actual making of the movie.

First, he must "sell" the movie. Stills taken for this purpose fall into eight classifications:

1. Production stills—actual scenes taken from the movie.
2. Off-stage portraits
3. Fashion photographs
4. "Leg art"
5. Seasonal gag shots of the stars
6. Clinch shots of stars—specially posed for newspaper advertising layouts
7. Tie-ups
8. Publicity photographs.
STILL PHOTOGRAPHY IN THE MOTION PICTURE INDUSTRY

PRODUCTION STILLS

Chief of these is the production still. This is a photograph of an actual scene, taken on the set with an 8 x 10 view camera when the company has finished shooting. When the director turns away to prepare for the next set-up, it is the still man’s moment—and literally a moment. Yelling “Hold it for a still!” he threads his way through a bedlam of grips, electricians, prop men, camera assistants, wardrobe girls, and hairdressers, sets his tripod on the coveted spot, and dives under his black cloth. With a single gesture the swing back is adjusted, the impatient actors are brought into focus, the lens stopped to f/22, and the film holder inserted. Our still man gives the bulb a quick poke and struggles out.

Production stills of this kind are extremely important to the smooth running of any motion picture. There is not always time to do a good job, however, since minutes are fabulously precious on the studio set. The photographer will therefore often find this unsatisfactory, but nevertheless very important work.

On an average movie of the “B” class, the producing company guarantees the releasing company a minimum of 125 of these production stills; an “A” picture may supply up to 1000, each one different. These are channeled out through all the publicity outlets: wire syndicates, newspapers, magazines. They are used in sales booklets within the industry, for display advertising in front of theaters, in advertising layouts of all kinds, and made up into “silent salesmen”—a packet of stills compiled to impress exhibitors. In other words, they are used first to sell the movie to the exhibitor and then, by the company and the exhibitor together, to sell the movie to the paying public.

The second, coming under the “selling” category is the off-stage portrait of the stars and character actors, shot either in a gallery or in a corner of the sound stage on which the company is working. The latter is preferable because the actors can then be snatched between scenes, thus obviating costly special sittings.

In regular studio portrait work, most portrait still men develop a style of lighting and posing. George Hurrell descended on Hollywood with his low-key, one-light effect of lighting women; many are apeing his results, but Hurrell’s individualism still stands out as any artist’s style will. Originality, not mimicry, remains the best policy.

Personally I favor low-key portraiture because it results in prints that are not only rich in the proportion of black to half tones, but they seem more character-revealing. For heads I generally employ a 750-watt spot key light and three 500-watt spots—one for filling in and two that may be placed

PRODUCTION STILLS. A scene from Pot O’ Gold was repeated by the two stars—Paulette Goddard and James Stewart—so that the still man could get this sequence, which might be used as a strip in a magazine.
at strategic points in back of the subject. These two lights, known as “kickers,” tend to relieve the subject from the background. Suitable gauzes or “frosts” are used over the spots to balance the quantity of light properly and, quite often, the spot used for filling in the shadows will be placed next to the lens. This fill light may, in addition to the gauzes, carry a “snoot,” a cylinder placed over the light, cutting the beam to a diameter to include only the face. Then a white backing is placed ten or fifteen feet behind the subject, all light having been screened from it. A 65 amp arc will be spotted on the backing at any point required to lighten the composition on the groundglass. The exposure for such heads on Super Panchro Press generally runs around 1/10 second at f/22.

Because of the difficulty in getting the stars to pose for a sitting, as many poses as possible must be made in an hour. With a cooperative subject and the help of a good electrician who understands lighting, all the portraits of one star can be made within three hours. Sometimes forty different poses are made in that time.

**ADDITIONAL STILLS**

In addition to production shots and off-stage portraits, the still man is responsible for fashion photographs of the stars, “leg art,” and seasonal gag shots. These are just what their names imply. The gag shots of stars may show them carving Thanksgiving turkeys or decorating Christmas trees, peeking coyly from behind a huge Valentine or shooting off fireworks.

There is also “poster art”—clinch shots of the stars specially posed for newspaper advertising layouts. Then there are tie-ups. These show the lead posed with a particular radio star or some other nationally-known person.

Lastly there are publicity photographs—human interest, action, news, or candid shots of the stars. All these stills are released through the same channels to create a general interest in the movie in question and thus build up box-office draw.

**STILLS HELP TO MAKE MOVIES**

The still man's second function is to aid in the actual making of the movie. In this category are “set” stills, an important part of his daily work on the stage. When the company moves into a new set, for instance a boarding house parlor, the still man photographs it in its entirety, being careful to show all detail of props
STILL PHOTOGRAPHY IN THE MOTION PICTURE INDUSTRY

FASHION SHOT. For a publicity build-up, starlets are often posed in the latest fashions and the photos, are commonly seen in fan magazines and the fashion departments of newspapers and national magazines and furnishings. This is for the purpose of “matching” for possible retakes, in case any part of the scene has to be redone at some later date. The prop men and set dressers can then reproduce the set down to the last exact detail of crumpled newspaper or half-drawn window shade. If, in the course of the action a fight or some upset makes violent changes in the room, the still man must photograph this also. In this particular kind of work, the still photographer is expected to take a record shot—artistry is out in favor of extreme accuracy. This tends to limit his scope, but presents a definite challenge.

TIE-UP PUBLICITY. Informal pictures of stars greeting celebrities on the set are always good—and may also come under the head of news. Here are Paulette Goddard and producer James Roosevelt on the set of Pot O' Gold

CHARACTER STUDY. Constantine Romanoff was posed for this remarkable on-the-set camera study, showing “the hairy ape” in John Ford’s Argosy production of The Long Voyage Home, adapted from the plays of Eugene O'Neill.

Make-up stills are taken of all the important actors, also for the purpose of matching. Wardrobe stills—shots of the principals in their various changes—are taken for the same reason. Lastly, the still man makes background “plates” or “stereos” as they are sometimes called—8 x 10 negatives which are later reduced to lantern slides and then projected on the process screen. In the case of very complicated process work, there is a special staff, of course.
The scene may call for a touring car coming to a stop at sunset on a highway in Arizona. With the process screen this can be easily accomplished on the stage. A dirt road, with perhaps a barbed wire fence on the far side, is built in front of the screen, a
still of the sunset on the Arizona desert is projected on the screen, and the illusion is complete. In this way studios have saved many thousands of dollars in production costs in recent years, cutting expensive location shooting down to a minimum.

When one realizes that the average production schedule of a movie is from four to six weeks, and that this vast bulk of photographs which the still man takes must be done in that time (he usually goes on salary only a day before shooting starts), it is evident that he need never have an idle moment. There is use every moment of the day for one or another of the cameras which comprise his equipment.

**EQUIPMENT**

The 8 x 10, of course, is the most commonly used camera. With it are taken production stills, fashion, wardrobe, make-up and set stills, “stereos,” and portraits. This is because, in the main, the 8 x 10 print is universally preferred and printing by contact is cheaper; also because an 8 x 10 negative is naturally more adaptable to retouching because of the convenient working size.

The 4 x 5 Speed Graphic with synchronized flashgun, used for news pictures or anything that may catch the eye, probably comes next in importance. Between scenes, the still man keeps within shot of the principals in the cast, alert to any odd positions they may assume which would make a good flashbulb shot. Such pictures can be captioned easily and are therefore in demand by newspapers. When time permits, the still man may use two or more bulbs placed at strategic points, all bulbs going off in synchronism through extensions from the flashgun. Such pictures give the feeling of careful illumination with backlighting; in a set-up where the actors are perhaps 30 feet from the background, two bulbs can make all the difference between a black print with two ghostly faces and one full of detail and environment.

Owing to the fact that at least one of the lights in a movie set hits the lens in every shot made, “opticoting” the lens surfaces has a distinct advantage. Not only does opticoting minimize the extent of refracted light in a lens, thereby increasing its apparent speed by as much as half a stop, but it also decidedly increases the definition. This does not mean the lens shade may be discarded.

Color. While one-shot, two- and three-color cameras are occasionally used and reproduction therefrom is the best, Kodachrome is most generally employed and with quite satisfactory results. On the average “A” movie about 30 8 x 10 and 40 4 x 5 Kodachromes may be shot, mostly with magazine covers in mind.
THE COMPLETE PHOTOGRAPHER

TECHNICS OF STILLS

While it is true that the still man’s most important function is to sell the movie by means of his photographs, the actual way he achieves this is often surprising to the layman. Ironically enough, 85 per cent of the demand is not for pictures which “tell the story,” but for those which fall roughly into the three classifications of “glamor,” “menace,” or “gag” stills. The majority of outlets are merely interested in eye-catching stills which attract attention to the blurb underneath; only a few of the magazines are interested in printing the actual narrative highlights of the movie.

The general rule for all stills is to fill the plate with the principals. The larger the stars can be made on the groundglass, the better the publicity departments like it, regardless of the fact that the scene may include a group of supporting players and extras. Partial reason for this is that a large group of people is generally more confusing than eye-compelling; also the public is much more interested in looking at two well-known faces in a new setting, than at many unfamiliar faces. Background, too, is less important than the stars, unless it be something extraordinary.

Another primary rule for a still man—one which he either learns quickly or he finds himself looking for a job—is that his picture must be right on the negative. The pressure of speed on both still man and laboratory makes it impossible to depend on darkroom methods of dodging and doctoring to turn a merely passable negative into a good print.

Since the major portion of his work goes to newspapers, the still man must consider the technical demands of the engraver when he sets up for his still. Most newspapers in this country want clearly defined photographs which are easy to reproduce—that is (by their definition) photographs with white backgrounds and few shadows, with no regard for gradation or quality. Newspapers will not bother with, or are not equipped to reproduce, even the most excellent photographs if they are not readily copied in the usual manner. This is the chief reason why most Hollywood stills seem to lack feeling and inspiration. Stills for the small group of prestige or class magazines, on the other hand, demand exactly the opposite approach.

SET-UP OF STILL MEN

The major studios—Paramount, M. G. M., R. K. O., Universal, Columbia, and 20th Century Fox—employ a man to head the still department. His job is to organize the lab and keep it functioning, and to hire still men. One still man is assigned to each movie production; each major studio will keep two or three portrait still men constantly on the payroll.

In starting out, the regular still man is handed an 8 x 10 view camera and a 4 x 5 Speed Graphic with accessories. As each major studio always has from 4 to 18 different movies in production, four or five regular still men are kept constantly busy and, as a result, the seniority system of employment prevails. As soon as the seniors have all been assigned, new men are called in for additional productions then starting. They may be given their calls to begin work the next morning and they are seldom advised when they will be taken off the payroll. As a result, when not working, still men must remain within ear shot of the telephone in order not to miss a call.

On the other hand, independent studios such as Samuel Goldwyn, Walter Wanger, Sol Lesser, etc., hire one still man to cover completely each production. It is up to

FLASH ACTION. Here is a typical gag shot, given the candid feeling by the use of flash photography on the set. The author has also not forgotten to include a bit of leg art!
STILL PHOTOGRAPHY IN THE MOTION PICTURE INDUSTRY

him to organize his time so that all portraits and publicity stills can be made without sacrificing the regular production stills of scenes. He takes over from start to finish. He is given a script of the picture and he takes a decided interest in working out a program for himself so that, at the end, he can feel with pride that his production was completely covered from every point of view.

The still man, as well as being an expert technician, a speed artist, an advertising man and active member of a movie crew, must be a promoter and diplomat. Although the publicity department is his nominal boss, he is rarely given actual assignments, and unless he has initiative and is quick to see picture possibilities as they arise, he does not last. He functions most of the time on his own. When he is given specific assignments, they are often so far-fetched that director and stars will flatly refuse to pose. The news photographer can snatch his picture and run, but the still man is an integral part of the movie company; he must face them every morning for the length of the picture, and continue to command their cooperation. He must therefore use his own judgment and diplomacy in striking a balance between the publicity department's schemes and the company's good-will.

In his relationship with the movie company, time is the still man's most potent adversary, for time literally means money. The tremendous cost of a movie production, which averages from $6000 to $10,000 daily, places all concerned under terrific pressure and tension. This is understandable but often makes the still man's job doubly difficult, for the company frequently begrudges him even the minute or two necessary to get his still—in spite of the fact that the entire company from the director down realizes that his job is not only important to them and their movie, but essential.

The good still man is hired for his point of view and for his capacity to act without being told. This does not apply in the same degree in certain studios where the policy is to hire three separate men to fulfill the still man's three main functions. In this case there is a portrait photographer, a publicity still man, and a third photographer attached to the movie company for production stills alone. Then the production man's job is fairly simple and routine, consisting only in handling an 8 x 10 camera for shots of movie scenes. Moreover his daily output of such stills is often arbitrarily limited because of the specialization.
The essential difference between the still man and other photographers is that the still man is an integral part of the motion picture industry; he must know its problems and limitations and understand his own place in it. Unlike the commercial photographer who can take his time properly lighting and arranging a set-up, the still man has at most one or two minutes before he must hurry back into the obscurity of the sound stage's bedlam. Therefore, before adjusting the legs of his tripod he must have a complete plan in mind for lighting, angle, exposure, distance, pose, mood.

PROCESSING LABS

The major studios have their own processing labs. At the end of the day the still man turns in his exposed film to the lab and there his responsibility ends. Should his exposures not conform to the lab's time and temperature method of developing, he is advised the following day to make the necessary adjustments. Because of the quantity of exposed film processed every night—from 300 to 1000 8 x 10's and 4 x 5's—little individual consideration can be expected. On the other hand, United Artists' studio, which is made up of independent producers and which has its own small lab, seldom handles more than two productions at once. Independent producers either contract with this lab for their processing, or with some small outside lab. In either case the still man has much greater supervision over his work. For instance, if he knows ahead that certain films have been under- or overexposed, he may so earmark them for the lab's benefit, and thus possibly be saved the embarrassment of a long explanation.

SYMBOLS—THEY TELL THE STORY OF PEOPLE

It is strange but very true that sometimes the view of a man's desk will tell more about his character than a lifelike portrait. Sometimes a photograph of the top of a lady's dresser or of the contents of a small boy's pocket will reveal traits which are hidden by a portrait of his or her features. Inanimate objects—signs, billboards, gravestones—have been used for years by documentary photographers to express a level of mentality or of material wealth, a locale, or a way of living. Unfortunately the most recurrent symbol has been the well-known ashcan, now somewhat replaced by more positive symbols, however. The photo-journalist has taken up the symbol technic and we have seen pictures of such things as President Roosevelt's souvenir-laden desk, or the interior of a serviceman's locker, or the well-stocked shelves of a farmer's preserve closet.

Amateurs will find that symbols also tell the story of people they know. Father's old work hat or brother's well-painted jalopy, or perhaps a close-up view of some of grandmother's books—these will make fine subjects for the camera. And countless others will come to mind, of course. The main thing is to get up close enough to the object so that it will really speak for itself, so that the symbol will really play a positive part in rounding out the portrait which is being created.

Then you might try an unusual mailbox series, a row of military caps, or even footprints.

ART WORK. Fascism and Uncle Sam are found depicted on a box car in Texas—symbolic of the attitude of a whole people

F.S.A. photo, Russell Lee
I. General Introduction

Until a photographer—whether amateur or professional—develops and prints his own pictures he is missing more than half the thrill of his hobby or profession. As a cameraman watches his picture slowly take shape out of apparent nothingness onto a white sheet of paper, he is viewing the fulfillment of a long series of his own individual efforts, and that fascination—watching the mystical formation of an image—never leaves him no matter how long he is “in the business.”

We are going to follow, by means of many pictures and brief pointed text, the evolution of a picture—from the time it leaves a camera, through development, fixation and washing of the negative, through contact printing, and finally through enlargement. Every step in each process will be completely shown in detailed series of story-telling pictures so that anyone, if he follows this evolution himself, will be able to process his pictures to his own personal satisfaction and toward general acceptance among fellow camerists.

Not all processing requires elaborate darkroom set-ups or expensive outlays of equipment—we will begin our picture travelogue of a picture in the least expensive manner practical—right at home where the kitchen table and blackout curtains will do a thorough job at the least cost. As our “darkroom technic” becomes more complicated—cut films for example—necessary equipment will be shown and discussed. We will constantly watch the budget problem because by solving it, photography has become the hobby of millions.

At the portals of darkroom procedure one should swear allegiance to three principles: cleanliness, accuracy and high standards—cleanliness in all steps of processing; accuracy in compounding solutions, in measuring temperatures and in timing; and high standards of negative and print quality. The main equipment of every darkroom should be a spacious waste basket!
II. Developing Roll Film In A Tray

Your first darkroom may be any room so long as it is completely (100%) dark. Select a suitable table, protect it with moisture-resisting paper, such as butchers use to wrap meat, and you are ready to begin. You will need the following items of equipment:

1. A safelight—an inexpensive variety with a Wratten Series 2 Filter and correct bulb
2. Three enamel or glass trays (5 x 7 inches is all right)
3. Graduate measuring at least 16 ozs.
4. Glass stirring rod
5. Thermometer (Fahrenheit preferred)
6. Clock
7. Film clips
8. Towel
9. Cotton or fine grain sponge

For your first attempts it will be well to use an orthochromatic film such as Agfa Plenachrome or Eastman Verichrome, so that you may use the safelight to see what you are doing. Note: do not judge the time of development by how dark the image looks in red light—the safelight merely permits you to see your equipment. Time and temperature will determine the length of development, and later you will be wise to do your developing in total darkness regardless of the kind of film you are using. (Panchromatic film must be developed in total darkness always).

Many excellent prepared photographic solutions are available and you should use these at first. Supplied in tubes, cans, or boxes, these need only the addition of water and thorough stirring. You will require:

1. Developing Solution: Tube developers, such as Agfa or Eastman MQ Developers are “universal”—that is, can be used for either film or paper. Later you will turn to developers designed solely for negatives such as Agfa 17 or Eastman D-76. Accurately follow the directions for mixing which are on the tube label and stir thoroughly until the solution is clear.

2. Rinse: Clear water will suffice.

3. Fixing solution: Usually called “hypo,” the fixing bath is also standard and directions on the label should be followed carefully. Either Agfa 201 or Eastman F-5 are recommended hardening-fixing solutions and are available in easily mixed lots.

For step-by-step directions on mixing solutions refer to pages 108 and 111.

1: Always arrange your equipment—trays, solutions, clock—in the same order to avoid disastrous confusion. The layout shown is standard for most photographers. (Developer to the worker’s left or right as required.)

2: Mixing chemicals: If a graduate of sufficient size is used, your solutions can be mixed in it. Be certain to clean the graduate thoroughly after mixing each solution.

In case you are working on a table that must be used for other purposes, protect it with newspaper when using solutions or mixing chemicals in order to avoid stains.
3: Fastening film clip: before breaking the seal of the exposed film, turn out the white light. Slit seal with your right thumb nail, unroll protective paper until the film is reached, slit adhesive and fasten first clip. Lay clip down and continue unrolling until the end of the film is reached. Fasten second clip. Discard protective paper. All film spools should be saved and given back to your photography dealer.

4: Presoaking film: take a clip between the forefinger and thumb of each hand and lower the film in a U-shape into the rinse bath. See-saw the film back and forth through the water by alternately raising and lowering each hand. When film is completely limp, you are ready to develop. This presoaking makes the handling of the film much easier during development and insures an even coverage of developer at the start.

5: Development: with the developer at the exact temperature recommended by the manufacturer, lower film into the first solution. Watch the clock all during development and remove film at the exact time specified by the manufacturer's developing instructions. Keep film moving.

6: Rinse: use the same water to rinse off the developer as was used to presoak. See-saw the film in the rinse for at least 20 seconds.
7: **Fix:** After rinsing thoroughly, immerse in 65° to 70° fixing solution. Continue seesaw motion for about 12 minutes. After five you can turn on the white light and view the cleared image.

8: **Wash:** A regular kitchen or bathroom sink with a drain giving at least six inches of water will do. Be sure that fresh water constantly circulates around the entire film and occasionally remove the film and drain. Wash 30 minutes. Avoid turning on the full force of the faucet water or the agitation might damage the film by causing scratches where the film ends rub the emulsion.

9: **Drying:** A most important step in film processing. Suspend the roll in dust-free air by means of the clip, leaving the second to hold the film taut. With a damp sponge, chamois, or cotton, swab from top to bottom. Then remove any small globules of water with cotton. Do not dry over or beside a radiator. During this final drying process it is extremely important to keep the film in a dust-free room and also carefully wash any dust or grit out of the sponge or cotton before using. With a little extra care at this stage you will be saved much time later when spotting the final prints. When dry, cut the roll into individual negatives and file in separate envelopes. Be sure no damp spots remain.
The most satisfactory method of developing roll film is by using an adjustable roll film tank which is sold for $1.65. Once the film is loaded, the entire processing can be conducted in white light. The tank further helps eliminate finger prints and is much less tedious than the tray method. For the more prolific amateur and the professional, metal tanks holding five reels are available.

Besides the adjustable tank (get an adjustable right away, you may change film size or wish to develop another’s films sometime), you will require:

1. Thermometer (Fahrenheit)
2. Clock or (preferred) interval timer
3. 16 oz. graduate
4. Sponge, chamois or cotton
5. Funnel
6. Film clips or clamp-type clothes pin
7. Bottle of negative developer
8. Bottle of hardening-fix

1: Lay-out of equipment: bottle of fix, bottle of developer, tank, lid, reel and film, thermometer, clock, funnel, graduate, sponge, negative squeegee.

2: Loading the reel: TURN OUT ALL WHITE LIGHT. After the protective paper has been removed, grasp film by the edges, (always handle roll film only by the edges) and insert into the two slots of the reel. Gently shove the film into the absolutely dry reel bit by bit.

3: How the reel works: note that the spiral grooves prevent the coils of film from touching and permit circulation of solutions.

4: Closing tank: when loaded, insert the reel into the empty tank. Put the lid on securely and you may turn on lights.
5: Pour in developer—after you have brought it to the correct working temperature of 68°. Set clock. If the room temperature varies greatly from 68°, place roll tank in a pan of water at 68° to maintain the solution at constant, correct temperature throughout entire time of processing. By determining the capacity of your tank and measuring out developer into a graduate, you will avoid spilling. Do not process more than 10 rolls of film per quart of developer.

6: Agitate frequently during development by twirling the activator back and forth between the thumb and forefinger. If you use a 20 minute developer, you should twirl the reel back and forth several times every 2½ minutes. Automatic agitators which provide constant motion are available but certainly not necessary.

7: Pour out developer after development time has elapsed. A glass or enamel funnel is helpful. Store developer in a dark brown bottle of no more capacity than you have developer. Bakelite screw caps are more satisfactory than corks, and bottles should be placed in a room of moderate temperature. Label should show the kind of developer, when mixed, and the number of times used.

8: Rinse should be at 68° also. Pour in rinse, twirl agitator back and forth several times, and pour off. Rinse may be clear water, water and a few drops of acetic acid to act as a short stop, or a pre-fixation hardening bath (during hot weather), such as a solution of potassium chrome alum. Whatever the rinse, be certain it is recommended for the kind of developer you use.
9. **Fixation:** Fix should also be at 68°. Agitate briskly for a few minutes after you have poured in the fix to be certain that no air bubbles form. Development continues in such bubbles, causing spots in the negative which are impossible to remove or print out. Fix for about 12 minutes and agitate every 2 1/2. Hypo, like a standard negative developer, can be stored in dark brown bottles. Two quarts of fixing solution will usually process 20 rolls of film. However, should it become milky or froth easily before then, discard it.

10. **Washing:** Running water is much preferred to frequent changes, however, if possible, the water should run at 68°. Direct the flow of water into the center of the reel, permitting fresh water to rise through the spirals. Washing should continue at least a half hour and about every five minutes completely empty the tray to remove accumulated hypo. Occasionally lift the reel in and out of the water, forcing it through the reel.

When using frequent changes of water rather than running water, flush the reel up and down several times in each change and then allow the film to soak five minutes before discarding one change of water. About six changes of water, all about 68° F.—covering 30 minutes of soaking—will do a thorough job of removing the hypo from the emulsion.

11. **Drying film:** This is a most important step and great care should be taken. A sponge negative squeegee is a great help but not absolutely necessary. Two pieces of damp cotton, one on either side of the negative, should be slowly drawn from top to bottom of the roll. Attach film clips or clamp clothes pins to both ends to suspend the roll and also keep it taut. Do not hang over or beside a radiator—too rapid drying is harmful. Swab the film several times, taking care not to nick it with your fingernails. Daub remaining globules of water with the tip of your cotton swab. When thoroughly dry, the negatives should be cut to individual units if 116 or 127; if 120 they can be cut in pairs. For 35mm negatives, safes are available for storage in strips. Do not put more than two negatives or strips in one envelope. Alphabetized files are convenient and expedient.
IV. Cut-Sheet Film In A Tank

Cut film is the standard professional film because it is easier to handle, more durable, and can be shot and processed in any number. Processing equipment required includes: 3 tanks, sufficient developing hangers, thermometer, internal timer, graduates, cotton and negative developer, rinse, fix and spot preventive.

1: Loading the hanger and all processing must be done in complete darkness unless light-proof tank covers are used. Prior to turning out lights, arrange holders, hangers, clock, developer, rinse, and fix in a customary order. Adjust temperature of all solutions, and lay out hangers with the top clasp open. Slide the film out of the holders by the edges and insert one into each hanger. Clasp.

2: Developer should be selected according to film manufacturer’s recommendations. Directions accompanying developer give time and temperature. Several times during processing remove hangers from solution, tilt, and drain off developer.

3: Swabbing the film should follow rinse, fixation, and 30-minute wash.

4: Spot-preventive bath for about two minutes guarantees clean negatives.

5: Drying cut film can be done either in the hangers or (more rapidly) by suspending film from a wire by film clips or clamp clothes pins at corners of the film. Rapid dryers with heat and circulated air cut processing time.

6: Clamps or clothes-pins should be fastened near corner edge.
V. Handling Filmpacks

Filmpacks can be processed in trays, grooved tanks, or filmpack developing racks and regular processing tanks. To open pack, (1 and 2), slide off the metal protective guard at the tab end and raise lid; remove each film sheet separately, tear off thin strip of tab but leave protective paper backing through fixation. Figure 3 shows insertion of film sheet into grooved tank. Figure 4 illustrates loading of filmpack negative rack.

VI. Desensitizing

Development by inspection—watching the negative develop under a safelight and letting the density of the image determine the development time—is a favorite method. To develop high speed films under a sufficiently brilliant-safelight (Wratten OA or Agfa A6), a film desensitizer must be used. This bath cuts light absorption by film. Use either of two solutions: Pinakryptol green for high speed orthochromatic films and Pinakryptol yellow for high speed panchromatic film (except Agfa Super Pan Press for which use green). Pinakryptol green can either be used as a pre-developer bath of two minutes or can be part of the developer (1 part desensitizer, 30 parts developer). Pinakryptol yellow can only be used as a pre-developer bath (Fig. 1). Two minute pre-developer bath in absolute darkness (Fig. 2). Two minutes of development in absolute darkness. Safelights may be turned 15 seconds of every minute (Fig. 3). Negatives completely developed, being inspected under safelight (Fig. 4).
VII. Reduction of Negatives

Negatives which are either too dense or too contrasty to enlarge well should be reduced. Three types of reducers are recommended. For overexposed (too dense) or slightly fogged negatives use Farmer's Cutting Reducer, Formula No. 1. For overdeveloped (too contrasty) negatives use Farmer's Proportional Reducer, Formula No. 2. For overdeveloped negatives of contrasty subjects use Kodak R-1 Reducer, Formula No. 3.

Prior to reduction of any kind the negative should be fully fixed, washed, and then extra-hardened in a formalin hardener such as Kodak SH-1:

Water........................................ 16 oz.
40% Formaldehyde.......................... 2 1/2 drams
Sodium Carbonate, desiccated........... 73 grains
Water to make............................ 32 oz.

Immerse in hardener for three minutes, then in regular fix for five minutes; wash thoroughly.

If but a small section of the negative requires reduction to simplify printing, use Farmer's Cutting Reducer, Formula No. 1, and a wad of cotton or fine brush to apply.

Figure 1 is a contrasty negative. Figure 2 shows the same negative after using Farmer's Proportional Reducer. Figure 3 shows immersion of negative in reducing solution. Constant rocking of the tray is necessary to prevent spotting. Watch reduction closely. A white tray aids judgment. Process may be repeated if insufficient. Thoroughly wash negative following treatment (Fig. 4). Local area reduction with a fine brush is shown in Fig. 5.
VIII. Intensification of Negatives

Negatives which are too thin to produce satisfactory enlargements (Fig. 1), should be intensified. A satisfactory method is using Kodak In-4 Intensifier which gives a more permanent intensification than do other formulas and which can be used in ordinary room light. Following regular fixation and thorough washing, the negative should be extra hardened, as with reducing, in a formalin hardener, such as Kodak SH-1.

Immerse in hardener three minutes (Fig. 3), then in a fix for five minutes; wash.

Bleach the negative completely by immersing in the Chromium Intensifier for about 10 minutes at 68°. Rock the tray back and forth (Fig. 4). Do not touch the negative except by the edges. As bleaching progresses, the negative becomes white and the image fades. Wash for five minutes in running water. Redevelop the negative in D-72 (diluted 3 to 1) for 10 minutes at 68° (Fig. 5). Fix for five minutes and wash thoroughly. Figure 2 is the completely intensified negative. Repeat the process for more intensification.

OTHER METHODS:

For maximum intensification, the Mercury Intensifier is recommended; however, the resulting image eventually will fade. Bleach the negative until white in the following solution:

<table>
<thead>
<tr>
<th>Potassium Bromide</th>
<th>3 oz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercuric Chloride</td>
<td>½ oz.</td>
</tr>
<tr>
<td>Water to make</td>
<td>32 oz.</td>
</tr>
</tbody>
</table>

Wash thoroughly and “redevelop” in a 10% sodium sulfite solution for moderate intensification; in D-72 diluted 1 to 2 for 10 minutes at 68° for more intensification; or in a 10% ammonia solution for maximum over-all (increase in the density of a negative) intensification. For maximum increase in the contrast of a negative, “redevelop” in the following combination of solutions:

**Solution A**

<table>
<thead>
<tr>
<th>Water</th>
<th>16 oz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Cyanide</td>
<td>½ oz.</td>
</tr>
</tbody>
</table>

**DEADLY POISON, HANDLE WITH CARE**

**Solution B**

<table>
<thead>
<tr>
<th>Water</th>
<th>16 oz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Nitrate Crystals</td>
<td>¾ oz.</td>
</tr>
</tbody>
</table>

Add B to A until a permanent precipitate is produced. Let stand for a while and then filter. Immerse negative until black and then wash thoroughly.
IX. Mixing Prepared Solutions

Prepared photographic solutions which require but the addition of water and vigorous stirring are by far the most satisfactory way of obtaining fix and developers. They eliminate waste of time, the possibility of errors in weighing, and inconvenience. Simple rules to follow are:

1. Follow manufacturer’s directions explicitly and completely.
2. If two containers, be certain that correct one is mixed first.
3. Warm water (125°) dissolves chemicals more rapidly than cold.
5. Always clean all graduates, thermometers and containers before and after use with hot water.

Photographs below illustrate the important steps in mixing a prepared paper developer. Fig. 1: After water is heated to 125° (note hot plate), it should be poured into a large graduate, enamel pan or pail. Fig. 2: Slowly pour in the contents of the first of the two containers to be mixed, as per directions on the label. Fig. 3: When the first powder has dissolved completely, pour in contents of second compartment, also stirring well. Fig. 4: Empty graduate into storage bottle and add necessary amount of cold water, as prescribed in the directions on the label. Store in a cool place.
X. Compounding Developers

If one plans to mix his own solutions, an accurate scales, stirring rods, a 32 oz. graduate and a 16 oz. graduate are required.

1. Mix all chemicals in the order in which they are listed in the formula, unless specifically directed otherwise.
2. Be certain one chemical is completely dissolved before adding the next.
3. Stir vigorously and pour chemical in bit by bit.

The standard elon-hydroquinone paper developer (D-72) is being mixed in the picture series following. Fig. 1: Warm water (16 oz. at 125°) is filtered into the large graduate. Fig. 2: Elon, one of the two developing agents, is poured onto scale. Note black paper negative separators used to hold chemicals during weighing. A new slip is used for each chemical. Fig. 3: Pour sodium sulphite, a preservative, into the thoroughly mixed solution. Stir. Fig. 4: Hydroquinone, second developing agent, taken from container and measured on scale.

<table>
<thead>
<tr>
<th>Kodak D-72</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Water</td>
<td>16 oz.</td>
<td>500 cc.</td>
</tr>
<tr>
<td>Elon</td>
<td>45 grains</td>
<td>3.1 grams</td>
</tr>
<tr>
<td>Sodium sulphite, desiccated</td>
<td>1½ oz.</td>
<td>45.0 grams</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>175 grains</td>
<td>12.0 grams</td>
</tr>
<tr>
<td>Sodium carbonate, monohydrated</td>
<td>2 oz.</td>
<td>278 grains</td>
</tr>
<tr>
<td>(if desiccated use)</td>
<td>2½ oz.</td>
<td>70.2 grams</td>
</tr>
<tr>
<td>Potassium bromide</td>
<td>27 grains</td>
<td>1.9 grams</td>
</tr>
<tr>
<td>Cold water to make</td>
<td>32 oz.</td>
<td>1.0 liter</td>
</tr>
</tbody>
</table>
Fig. 5: Measuring out correct amount of sodium carbonate, activator of the developer. Fig. 6: The restrainer, potassium bromide, is a small quantity, requires careful weighing. Fig. 7: Adding cold water to make full amount of stock solution—32 ounces. If the solution is to be used immediately, cool to 68° and dilute according to directions. Fig. 8: Completely mixed solution should be poured into dark glass bottles for storage. If you use small quantities of developer at infrequent intervals, use 8, 12, or 16 oz. bottles and use up a complete bottle each time. Fig. 9: Storage bottles should be kept in a cool place. Labels should show kind of developer, when mixed, and, if a negative solution, how often used.
Contact printing, making pictures the same size as the negative with light sensitive paper in “contact” with the negative, involves the use of the slow chloride papers. When ordering, however, merely state “contact print paper” and give the contrast number, the size, and the surface desired.

Equipment necessary for contact printing, as shown in Fig. 1, includes: a clock with a sweep second; a paper cutter; assorted contact printing papers Nos. 1, 2, 3, and 4; printing frame the size of your negatives or larger; opaque mask for white print borders; 3 enamel or glass trays, 8 x 10 preferred; 2 print tongs—one for developer only, the other for rinse or short stop and fixing solution; a white light source easily turned on or off (a 60 watt bulb in a gooseneck desk lamp works satisfactorily); a safelight with a Wratten OA filter and a 10 watt bulb; 16 oz. of developing solution made with a tube of standard MQ developer; a water rinse or short stop bath composed of a few drops of acetic acid in water; and 32 oz. of hardening-fix solution, makes it complete.

Fig. 2 is a close-up of the printing frame open, the negative mask, the negative and assorted contact papers. Note that first the negative—glossy side down—is placed in the frame against the glass. Then the mask is centered over the negative and the paper, also glossy side down, is placed on top of the mask. One side of the double hinged cover is locked into the frame first. Hold the negative and paper in place and then lock the second half of the cover into position with the cross metal guards.

For more convenience and speed, use the more expensive contact printer, such as illustrated in Fig. 3. Such print boxes are easily made at home and consist primarily of a box with a safelight and a white light inside, a glass top and a hinged cover which can be raised and lowered. Manufactured printers are available in various sizes (Fig. 3 is for 8 x 10 negatives and smaller) and have adjustable masks to accommodate any smaller negative. Prices range from $3.50.
1. Insertion of the negative in the printing frame. Place the negative shiny side down on the glass—the dull or emulsion side faces up to come in contact with the emulsion side of paper later. Clean the glass of the frame thoroughly before use, remove any dust from negative and handle by edges. Place mask over negative. Be sure it is right size for negative.

2. Cutting test strip after turning out white light. Select the right contrast (number) of paper by comparison to chart on page 112, slit one edge of the envelope only and remove inner container. Cut a few sheets into strips about an inch wide to make “tests” and conserve paper. For beginner’s first efforts, use glossy single-weight paper which is easiest to handle and to obtain.

3. Return unused paper to light-proof envelopes. Insert black envelope into the brown, flap-end first, thus protecting the paper from fogging when the white light is turned on to expose the test strip. The size of paper to use in printing should be determined by your negative size. White borders on prints are desirable and are made by using negative mask to cover negative edges.

4. Insert paper strip and hinged frame cover. Place paper shiny side down on the negative. The shiny or smooth side of the print paper is the emulsion side and should face the emulsion or dull side of the negative. Hold paper and negative in place with a finger and slide half of the hinged frame cover in and lock into position. Lock second half.

5. Expose test strip. Place the printing frame with negative and print paper inside, directly under the light source. If negative is normal in density and a 60-watt bulb is used, turn the white light on for 20 seconds with the entire negative exposed; cover 3/8 of the negative with a light-proof paper and expose another 20 seconds; cover 3/8 of negative and give another 20 seconds under white light.
6. Develop test strip with eyes on the clock. Follow manufacturer’s directions. Be certain that the developer is at 68° and completely submerge the strip the first time. Use print tongs to move the strip around occasionally and rock the tray back and forth as development proceeds. Do not leave the strip in the developer longer than the manufacturer advises, regardless of how the test looks.

7. Rinse, then into fix with the test strip. Rinse should be a very weak acetic acid solution (few drops in 8 x 10 tray) and submerge for about 30 seconds. Place in fix and rock tray for a minute. Turn on white light and study results. If all exposures are too dark, make another strip beginning with 15 seconds and retrogressing; if too light, increase exposures from 60 seconds.

8. Insert full size sheet, once you have obtained correct time by test strips. Be sure white light is out when any paper is being transferred. If printing frame is larger than the negative, use a negative mask which fits frame and has an opening slightly smaller than the negative. Center paper on the mask so that all borders will be equal. White guide lines on the mask aid under safelights.

9. Expose contact print. Give exactly the time which you have determined is correct, by strips. If you do not have a sweep-second clock, count “1000, 2000, 3000” rather than “1, 2, 3,” for more accuracy. Keep regular cadence so that exposures will not vary from tests to final prints. Do not move the light or the frame during exposure. Always keep unused paper enveloped for safety.

10. Mark seconds of exposure and grade of paper on the reverse side of the print with a soft lead pencil. Do not press hard. Record saves testing if additional prints are needed later. If you number your negatives, also mark down negative number on back of prints. If during tests no exposures give a brilliant print, try one grade harder paper. If prints too contrasty, try a grade softer.
11. To submerge a full size print correctly, grasp it by either upper corner, lower bottom end into the developer, and give a slight shove toward yourself, releasing the print as you do. Then rock tray back and forth. Hereafter you may handle the print with the tongs. Do not hold print continuously—a white spot results. Occasionally check the developer temperature for consistent results.

12. Agitate print with tongs occasionally—not continuously. Be sure that you have the correct size bulb in your safelight and that it is not too close to the developer (about three feet). If the entire print, border included, grays over, you know that either the paper has been previously exposed to white light or that your safelight is not “safe.” Check safelight by developing unexposed sheet.

13. When development time has elapsed, remove print by grasping a corner with the tongs. Completely drain off as much developer as possible by suspending it over the developer for a few moments. This saves transferring too much developer to the acid rinse which would eventually nullify its short-stop action. You can develop approximately 60 4 x 5 prints in 16 ounces of developer if it is freshly mixed.

14. Drop print into short stop bath. Do not allow developer tongs to become contaminated with acetic acid. Agitate and remove print from the rinse with fixer tongs after about 30 seconds. Should you accidentally splash developer tongs with either rinse or hypo, wash thoroughly in hot water. Discard rinse after about 60 prints. If fewer, it isn't worth storing for future use.

15. Inspect print under white light after it has fixed for two minutes. If print is not perfect, determine cause and make another—poor prints nullify whole photographic effort. If you are a beginner, have a professionally made print handy for comparison before going on to your next negative. If print is muddy gray, it is overexposed or too soft paper; if too black and white, it is too contrasty paper.
16. Rock fix tray occasionally during the 12-minute fixation period to assure thorough processing. If any prints stick together, separate with prints tongs. To aid in keeping same tongs for developer and same pair for fix, paint the handle of one red, the other green. Also identify your trays—fix should never come in contact with any container or implement used for developing. Discard fix when milky.

17. Wash prints thoroughly to guarantee permanence. If you have few prints to wash, 30 minutes will suffice; if many, wash an hour. Occasionally completely empty container and also separate prints. If running water is not available, place prints in a large pan and change water at least six times with five minutes of soaking between changes. Small, effective print washers are available and practical.

18. Remove excess water from prints by placing on a smooth surface, such as glass, and swab with a damp sponge if glossy surface prints are not desired. (For ferrotyping to gloss, see directions, p. 124). Be sure glass is clean and place prints face up. Glossy papers can be dried in this manner if semi-glossy results are wanted. Wash sponge and glass.

19. Spread prints on a dry towel or place them between photographic blotters. Do not put wet prints in a book or between newspapers for drying—lettering sometimes smears when dampened. Blotter rolls are available and practical. These dry prints flat. Do not place towel or drying device on a radiator, because prints will curl excessively. Wash towel between batches of prints. Handle prints only with clean hands.

20. Press prints when thoroughly dry. Once prints are completely dry, they may be placed in a book or between blotters under a weight to flatten them. Electrical straighteners are available but expensive. If prints persist in curling, dampen back slightly with moist cotton before pressing. When flat, trim prints if borders vary in width. Trim in a cutter, not with a scissors, for neat results.
Making enlargements is the most interesting of the darkroom processes for it permits final "dressing" by the photographer—he can alter the composition by just enlarging a small part of the negative and he can alter emphasis by printing some sections darker, others lighter.

Enlarging requires the purchase of some rather expensive equipment. Fairly satisfactory enlargers, the biggest single item, are available from about $18.50. But remember, the less you invest, the more you are going to have to make up for the deficiencies of your equipment.

Many kinds of practical enlargers are available. Generally these are hand focused. However, there are automatically focusing machines, such as Figure 1, which are most simple to operate. Also, enlargers may be either horizontal or vertical or both, as shown in Figure 2. Almost universal preference is for the vertical. Another choice is whether you desire a diffusion or condenser type of enlarger. Condenser enlargers spread the light evenly by means of lenses, focus sharper and utilize more of the light per bulb. But they are more expensive.

Besides the regular darkroom equipment as previously outlined, you will need, an easel; a device for holding printing paper in position and for varying margin size; negative masks to accommodate various sizes of negatives if your enlarger does not have adjustable masking leaves (Fig. 3 shows a variety of metal masks including a rapidly working 35mm mask and an adjustable 4 x 5 and 5 x 7); 8 x 10 or 11 x 14 trays and other devices to be covered later.

Choice of an enlarger lens is determined by the size of negative you use and how much magnification is desired per unit of height. If your camera lens is removable, it will be satisfactory. Regular enlarger lenses are more convenient and a variety are shown in Figure 4, including a 2", 3", 4 3/8", 5 1/4", and 8 3/4" lens for various negative sizes. The shorter the length of lens, the less height is required for a given enlargement size, but the lens must "cover" your entire negative.
Enlarging Technic

1. Clean negative with brush and breath to remove dust. Handle negative by the edges. Clean negative carrier with soft cloth, or lens tissue if glass to remove fingerprints and dust.

2. Insert negative into carrier glossy side up with the image facing away from you for correct viewing when the negative is in the enlarger. The dull side of a negative is known as the emulsion side.

3. Turn on the enlarger lamp by hand or foot switch (latter preferred) to focus on a blank sheet of old exposed enlarging paper. Adjust the enlarger head on only the most effective area.

4. Adjust diaphragm after you have focused. How far to stop down is solely a matter of experience. Adjust until the image begins to lose contrast. By stopping down the lens you increase the time of exposure.

5. Cover lens with red filter so that you can place unexposed paper in easel. Do not jar enlarger. Filter is safe for projection paper. A red filter is not essential in every case, but it helps in seeing the image on the sensitized paper.

6. Select number and kind of enlarging paper. Determine contrast number by comparison of your negative with those in the chart on page 112. Always close the paper box after removing an unexposed sheet.
Fig. 7. Use test strips to determine exposure. Cut enlarging paper into strips—a 2-inch swath gives adequate emulsion for a good test. Cut a full sheet into such strips or use trimmings if your paper has been cut down from larger sizes.

Fig. 8. Push filter from under the lens to expose test strip. While filter is still over the lens place the strip over the most important features of pictures. After 5 seconds cover 1/2 of strip, after 15 seconds cover 3/4, and after 30 seconds turn off the machine.

Fig. 9. Develop test strip in solution at the correct temperature and for the exact number of minutes or seconds recommended by the paper manufacturer for the contrast and kind of paper you are using. Development times vary.

Fig. 10. Check test strip under white light, after rinsing a few seconds and fixing a full minute. If the entire strip is too dark, decrease all three test exposures 50%; if too light, increase 50%. If in between, take median of the two.

Fig. 11. Wipe hands if wet, after rinsing thoroughly in uncontaminated water. It is not necessary to soap hands, merely rinse well between use in various solutions. Repeat test strips as often as necessary until the correct exposure is found.

Fig. 12. Insert full size projection sheet when correct time has been determined. Adjust margin masks carefully and set the paper guides tops. Use both hands to insert the paper. Snuggle the paper against the guides and lower mask frame.
13. Expose full size print. If you must dodge or shade areas of print, count seconds “1000, 2000, 3000” for accuracy. See p. 125. Use second hand of clock for exposures above 6 or 8 seconds.

14. Mark exposure time, grade paper, negative number on back of print with soft pencil. Exposure time includes number of seconds and diaphragm opening. Use a wax pencil or a soft writing pencil for this purpose.

15. Slide sheet into developer by one corner with a toward-the-chest movement to completely submerge entire print immediately. Rock tray. Hold the print by the edge and avoid placing any unsightly fingerprint marks.

16. Rinse in dilute acid bath when development time has elapsed. Leave in rinse 30 seconds, rocking tray all the while. Drain excess from corner. This checks development and prevents the carrying over of excess developer into hypo.

17. Rock fix tray occasionally during 12-minute fixation period. Do not turn on white light until 2 minutes after submersion. Discard fix when frothy. When a number of prints are left in the fixing solution, it is good practice to rearrange prints occasionally.

18. Wash prints at least half hour. A siphon washer (attached to faucet) removes hypo from bottom of wash tray, pours in fresh water, circulates prints. It is safe to wash prints about an hour if doing a dozen or more at one time.
Fig. 7. Use test strips to determine exposure. Cut enlarging paper into strips—a 2-inch swath gives adequate emulsion for a good test. Cut a full sheet into such strips or use trimmings if your paper has been cut down from larger sizes.

Fig. 8. Push filter from under the lens to expose test strip. While filter is still over the lens place the strip over the most important features of pictures. After 5 seconds cover 1/3 of strip, after 15 seconds cover 2/3, and after 30 seconds turn off the machine.

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18. Wash prints at le half hour. A siphon wasl (attached to faucet) moves hypo from bottom wash tray, pours in fr water, circulates prints. is safe to wash prints at an hour if doing a dozen more at one time.
XVII. Glossy Prints by Ferrotyping

By far the majority of all amateur and professional prints are glossy because they stay cleaner, dry faster, and are required for reproduction use. Ferrotyping, the scientific term for glossing prints, is simple and requires either black ferrotype tins or the more convenient chromium plated sheets.

The entire process is as follows: Fig. 1. Wash chromium tin with hot water, soft cloth, and soap. Fig. 2. Dry and polish tin until there are no streaks with a dry soft cloth. Fig. 3. Douse thoroughly with clean cold water. Fig. 4. Carefully lay washed prints face down on the tin by the two corners. Gently smooth out any wrinkles with the palm of the hand. Fig. 5. Use a print roller or rubber squeegee to scrape off excess water and adhere print to tin. Fig. 6. Remove any surplus moisture by using a photographic blotter. Fig. 7. Let prints dry by room temperature (requires about an hour) unless you have an electric print dryer. Do not attempt to hasten drying by pulling print from tin. For rapid work, procure an electric dryer. When not in use, wipe tins with soft rag and store tins carefully between soft paper or blotters to prevent scratching. Daub off print with wet cotton if your water has impurities.
If any part of your print is too light or too dark and the rest of your enlargement is correct, you can increase or decrease the darkness of these areas by "dodging." Placing your hand between the enlarger lens and any given area for part of the exposure, lightens the image in that area. Blocking all of the light from the enlarger except in a small area, darkens that area. This is dodging and its uses are many.

Use your hands for most dodging. In Figure 1 the technician is shading the center area of the picture in order to darken the corners. Mechanical dodgers—a disc on a wire, a cardboard with a hole in it—(Figs. 2 and 4) are often more convenient for restricted shading. However, in most cases hands are flexible enough to permit but a beam of light, as in Figure 3, where the printer is "burning in" the subject's face.
Not all “gadgets” are helpful. Indeed, some are rather detrimental. Remember, you do not absolutely need any of these—they are but a luxury to be purchased after you own the best in the way of necessities.

Some handy gadgets include the following. A photographic paper safe, Fig. 1, which is light-proof and in which paper can be stored without wrappers. Accurately focusing dense negatives can be done by substituting a line enlarging negative, Fig. 2, for focusing and then returning the real negative to the carrier for actual exposure. Another device to help in focusing is the brilliant image viewer, Fig. 3, which enlarges a section of the projected image. To help determine exposure, use a projection print scale, Fig. 4, to match the density of your negative and read off the correct time. Or use an electric enlarging meter, Fig. 5. Practically a necessity for professional work is a floor foot-switch for the enlarger, Fig. 6. When many identical prints are to be made, an electric timer, Fig. 7, will automatically turn off the projector. A dodging gadget is a vignetter, Fig. 8. And for speed drying use an electric drier, Fig. 9. Christmas cards are enhanced by trimming with a deckle-edge cutter, Fig. 10.
XX. Self Education in Darkroom Technic

The foregoing pages have briefly outlined the bare technic—the mechanics—of darkroom procedure. Through the use of many photographs, pointed captions and tables, you have been shown how to develop film, make contact prints and enlargements—that is, how to use your equipment. Little has been said about making high quality prints, other than the excellent advice to follow manufacturers' directions exactly, to be clean and neat, and to get the most out of your instruments.

But darkroom technic is more than mechanically following directions. A good printer is as much an artist as the cameraman for he can ruin or improve the cameraman’s picture. It is the printer who, in the last analysis, sets the caliber of the final product. Therefore, now that you have the tools and the knowledge of how to use them, much still remains to be learned.

This "much to be learned" makes the difference between a poor printer, a mediocre printer and a real technician. How to become the ultimate? The answer is self-education, practice and determination. Several suggestions are in order.

First—set your goals high. Beg, borrow, steal but do secure a high caliber print (not a reproduction) from an expert. Do not consider a print made at the corner drug store as your standard. Such a print may be excellent, but rarely is. Rather, procure a print, such as you want yours to be like from some photographer whom you wish to emulate. Keep this print prominently displayed in darkroom and before going onto the next negative, try to make your prints compare favorably. At first this may require many prints, but eventually you can obtain quality with but two or three tries. Many photographers have spent whole nights making just one print but that print was perfect and well worth it.

Second—submit your prints to experts for criticism. Select a person in whom you have confidence and then listen to his criticism and follow his suggestions. Do not defend yourself or apologize for your results. Come to your expert in the frame of mind that he knows what he is talking about and that you know nothing. Don't argue with him or you will never receive constructive criticism at all—merely meaningless complimentary phrases to get rid of you. Even if you don't agree and you should—don't argue. Don't come back until you have mastered your critic's recommendations... and can show it in print. Any good photographer is glad to help an amateur who shows he is willing and eager to learn; no one helps the "know-it-all—already" and, sadly enough, many, many amateurs are such!

Third—experiment intelligently. Find out for yourself what effect prolonged development has, what various dilutions do, how various dodging devices aid or detract. Dodging is a technic which requires many, many hours of practice—so that you get the "most" out of any negative, but not "too much." Try different surfaces, kinds of paper, and brands to determine which is the easiest and most satisfactory for yourself.

Fourth—completely "finish" a worthy print. This includes flattening a print if it curls by dampening the back of the print and pressing between blotters; removing all spots with pencils, inks, or spotting colors and solutions; mounting the print on cardboard and naming appropriately, or correctly trimming margins. Have your work consistently and neatly turned out before exhibiting or showing.

Fifth—if you want to be known as a good photographer, a good darkroom technician—only show those prints which are absolutely correct and of which you are justly proud. It is better to exhibit three correctly printed photos, than 12 prints of which only three are correct. Remember, you are judged by what is shown, not what you throw in the waste basket!

Sixth—size counts! Somehow, everyone including photographers are impressed by size, particularly the size of a print. An 8 x 10 is more impressive than a 5 x 7, an 11 x 14 carries much more punch than an 8 x 10, and a 14 x 17 really wows 'em! But, always be certain that your negative is capable of such enlargement. A grainless, completely sharp 8 x 10 is much preferred to a fuzzy, grainy 14 x 17.
Seventh—weight counts! For magazine and top-quality newspaper reproduction, most professional photographers use double weight paper. Somehow, as it is with size, so it is with weight—a double weight print is impressive. All of the sample prints sent out by the photographic manufacturers are double weight and are generally glossy paper which has been pressed between blotters but not ferro-typed. Such a print seems to have more emulsion quality and to carry warmer, richer tones. Try a double weight 11 x 14 sometime for submission to the camera magazines. All salon prints are, of course, double weight.

Proper maintenance of equipment is one phase of darkroom work that most amateurs neglect. For clean, dust-free work, all equipment should be kept in good working order. Glass in printing frames and negative holders should be thoroughly washed before each session; the enlarger lamp housing should be wiped occasionally, and the lens thoroughly cleaned regularly with lens tissue. Follow the manufacturers' directions for oiling and cleaning the mechanical parts of your machine. Dust the easel before each use.

While photographic trays naturally retain some permanent stains with continued use, they should be cleaned regularly. The dark brown discoloration of the developer tray can be removed by filing the tray with a strong solution of acetic acid and letting it soak. Do not permit too long an interval between cleaning and you will have little difficulty.

New ideas give stimulus and add interest to your work, so read widely among the photographic books and magazines. Most amateurs and many professional photographers never received a moment's instruction but did learn much from experience and reading. Do not accept everything you read at face value—try it out first with work that doesn't matter.

Finally, be progressive. When you hear of something new under the photographic sun—try it out at least.

THE COMPLETE PHOTOGRAPHER and the author are grateful to the following photographic firms for the loan of equipment: Eastman Kodak Co.; Medo Photo Supply; Penn Camera Exchange, Fink Roselieve, Simmon Bros., Inc., Agfa Ansco.

ANALYSIS OF . . . EVENING HOUR

George French has done a body of work which might be called "documentary from the inside," which show old timers from Maine—real salt-of-the-earth people—as they go about their business of living. He knows them all from way back and they know him. This bond of mutual liking and trust gives a quality not often enough found in much documentary photography where the photographer is on assignment with people he has never seen before. It is indefinable but clearly evident in this interior of the old time kitchen, so snug, neat, and handy. It is most clearly felt in the unbroken contemplative atmosphere of this after-supper hour around the big stove when the man of the house is free to tilt back in his chair, lock his arms over his head and think things over, and the woman of the house can sit by the lamp and lose herself in her book. The man at the table is Mr. French, himself, often a part of their silent companionship. In our times of slick superphotographic models, the gestures of real people being themselves cannot be too highly valued. Furthermore, this ease between the photographer and his subjects produces a quality of "drawing" in the form, face, gesture, placement in the picture space which is entirely different from the more self-conscious arrangements made by a photographer who is an outsider—no matter how sympathetic and skillful. The subjective row is not upset. This dreaming home quietude makes this picture.

Devoid of every arty claim, this picture repays pondering and unfolds in many directions. The people themselves: America is not breeding citizens of such substance every day now. Self-reliance. Land of Emerson. The useful things all hung up in their places. The wide-bellied stove, the center of everything. Round table with the lamp all in reaching distance and seeing distance. Her purse and his cane on their hooks. The chromos, the strong horizontals, the coffee pot and the tea kettle, the yardstick and the whisk broom, the flat iron and the hammer. Coats and rubbers hanging in their places. The dark open door to the bedroom. The religious picture, the patterned rug island on the plank floor. Initials "W F" carved child high. Such is the center home altar.

Mr. French used only the soft pervading light from the kerosene lamp on the table, plus another kerosene lamp near the camera, which preserves the homogeneous natural light by which they read and live.
The photograph on this and the opposite page were taken in exactly the same position, providing a fine contrast in seasons. This one of spring is a soft composition in greys, with the tree blossoms accenting the light areas.
A reversed cold weather image of the scene shown on the opposite page. Here the contrast is rather harsh, with the trees providing the dark accents. Both were taken by a photographer well known in Europe and America.
DESERT EVENING

Taken in the Two Gray Hills country of the Navajo district for the Department of the Interior. The picture—with the expanse of earth and the cloud-flecked sky—has an "open" and clean quality, important to desert pictures.
Backlighting gives this photograph of Radio City's famous dancing group its dramatic punch. Taken during rehearsal, the photographer, by careful choice of position and lighting, has put into his photo a feeling of glamor, precision, and "backstage".
WHITE TURKEYS

Henry Sarason

Taken with a Rolleiflex on medium pan film, f/8, and 1/25 second. The upper left corner has been flashed in. Dr. Sarason has given us this whimsical little glimpse of the home life of very young white turkeys without leaving his own backyard and without fussing with any artificial lights. The dark coop interior makes a rich background for the white Redgellings—and their grouping in relation to the window is quite perfect. The parallel rhythm of backs and heads of the three turkeys is countered by the opposing one. The standing sentinel balances off those perched low on the roost. A particularly fine quality from the daylight through the window square illuminates the bald heads and scrawny necks with subtle tone changes. In the lower right, a very close tone passage of more dimly seen fowl fills out the corner.
FARM HAND

A child and an animal together will almost always make an appealing photograph, but this one has added attraction because of the solemnity of the child and the enormity of his task. This is a well-planned and well-executed shot, made for Look Magazine.
BUILD YOURSELF A DARKROOM

Nestor Barrett
Co-author of How To Build and Equip a Modern Darkroom

Sensible and easy-to-understand plans for a darkroom are given and discussed in detail in this article by a darkroom construction authority. The advice given here is adaptable to a closet darkroom or one in the wide expanses of a cellar. It covers construction of walls, doors, ventilation, workbench, and sink—as well as the electrical system. Simplicity and fundamental good sense are stressed in the plans given.

A darkroom is so easy to build, and so inexpensive, that every amateur photographer who hopes to advance beyond the box camera stage should have one. The photofinishers do their best, but mass production methods used on snapshots can never take the place of personal effort. The photographer who builds a darkroom has taken the first important step toward becoming a technician.

The amateur's darkroom can be as simple or as elaborate as he desires or can afford. It may be only a hole in the wall, a closet just large enough to squeeze into, or a spacious room in which every kind of apparatus may be set up. It may consist of only a board or two to be used over the bathtub, or it may be half of the cellar partitioned off. Nevertheless, whatever and wherever it may be, it can be truly said that the experience of the past has shown that certain shapes and arrangements of apparatus are the most successful, and will make for the maximum of working comfort. Just what kind of a darkroom you build will depend on three factors: personal taste, the place available, and the cost (Fig. 1).

When you begin to decide on the size and layout for your darkroom you will find that many personal peculiarities enter into your judgment on the subject. One famous pictorialist has a darkroom so small that only he can work in it. It is in reality a small closet, though very well equipped. When asked why he worked in such cramped quarters, he replied that he liked to be able to reach everything in the room without getting off his stool. So consider your own

ANALYSIS OF . . . VALENTINA ORLIKOMA

The clear beauty of devotion and dynamic concentration comes from this character shot of Valentina Orlikova, the young woman Soviet Merchant Marine First Mate. Her personal history and her personal appearance as photographed by Nina Leen exactly jibe. She was born on the Pacific waters of Vladivostok, loved the sea and determined to live with ships. At the age of fifteen she began at the Shipbuilding Technicum and studied all stages of construction from blue prints to launching. Her zeal carried her to college in Leningrad where she also worked in the Institute of Shipbuilding. In addition she studied astronomical observation and finally, studying with the Water Transport Engineers, she realized her ambition to become a pilot and marine engineer. At twenty-three she married a fellow engineering student—who had a son who became separated from them by Hitler's invading armies while he was visiting his grandparents. When war came soon after, both Orlikova and her husband gave themselves wholeheartedly to the struggle against Fascism, each sailing as mate on ships serving in the war. In her crew there were eight other Russian women. Orlikova describes how they have cared for the wounded men without fear for themselves when their vessel was torpedoed.

Nina Leen has projected Valentina Orlikova's magnetic personality with grasp and sensitivity. Straight thoughtful gaze, active triangle of the trimly uniformed figure with the soft hair and feminine face is the portrait crux. But the surroundings of the ship's office amplify the characterization, as Nina Leen has organized and lighted the objects and the space. The triangle point above pitched the eye down to the head through the extended arm. We are off through a variety of trapezoidal shapes devoid of one right angle. This launchess activity of sheer space. The gamut of tone from crisp whites to silhouetted masses also makes clean-cut tonal action. Overhead room angles, her forward moving shadow, curling map, sharp-edged books, hanging coat all make simple intense portrait accompaniment to the design which is completely in character.

Barbara Morgan
problems in planning your darkroom. If you are short, don't put in a lot of high shelves just because they show in a plan. If you are tall, build the benches higher than standard. Some people want to stand up when they work, others must be seated. Arrange your fixtures so that they suit your convenience regardless of what the "experts" say.

LOCATION

Where shall you put your darkroom? Any place you have some spare space. If you have several places available, you might consider the ideas which follow and choose the site which best meets the requirements.

Your basement, if it can be kept clean and can be ventilated, is the best place in the house for your darkroom. It has one advantage over all other locations which is hard to match—a nearly constant temperature the year round which runs very close to 65 degrees. To achieve this constant and almost ideal temperature anywhere else in your house may cost hundreds of dollars in air conditioning equipment and maintenance. But you get it free in your basement.

If you have a room in the main part of the house, this is next best because you will probably always try to keep your home at a comfortable temperature. However, during the hot summer months, you may have trouble with the room temperature being too high. The same objection goes for the attic, only more so, because the full force of the sun will beat down on it all day. However, if you have no other place, build it in your attic adding some insulation material to alleviate the heat.

An old barn or other building on the back of your lot may be a good place for the photolab. Quite often such a building will have a high second story, causing the lower part to be quite cool. With very little remodeling, such a place will make a fine darkroom.

Another thing you have to check in deciding where to put the darkroom is the water supply and drainage. It is almost imperative to have at least a cold water connection in your place, and this, of course, creates the necessity of a drain. Quite often the difficulty of drainage is advanced as an argument against having the darkroom in the basement, but a little ingenuity will overcome this handicap.

Some apartment dwellers will have no space available and will need to use the kitchen sink or bathroom. Even they will find that a few built-in items will be helpful in keeping their work orderly. Other ingenious photographers have designed what they call a "darkroomette." This can be conveniently folded up when not in use.

COST

One of the most important considerations is, of course, the cost. Here again you can be governed by your own pocketbook. For as little as ten dollars you can buy enough equipment to make contact prints. If you do the carpentry and plumbing work yourself, you can build a rather elaborate darkroom for very little cost. In this connection, those amateurs who would like to build themselves equipment and have no tools or

FIG. 1. Jack Wright, West Coast pictorialist, built himself this simple set-up. Notice the linoleum-covered bench, the old sink mortised into the top of the bench, and the tray siphon connected to the faucet.
BUILD YOURSELF A DARKROOM

workshop, should not overlook the evening high schools in their cities which frequently throw their woodworking departments open several evenings a week to anyone who pays a small fee. Competent teachers are generally on hand to help you over the hard spots, and the equipment is always good.

One point should be borne in mind when you are considering the question of how much to spend on your darkroom. Avoid the pitfall that many amateurs fall into in their thinking. Do not consider the darkroom as a necessary evil, something you have to have but should get as cheaply as possible. Remember that many hours will be spent here. Most of the photographic process will be carried on here. You will work at night largely, after the day's work. You will be tired. Give yourself a break. Make your darkroom well ventilated, comfortable, warm, and conveniently arranged. Remember also that it will be to little advantage to make negatives with thousand dollar equipment, if you develop them in a damp, dust-laden, cobweb-festooned corner of the coal cellar. Better spend less on the cameras and more on the place to work.

GENERAL PLANNING

Before we discuss the actual layout and construction of some sample plans, let us consider a few general ideas about darkroom planning. When we sit in front of our drawing board ready to make such a plan, we must first draw its outline. What sort of a shape should this outline take?

Here is a good rule to follow if you are going to have anything larger than a closet. Make your darkroom narrow and long. You can well follow the architect's rule for the design of kitchens. Today we want our kitchen so that it is just one step from one side to the other. This saves thousands of steps in the course of a year, yet keeps the walls far enough apart for comfort.

Another rule we like to follow is to have a wet and dry side. Along one of the long walls we have our sinks, developing boxes, trays, and water faucets. Along the opposite wall we put the dryer, the mounting press, and the storage cabinets.

This wet and dry separation also lends itself to a straight-line production layout which is very useful in the darkroom. This means that the films, when they come in, follow around the room as the processing goes on from stage to stage. All backtrack- ing and overlapping in operations is avoided. You might think that this applies only to a big studio, but you can arrange your darkroom just as well this way. Why not do it and save many steps in the course of a year?

Six feet is a good width for a darkroom. This allows the one step separation when the tables, sinks, and shelves are installed. The length depends on you and how much equipment you have to install. Six by eight feet is a good size for a small darkroom, while six by eleven and on up as far as you want to go within reason will give good shapes.

WALLS AND FLOOR

Let us consider some actual problems which you may meet in constructing your darkroom. We shall do this by taking a typical case of a simple but reasonably well equipped one, starting from the beginning and designing it step by step as we go along.

Since it is suggested that the basement is a good place for your darkroom, let us design one for this space and see what results we will have. Ours is a concrete basement with a concrete floor. As we stand in it we notice the floor joists are just a little above our heads. We measure and find that they are between six and seven feet. We must keep this in mind when we put in the enlarger, or we may find that we cannot get much use out of it without cutting a hole in the kitchen floor, a plan which may be hard to sell our wife.

Some houses have a full basement, the walls of the house being supported by the basement walls. Most modern homes have only a partial basement, that is a small room dug out of the ground under the rear part of the home. In any event we select a corner which is not now occupied and lay off the length and width we want to make our room.

The problem now arises whether or not we should use the walls of the basement for two of our walls, and build two of lumber. If we want to keep the cost down this will be all right. The only disadvantage in such a pro-
FIG. 2. Method of building the darkroom wall

procedure is that concrete is hard to drive nails into, and everything you will want to attach to these walls will require a lot of effort. A good compromise is to set in studding as shown in Figure 2 and nail on lumber above the surface of your work benches. The studding is attached to the concrete with expansion bolts after holes have first been drilled with a star drill. If you cannot get expansion bolts, you can use a wooden peg instead. This saves a lot of lumber and gives you easy nailing space where you can use it.

Before starting any building it is a good idea to give the concrete part of our darkroom a coat or two of asphaltum paint. It is cheap and available in every paint store. A couple of coats will seal the concrete so that moisture will not seep through readily and it will also give a smooth surface easy to keep clean. Unpainted concrete is impossible to clean. No matter how much you sweep it you always raise more dust. Since cleanliness is the first law of photography, our asphaltum paint will prove the cheapest insurance we ever bought.

We are ready now to start construction. Having marked out our wall lines on the floor, we next set up our studding. Its size and spacing will depend on what material we use for the walls. Lumber can be used. Tongue and groove is better than plain boards for the outside walls because it is hard, if not impossible, for the amateur carpenter to fit plain boards together close enough to avoid light leaks. But if you do a good job with tongue and groove, your wall will be light-tight. Since we are building inside walls and are not concerned with strength, we can space our studding as far apart as we like. One every two feet is a good distance.

Wall boards of various kinds make good wall material and are easy and quick to erect. Since wall board comes in widths up to four feet, studding can be spaced four feet on centers. Two by four lumber is generally used for studding, but for a small room such as we are building, two by two will be strong enough and quite satisfactory.

When your walls are built and the benches and wood work installed, you may want to paint them. Give them a coat of some light paint such as cream or white. Some experts recommend a zone of black on the bench and up the walls a short distance. The only reason for this is that many enlargers leak light and a light colored wall might reflect it around and fog the paper. The accurate

FIG. 3. Plans for a plywood light-tight door using 2 x 2 lumber. Notice the hook and eye lock and the safety panel of cardboard for emergency use.
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use of modern photometers with enlargers also demands that all extraneous light be cut out and this "dark" zone will help in this respect. No special paint is needed, and any good flat wall paint will do.

THE DOOR

When you are putting up the outside walls, bear in mind that some openings must be left in them. You will need a door and you should leave two vents for ventilation. Of course there will need to be holes for the water and drain pipes.

A light-tight door can be made very simply from plywood. Figure 3 shows how such a door can be made of plywood or insulation board and some two by two lumber. A rectangle of 2 x 2's is constructed so that its outside dimension is one inch less on three sides than the size of the door. On the hinge side the plywood is nailed flush with the outer edge of the 2 x 2 frame. This is clearly shown in the plan and elevation at the top and left of the drawing. Notice in the plan how the wall laps over the 2 x 2 upright just one inch, allowing the door panel to do the same. On the hinge side a strip of plywood is nailed on the inside of the door frame, since this lap arrangement will interfere with the hinges if used on the outside.

The simplest way to lock this type of door is to use an ordinary screen door hook and eye. This insures that the door will not be inadvertently opened while films or prints are being processed. It has one disadvantage. If for any reason the darkroom worker should become ill or faint it would be difficult to reach him. You overcome this obstacle by cutting a hole about 6 inches square in the plywood and gluing over it a heavy cardboard safety flap. When the door is painted it will scarcely be noticed. Now if it is necessary to enter the room forcibly, you break through the safety flap without having to damage any part of the construction.

A method of making a standard door light-tight is shown in the diagram at the right of the figure. Regular cloth or felt weatherstripping is applied to the stop of the door frame all around. When the door closes, the cloth makes a tight seal on all sides. Another way to seal a door is to nail an extra piece of L-shaped molding on the door frame and a wooden strip on the door. This is shown in the lower right of the figure. You often see maze openings described in darkroom literature. They are convenient, but have the very great fault that they take up a lot of room, far more than can be spared in the ordinary home.

VENTILATOR

To make your ventilators light-tight, you can build a box with baffle plates over the intake vent. The ventilator is placed in the door near the bottom and another is installed on the wall opposite the door over the print dryer. The drawing, Figure 4, shows clearly how it is constructed. All that is needed is a shallow box about 5 inches wide. In the center of box place an upright board six inches high so that light entering through the screened opening will not come out the opening on the opposite side. The opening is 4 inches high and 14 inches long and is covered with ordinary window screen. The box should be painted a dead black inside so as to kill all reflections. A bent piece of pipe will also serve for a ventilator if you have it. A fan can be put on a shelf in front of this vent, making a satisfactory exhaust system.

It is sometimes suggested that a wad of steel wool impregnated with oil be placed in the intake vent as an air cleanser. This is a
cheap method of making your own air filter has the disadvantage of creating an odor in the air which comes in the darkroom. If you want an air filter, why not pay the dollar a good commercial one costs and install it in a slotted box outside your room intake vent.

**WATER AND DRAINAGE**

A darkroom can be used without running water, but if at all possible it should be provided. In a basement this is usually simple since many laundry trays are located there. Cold water is sufficient; if you have it handy there is no harm in bringing in a hot water line from your water heater, but it is a luxury rather than an essential, since a small electric grill and a stew pan will suffice to heat all the water you will ever need. Two cold water faucets, instead of one, are a great boon as they make it possible to clean up trays, graduates, etc. in the idle period while prints are being washed. If you live in a city where the water is hard and have a water softener for household use, it will pay you to bring in your cold water line from it.

Drainage is one of toughest problems to arrange in a basement. If the laundry trays are there, you can run your sink drain into the same sewer line. If, as in many cities, your drain pipes are above your head in the basement, there are only two alternatives. The first is to pump the water from the drain into the sewer line by use of a sump pump. These are small pumps which are set in a recess in the floor and which automatically pump the drainage into the sewer. They are not expensive and if you can get one they are the best solution to the problem. The other method is to let the sink drain into a natural sump in the ground, made by digging a large hole, filling it with gravel and running the drain pipe into it. This is all right for sandy soil, but poor in clay or adobe. Also, many building ordinances forbid such a practice. The sump pump is the best answer to the problem.

**ELECTRICITY**

Another convenience in a darkroom is to have a sufficient number of electrical outlets. If you can get it, a product called continuous plug mold is ideal. This is a molding which is fastened to the wall above your bench and has an outlet every foot or foot and a half, just as you prefer. Another product is the outlet box (Fig. 5) which has space for three switches or outlets in a small metal container. Either of these solves your electrical problem nicely. It is well to have plenty of outlets on both sides of your room so as to make your equipment as flexible as possible.

Safelights can be purchased in several designs or built just as you prefer. The commercial kind are made to hang down from the ceiling, attach to a wall bracket, or put on a swivel joint. Actually the safelight problem is not nearly as important as it once was when all operations could be performed in some kind of light. Many darkrooms now get along with only an orange one for use during printing, all the loading and film developing being done in complete darkness.

Switches for turning on the safelight and viewer lights should be convenient to reach and spaced far enough apart so as not to be confused in the darkness. A general room light can be placed in the middle of the ceiling, usually flush with the top so as not to impede the headroom. A socket for a blue daylight bulb over the fixing tray will be handy for checking up on the quality of your prints as you go along. A master switch
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should be provided at the door of the darkroom which will turn off all the current in the room, so that when you are finished working there will be no danger of some fixture being left burning for a long period.

WORKBENCH LAYOUT

Having erected the walls, put in a door, and light-proofed our room, we are ready to consider how it shall be arranged inside. Of course there are an unlimited number of plans which might be drawn, but we will consider only one basic one, from which any number of others can be derived. Figure 6 shows a plan and elevation for one side and the ends of a darkroom which will serve almost any purpose.

In considering this arrangement you will see that it is built along the straight line production idea. The work proceeds from one end to the other in an orderly manner. Our door is at one end of the room. As we enter, we have our main workbench on the left-hand side running clockwise around the three walls. Many darkroom plans have the bench start at the end wall, but since our plan is intended to be used in a basement as well as places where there is more headroom, we provide for making big prints on our enlarger without dismantling it. At the end of the bench we fix two uprights on the wall and build an easel which is really a shelf that can be “plugged in” at intervals on the two uprights (Fig. 7). Two 2 x 2-inch pieces are used for the uprights to be nailed or bolted to the wall. These should have holes drilled in them in sets of two’s about every four or six inches. The easel can be constructed of any kind of lumber and should be planed down to have a perfectly smooth surface. An old drawing board makes an excellent one. Affixed to the bottom of the easel are two brackets into which dowels have been driven and glued as shown in the sketch. The easel can be pulled out and plugged in at any height desired. Care should be ex-

FIG. 6. Plans for a simple darkroom, as discussed in this article
Fig. 1. An adjustable easel, for making large-scale enlargements

Fig. 8. How to build the wooden tray support which is set into the sink. Pointed cross pieces will minimize splashing when water is run from the tap

EXERCISE IN INSTALLING THE COLUMNS TO SEE THAT THE HOLES IN ONE COLUMN ARE ABSOLUTELY IN LINE WITH THOSE IN THE OTHER, OTHERWISE THE EASEL WILL NOT BE LEVEL AND YOUR IMAGE WILL NOT BE IN SHARP FOCUS THROUGHOUT.

When it is desired to make a large print, the enlarger head is rotated 180 degrees and the image thrown on the shelf which can be moved down to the floor if necessary. For normal work the regular easel is used on the bench. The shelf can be removed, enabling you to work from behind your enlarger if you wish.

The workbench is constructed of plain lumber using 2 x 4's for uprights and 4- or 6-inch boards for top. The cheapest kind of lumber will do for this, even second-hand if you wish. After a rough top has been built, it is covered with some smooth-surfaced material. The best top material is masonite, which is quite hard and has a smooth close-grained surface. Linoleum can be used but it is not as good as composition board. A space big enough to accommodate the enlarger and three trays should be built before the sink is built in.

SINK LAYOUT

The sink can be made of metal, it can be a second-hand kitchen sink, or built out of wood. If you build one of wood, use tongue and groove lumber and fit the lumber tightly together at all corners. If you can get some tie rods to bolt through to pull the whole thing tightly together, it will give added strength. After the sink is installed, give it several coats of waterproof asphalt paint and it should hold water for a long time without leaking. A handy thing to have in your sink is some slats made of wood on which to rest trays. A diagram of how to build one of these is shown in Figure 8.

Two 2 x 2's are cut slightly shorter than the bottom of the sink. On these are nailed or screwed some diagonal pieces set close together. These pieces are made by cutting a 2 x 2 diagonally lengthwise. The rack is set in the sink to support trays. The narrow edges of the slats prevent the water from the tap from splashing about the room. Give this a coating of asphalt paint also.

Underneath the sink there will be room on each side of the drain pipe. On one side you can build some racks of plywood to hold your trays. The tall ones on top will handle 16 x 20 trays and the smaller ones anything up to 8 x 10. Room for a wastebasket is provided on the other side. Underneath the bench proper you can build in such shelves as you wish, the arrangement as shown in the drawing being quite handy. Here you can store supplies and small apparatus when not in use. Get in all the shelf space you can as there is always some more that is needed.

OTHER LAYOUT IDEAS

You may notice that there is a 2-inch board along the bottom of the benches in the room. It is worthwhile to put such a false floor in your cabinets because it keeps the dirt from getting in under the shelving. Sometimes this two-inch space is recessed under the bench to make space for your toes to fit in when you wish to stand close to the workbench, but this takes some skill in carpentry and you may not wish to build it in.
enlarged in installing the columns to see that the holes in one column are absolutely in line with those in the other, otherwise the easel will not be level and your image will not be in sharp focus throughout.

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Above our bench we build a set of shelves. At the enlarger end they are divided into compartments with plywood to hold the different size packages of paper we may want to use. On the top shelf we put a safelight to use in developing prints. The standard safelight which can be purchased may be used, but a very good one can be made from wood, as shown in Figure 9. This safelight is simply a square box cut diagonally in two with a slot provided along the sloping face for slipping in the safelight glass. A ten-watt bulb is mounted inside and the wiring connected with a switch which can be mounted where most convenient to reach. It should be at least 36 inches above the bench top in order to make certain that it is absolutely "safe." The advantage of this safelight is that it remains in a fixed position, yet throws the light downward on the trays. If desired, the orange light for paper may be removed and a red one slipped in place.

Over the sink we provide a deep shelf to hold bottles of stock solutions and the like. Under this shelf we fit another board with slots cut in it so that graduates can be hung upside down by their bases for draining. Dry chemicals can be stored on the shelves at the end of the room.

Some electrical outlets are needed and three are shown along the wall above the workbench. Others may be installed.

On the plan of the right end wall (Fig. 6) we see the print washer and the end of our main bench as if the room were cut off at the end of the sink. Next to the washer (Fig. 10) we might make space for the print dryer. Below the bench on which the print dryer is placed, two shallow drawers are built to hold the ferrotype plates. Since most amateurs use chrome plates, it is well to keep them in a closed drawer interleaved with paper separators to avoid scratches. Below this is a cabinet with doors for keeping special apparatus which must be kept clean.

A handy device for the darkroom is shown in Figure 11. Anyone who uses cut film will find this rack useful for holding the film hangers while loading them before development. A good combination is to put two pegs in the wall over the workbench where you unload your films. These will hold the hangers when not in use. As you load them, you place them in the wooden frame which can be moved when full to the place where your developing tank is located. The construction of such a frame is so simple that the drawing is self-explanatory.

The bench extends the full length of the wall opposite the sink. If you have the time you can install cabinets above the bench, or simply some shelves. The same holds true of the space beneath the bench which may be used for storage. One point worth mentioning about building shelves is that if you make the upper shelf half the width of the lower, you can stand tall bottles on this lower shelf near the front and their tops will be free to extend above the level of the narrow shelf. A piece of narrow molding tacked on the front of the upper shelf will keep small containers from falling off. An isometric drawing of this side of the room is shown in Figure 12.

FIG. 9. This safelight is a square box cut diagonally with a slot for insertion of the glass through which the light is visible.
Notice that in this plan we have a "wet" side and a "dry" side of our darkroom. On this long bench opposite the sink there will be room for mounting presses, retouching outfits, film storage and loading facilities, and all the things we need to do away from the water and chemicals. If desired, a movie editing bench can be set up as well as slide making equipment, copying easel, and the like. There is ample room for long shallow drawers under the bench for storing mount board and finished prints.

CONCLUSION

What about the man who does not need, or has no space for this big darkroom? He can, by reference to this layout, arrange almost any variation he chooses. If he has only a small closet he will build a shelf on the three sides of the room opposite the door. Just enough space will be left in which to put a stool. On the shelf opposite the door will go the three trays for developing prints. The trays will be stored underneath the shelf and the developing box will be used there when films are to be developed. On the left the enlarger is installed. Since no running water is available, chemicals must be mixed and prints washed in the sink.

An amateur who considers this plan should not feel that everything must be built at once. Do not be discouraged by the elaborate layouts which your friends have or which you see in books. Remember that years may have been spent in assembling and installing the equipment. Start in with the bare necessities and add to them as you are able.

Some ideas on what it takes to outfit a darkroom can be gained by considering the following lists of equipment which start with the most basic needs and end with more elaborate layouts. For contact printing your films you can start with:

- Roll film developing tank
- Ruby lamp
- Contact printer or printing frame
- Three small trays or glass dishes
- 2 film clips
- One ferrotype tin
- Print roller
- Thermometer
- Developer, hypo and acetic acid
- 32 oz. graduate

When you are ready to go into enlarging you can add:

- Enlarger and lens
- Enlarger easel
- 3 large trays
- Print trimmer
- Paper safelight
- Funnel
- Darkroom timer
- Darkroom timer

Some additional accessories which can be added "ad infinitum" are:

- Cut film tank or 3 darkroom tanks
- Large graduate (1 qt.)
- Print dryer with chrome tins
- Rubber apron
- Tray syphon washer, or rotary washer
- Dry mounting press
- Viscose sponges
- Enlarger timer
- Photometer
- Print trays
- Rubber gloves
- Chemical scales

Summed up, the thing to bear in mind is that photography is an art in which the skill and ingenuity of the individual is the most important factor. Some of the greatest photographs have been made with the most rudimentary equipment. Edward Weston, one of the greatest living photographers, prints his pictures by contact in a printing frame with an overhead light bulb as his light source. Get started with the simplest equipment and increase your facilities gradually as you can afford them.
NEGATIVE DENSITY AND TONE
Lloyd E. Varden and Peter Krause
Agfa Ansco Co.

The proper tone reproduction in a print is dependent on many steps in the photographic process—from exposure through printing. Tone and density are defined and discussed and the importance of the characteristic curve is covered. These are all seen in relation to exposure and development and the entire article presents important background material for work in the darkroom.

In a discussion on the problems of tone reproduction in a negative photographic image, it is of foremost importance to bear in mind that in the photographic process it is a positive image of the original which we aim to obtain ultimately. The making of the negative image constitutes only an intermediate step, although an essential one. However, there exists such close relation between the tone reproduction in the negative and positive image that it would be impossible to discuss one phase of the problem separately without giving an incomplete treatment of the topic.

It is not always easily possible to produce a photographic image which represents a faithful reproduction of the original scene. In fact, faithful reproduction is seldom achieved. A simple illustration such as that shown in Figure 1 will help to make this more readily apparent. Here are shown three prints made from three different negatives on the same subject. The obvious differences which exist between these three prints are sufficient to demonstrate that photographic reproduction does not always effect truthful results. Undoubtedly, print B will be considered the best of the group. For example, when comparing A and B it is evident that the shadow portions of A are too light, being lighter than those of B, whereas the highlights of A are darker than those of B. Similar differences are apparent between prints B and C.

The important question now is, what can the photographer do in order to obtain optimum tone reproduction? An understanding of the scientific methods, contrary to a common belief, does not require a knowledge of involved mathematics. Only simple arithmetic need be employed in solving the problems at hand. A further objection often raised is that the making of a portrait, for example, involves not only scientific problems of tone reproduction, but embodies artistry as well. This is unquestionably true, but a more-or-less sharp dividing line can be drawn between the sphere of influence of both. All matters preceding the exposure, such as arrangements of lights and background, placing of the subject, and so on, are in the realm of art. All that follows thereupon can be
FIG. 2. Showing the original board divided into nine squares, each of distinct brightness value and ranging in tone from light gray to black.

FIG. 3. This is a print made from a negative exposed to the original chart. It serves to measure and compare the brightness of each square to that of the original.

determined scientifically. It is with the latter phase alone that we are concerned. It will be our specific task then to investigate the individual steps required and discuss the measurements necessary to produce a negative image of such character that a print can be made from it which is a faithful reproduction of the original.

MEASURING THE ACCURACY OF TONE REPRODUCTION

In attacking our problem logically, we find that we must first find some means by which we can determine how accurately the tones of the subject are reproduced in the photographic image. After all, it is only by comparing each tone in the original with its corresponding tone in the photographic image that a conclusion can be reached about their relationship.

Tones in an object consisting of white, grays, and black (for the sake of simplicity we shall consider such objects only at this time) differ only in respect to the amount of light which they reflect, or as it may be called, in respect to brightness. It is the brightness then of the tones in the original and photographic image that we want to measure and compare. The main difficulty in carrying out such measurements is not to devise an apparatus capable of evaluating the brightness values of tones, but rather to find areas in the original and especially in the photographic image large enough to make accurate measurements from them. For this reason it is preferable to use specially composed subjects, such as the one shown in Figure 2. This consists of a board divided into nine squares which range in tone from white to black, each square having a distinct brightness value.

It may be well to mention at this point that although this type of subject may not seem to have resemblance to commonly photographed subjects, there is actually little difference. Only in a normal subject the various tones are distributed in a different manner.

TONE REPRODUCTION CHART

Let us assume that we are to conduct a test as outlined above and that in carrying out our experiment we made two negatives using two different kinds of film, i.e., a portrait type and a commercial type. Both films having been exposed and developed normally, we then made two prints, one print from each negative. These two prints are reproduced in Figures 3 and 4 respectively. Our next step is to measure the brightness value of each square in both prints and compare it to that of the original chart. In order to pre-
sent the result obtained in an understandable manner; we must correlate the brightness values, as for example in form of a tabulation, such as the one shown in Table 1. From this table it is evident that the print shown in Figure 3 is a very good reproduction of the original, since none of the brightness values of the print alter more than one unit from those of the original. The second print (Fig. 4) on the other hand, obviously is far from perfect. In measuring the brightness values, it does not matter what unit is adopted as long as the same unit is utilized in measuring of both the original and the print. In this particular experiment, an instrument calibrated in foot candles was employed.

<table>
<thead>
<tr>
<th>Square</th>
<th>Original</th>
<th>Print No. 1</th>
<th>Print No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>B</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>C</td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>D</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>E</td>
<td>14</td>
<td>15</td>
<td>14</td>
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<td>F</td>
<td>12</td>
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<td>H</td>
<td>9</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>I</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

*Arbitrary unit.

**TONE REPRODUCTION CURVES**

Another method, and one which permits an easier and quicker appreciation of the relationship between original and print tone values, consists of a graphic representation. Here the brightness values of the original are plotted against the brightness values of the print. When this is done, a graph is obtained similar to that presented in Figure 5. In this case the brightness values of the tones in the original chart (Fig. 2) are plotted against the corresponding brightness values in the print shown in Figure 3.

The full significance of this curve will become more apparent if we consider briefly what shape this graph would take in case of tone reproduction. In this instance all tones of the original would be reproduced in the print with exactly equivalent brightness values. This is demonstrated in Figure 6, since here a brightness of 20 in the original corresponds to a value of 20 in the print, a brightness of 14 in the original corresponds to one of 14 in the print, and so on. A straight line is obtained which runs diagonally across the graph paper at an inclination of 45°. It is this straight line inclined at an angle of 45° which is representative of ideal tone reproduction. Therefore, any deviation from it indicates that tone reproduction is not perfect.

If now we refer to Figure 5, it will be evident that in this print, tone reproduction is not perfect since instead of a straight line...
inclined at 45° we have a curved line. However, we also find that the amount of deviation from the ideal case is not very great and much less than for the second print (Fig. 4). The curve of the second print is given in Figure 7. It should be understood, though, that it is not necessarily a curved line which indicates incorrect tone rendering. A straight line, as well, may represent tone reproduction which is not ideal. This is demonstrated in Figure 8, where the dotted line represents the curve of ideal tone reproduction. The

FIG. 6. Ideal tone reproduction curve which is obtained if all brightness values of a print correspond to the respective brightness values in the original.

FIG. 7. Tone reproduction curve of print shown in Figure 4. Note the great separation in tone values in the middle tones of the print and the compressed tone reproduction in shadows and highlights. The print has high contrast but lack of detail in shadow and highlight portions.

FIG. 8. Curve A and B demonstrate high and low contrast respectively. The dotted line represents the ideal tone reproduction curve. In case A, all tones are evenly separated, but less than normal. In B, however, all tones are separated more than normal.

considered the characteristics of the negative images nor their influence upon our measurements. It is the tones or densities of the negative image, however, which control the tone values of the print—at least to a major extent. In speaking about the tones in
NEGATIVE DENSITY AND TONE

natives and prints, it is necessary to make an important distinction: the tones in a print are determined by their brightness, or in other words, by the amount of light which they reflect. The tones in a negative, on the other hand, are significant for the amount of light which they transmit, for after all, it is the transmitted light which is to make the exposure of the print.

The term most commonly used to describe the transmission (and absorption) characteristics of tones in a negative is "density." Density is defined as the logarithm of opacity and opacity in turn is the reciprocal of transmission. The meaning of these three terms, transmission, opacity, and density, may be best explained with the aid of the diagram shown in Figure 9. Imagine a piece of film evenly exposed and developed so as to have a uniform gray tone, and a beam of light directed onto the film of the intensity of, say, one unit. This beam of light in passing through the film is weakened in intensity due to absorption by the silver grains in the emulsion which make up the image.

Let us further imagine that the degree of absorption by the films is such that the light beam possesses only 1/10 of its original intensity when emerging from the film. In this case the transmission of the film is said to be 1/10 and is derived by dividing the intensity of the transmitted light by the intensity of the incident light, or:

\[
\text{Transmission} = \frac{\text{Intensity of transmitted light}}{\text{Intensity of incident light}} = \frac{1/10}{1} = \frac{1}{10} = 1/10
\]

The opacity is 10, since opacity is equal to the reciprocal of transmission, or:

\[
\text{Opacity} = \frac{1}{\text{Transmission}} = \frac{1}{1/10} = 10
\]

Finally, the density, being the logarithm of opacity, is equal to 1. Density = \log_{10} 10 = 1.

The convenience in using density values comes from the fact that they progress arithmetically rather than geometrically as do transmission and opacity values. Another diagram will help to clarify this point (Fig. 10). If instead of only one film we now take two films, each having a transmission of 1/10, what then is the transmission of the two films combined? Obviously 1/100, for after the light has transmitted the first film,
its intensity is reduced to 1/10 of its original value and in passing through the second film it is again reduced to 1/10 of its intensity, which is 1/10 of 1/10, or 1/100. If three films were combined with a transmission of 1/10 each, their total transmission would be 1/1000. It will be clear now that transmission values progress in geometrical order, for as two samples of equal transmission are added (or combined) their respective transmission values must be multiplied in order to obtain the total transmission.

Similarly, we find that opacities also progress geometrically. Density values, however, because they are logarithmic functions, show an arithmetic progression; that means, the total density of two or more samples of equal density is obtained by addition of their individual density values. In the following table it can be seen how transmission, opacity, and density are related in specific cases.

For those, however, to whom the meaning of density seems to be not entirely clear, it may be well to simply think of density as a measure of the “blackness” of tones in the negative image. If the “blackness” is high, the density is also high and the higher the density, the smaller the amount of light transmitted.

**EFFECTS OF EXPOSURE AND DEVELOPMENT**

The densities in a negative, which become apparent upon development, increase—within certain limits—with increases in exposure. For this reason a “negative” image is obtained when an object is photographed in the normal manner because the lightest areas in the object which reflect the greatest amount of light produce the highest densities (or darkest tones) in the photographic image, and vice versa. Unfortunately, however, the response of photographic emulsions is not uniform at all exposure levels. This means that for a given constant increase in exposure the resulting increase in densities is not constant for all values of exposure. A simple experiment will prove this point.

In previous tests we photographed a test object consisting of a board divided into nine squares and from the resulting negatives made prints which served for measurements on the accuracy of tone reproduction. At this time, let us examine one of these negatives more closely and determine how the negative emulsion responded to the exposures which it received. No longer do we want to compare brightness values, but rather we want to measure the effects of exposure on the film in terms of densities. This we can do in two ways, either by a method of tabulation or by graphic representation. In both cases, however, we must first determine the magnitude of the various exposures as well as of the corresponding densities. Densities can be measured with the aid of an instrument known as a densitometer which fundamentally consists of an optical arrangement suited for determining the difference in the intensity of a light beam before and after transmitting a given silver deposit in the negative. In measuring exposure values, two factors have to be taken into consideration: the intensity of the light falling upon the photographic emulsion, and the time of exposure. While the time of exposure is controlled only by the shutter speed used, the in-
tensity of the illumination at the film plane is
governed by the brightness range of the sub­
ject and its color, the color distribution of the
illumination, the distance between subject
and film, and the performance of the lens.

CHARACTERISTIC CURVE

Let us assume now that the values of ex­
posure and density have been determined
for the conditions of our experiment and that
we are prepared to correlate these values by
tabulation, as given in Table III, or by
graphic representation, as shown in Figure
11. The graphic representation is interesting
in many respects, primarily, though, because
it demonstrates how negative emulsions in
general respond to exposure. It will be no­ticed that for the greater part, the curve con­
sists of a straight line, but that the lower end
is curved appreciably. Furthermore, it will
be seen that a certain minimum amount of
exposure is required before the film shows
any response—that is, produces any density.
In this particular case, a relative exposure of
4 units was required to produce the first
perceptible density.

TABLE III

<table>
<thead>
<tr>
<th>Square</th>
<th>Exposure</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>...</td>
</tr>
<tr>
<td>B</td>
<td>19</td>
<td>...</td>
</tr>
<tr>
<td>C</td>
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<td>8</td>
<td>...</td>
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<tr>
<td>I</td>
<td>5</td>
<td>...</td>
</tr>
</tbody>
</table>

The fact that the graph is curved at its
beginning is very characteristic, for it indi­
cates that the response of a film is non-unif­
iform for low exposures. This means that at
very low values of exposure, a photographic
emulsion is not capable of recording small
differences in exposure as corresponding
differences in densities. Rather, the film shows
no, or such small, separation between the
densities that it is of no practical value. For
example, two tones in a subject, both of low
but somewhat different brightness, may be
reproduced in the negative image as identical
densities. As the exposure is increased to
somewhat higher values, the densities in­
crease first gradually and then more rapidly,
but without uniformity, until a certain ex­
posure is reached. From here on the density
progression becomes uniform. This point is
marked by A in the illustration.

On the curve the straight line portion ob­
viously represents the region of uniform den­
sity progression. Actually the curve does
not end as shown in Figure 11. Higher den­
sities can be obtained if the exposure is in­
creased beyond the maximum value em­
ployed in this case. This can be done by
either increasing the time of exposure or by
using a subject of greater total brightness
range. In practice it is customary to expose
the film in an instrument known as a sensi­
tometer which is especially constructed to
give the film a very great range of exposures.
A curve plotted from a film exposed in a
sensitometer is shown in Figure 13. It will
be noticed that the curve does not progress
as a straight line up to the highest values of
exposure, as in the previous example, but
forms a shoulder at first and finally levels off.
Thus we find that at very high levels of ex­
posure, as well as at the lowest, the response
of a film emulsion to exposure is non-uniform.

CONTRAST AND GRADATION

While all tones in the negative which fall
within the straight line of the curve progress
uniformly in density, they may not progress
at the same rate as their corresponding ex-
FIG. 13. A curve such as this is obtained by exposing a strip of film in a sensitometer and plotting the density values against the corresponding relative exposure values.

Therefore the contrast of a negative is not determined entirely by the character of the straight line of the curve in certain cases. Furthermore, it should be mentioned that scientifically the contrast in a negative is defined as the difference between maximum and minimum density. If this difference is small, contrast is low; if the difference is great, contrast is high.

Because of this definition of contrast in a negative, it is possible that two negatives may have the same contrast and yet be of entirely different character. The two curves shown in Figure 12 will help to make this clear. For both of these curves the difference between maximum and minimum density is the same, but the progression of tones within these two limits is quite different. In one case (Curve I) the densities progress gradually, while in the second (Curve II) the density progression is very abrupt. This more intimate progression of tones between the limits of minimum and maximum densities is commonly referred to as the gradation of the photographic image.

The contrast as well as gradation characteristics of a negative are controlled by several factors. For example, the brightness range of the subject as well as its color distribution is of great influence. It is obvious that an object having a very great brightness range (which corresponds to a very great exposure range) will result in a negative of higher contrast than one having a small brightness range.

Photographic emulsions respond differently to various colors of the spectrum. This may be best explained by showing curves plotted from negatives exposed to differently colored light, as presented in Figure 15. Evidently, the contrast of the negative exposed to red light is in this instance less than that of the negatives exposed to blue and green light, while these also show some differences. It is for this characteristic of photographic emulsions that we considered objects consisting of white, gray, and black tones only in our previous experiments. Both the brightness range of the subject as well as its color composition, however, are dependent upon the quality of the illumination, a further factor which influences contrast of the negative.
EFFECT OF EXPOSURE

The effects of exposure upon contrast and gradation have been discussed already; nevertheless, it may be well to present an additional example regarding this point in order to avoid any misinterpretation. We have said previously that the response of an emulsion is not uniform for all levels of exposure. For instance, if the same subject is photographed three times in succession and the exposure varied each time but the three films developed identically, the effect will be similar to that shown in Figure 16 (if the exposure is increased in similar increments). In our case, the negative marked with B was the one which received normal exposure, while negative A received 4 times less and negative C 4 times more exposure than B. Comparing A with B it will be apparent that in the shadow regions where there is considerable detail noticeable in B, there is practically no tone separation in A. Furthermore, the contrast or the difference between maximum and minimum density of B is greater than that of A.

These differences exist because, in case of negative A, most of the exposures fall in the lower, strongly curved portion of the curve, which causes a depression in tone values and incorrect and insufficient separation between the individual densities.

In negative C, on the other hand, the overall density is considerably higher than in B. By this is meant all density values of C are appreciably higher than the corresponding densities in negative B. The contrast of C, however, is practically identical with the contrast of B. Despite the great difference in exposure which was employed in making B and C, negatives were obtained of identical contrast—and this is due to a characteristic of emulsions known as exposure latitude. The meaning of exposure latitude will become clear from the curve shown in Figure 17. If we assume that we made negatives of the same subject, and selected two exposures to
have the density range of one negative fall between points $A$ and $B$ on the curve and the density range of the second between points $C$ and $D$, it will be seen that the densities of both negatives fall entirely upon the straight line of the curve, although at different portions of it. For this reason, their contrast remains the same, although their over-all density alters. The exposure latitude of an emulsion may then be simply defined as the leeway in exposure which one may take and still obtain negatives of identical contrast.

**DEVELOPMENT**

Finally, we must consider the effects of development upon the contrast of the negative, for it is one of the most influential factors of all. It is well-known to every photographer that by increasing the time of development, the contrast of the negative is increased simultaneously. An experiment to demonstrate this fact can be made very easily. Three exposures are made of one subject using the same exposure values each time, and one negative is developed for 2 minutes, the second for 5 minutes, and the third for 10 minutes (Fig. 18). Then, by plotting exposure against density values, three curves are obtained. Three negatives made in this manner and the three curves plotted from them are shown in Figure 19. From the curves especially, but also from the negatives themselves, it is apparent that as development proceeds, all tones of the negative increase in density. However, the higher density values gain density much more rapidly than do the lower densities, and consequently the difference between maximum and minimum density increases as development is extended. In other words, negative contrast increases with increases in development. Naturally, the contrast of a negative cannot be increased indefinitely in this way, but after a certain time of development depending upon the particular film and developer employed, no further increase in contrast can be obtained. On the contrary, finally the contrast is reduced again, for while the high-
est densities do not change, after all of the available silver halide grains are reduced to metallic silver, the lower densities increase further due to an ever-growing formation of overall fog.

Of course, the temperature of the developer must be taken into consideration also; since development obtained is directly related to this factor. Moreover, it must be remembered that the composition of a developer may vary between wide limits. Some developers produce exceedingly high contrast, as for example X-ray developers, and others very low contrast, especially the so-called ultra fine grain developers.

REQUIREMENTS OF THE PERFECT NEGATIVE

Up to this point we have examined the more important factors which influence the reproduction of tones in the negative image, but we have not considered what the requirements are for a perfect negative. Upon first thought it would seem logical that a negative could then be considered ideal when all its densities were in direct and uniform relation to their corresponding exposure values—in other words, a negative whose curve consisted of a straight line inclined under an angle of 45°.

Such a negative would be ideal if materials were available for making the positive print from the negative which had the same ideal characteristics. Unfortunately, however, printing materials, such as photographic paper especially, are far from this state of perfection and in order to obtain a final positive image which is as faithful a reproduction of the original as possible, it is necessary to adjust the character of the negative image to fit the properties of the printing material. In brief, a negative similar to that represented in Figure 14 is not the ideal negative simply because it would not be possible to maintain the correct tone reproduction of the negative in making the positive due to limitations set by the paper.

In addition we find that the requirements for the character of the negative image are by no means fixed values, but vary according to the method of printing. For example, a negative from which a paper print is to be made should be quite different from one to be used for making positive transparencies.

For these reasons, it is necessary to have a great number of film emulsions widely different in inherent contrast and gradation characteristics. In Figure 20, there are shown three curves which demonstrate the great variation in inherent contrast of different film emulsions. Curve A represents a so-called portrait emulsion which is significant for its soft gradation; curve B is that of an ultra-high speed film used primarily for press photography, while curve C represents a film used in the graphic arts industry, where highest possible contrast is a necessity.
TONING BY DIRECT DEVELOPMENT

Ira Current

Without resorting to special toners, the photographer can often exercise control over the tone of his prints—by changing the proportions in the developer. Chloride, chlorobromide, and bromide papers are all covered in this article, which gives several formulas and methods for acquiring tones all the way from a deep black to a bright red.

THE MOST DIRECT, and usually the simplest, method of obtaining a toned print is through the developing process itself: and if the tones available are satisfactory to the requirements of the photographer, there is no need of any further special operations other than the normal fixing and washing before the print is finished.

TREATING COLD-TONED CONTACT PAPERS

Considerable control may be exercised over the tone of chloride paper prints simply through variations in the proportions of ingredients in the developer. Such papers, in order to take advantage of their blue-black character, require development in a rather energetic developer containing a good proportion of metol and carbonate (or other alkali), and a relatively lower proportion of hydroquinone and potassium bromide, along with, of course, whatever amount of sodium sulfite is necessary to preserve the developer while it is being used. Such a developer is represented by the standard Agfa 103 formula:

AGFA 103

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot water (125°F. or 52°C.)</td>
<td>750 cc</td>
</tr>
<tr>
<td>Metol (hydrate)</td>
<td>3.5 grams</td>
</tr>
<tr>
<td>Sodium sulfite (anhydrous)</td>
<td>45 grams</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>11.5 grams</td>
</tr>
<tr>
<td>Sodium carbonate (monohydrated)</td>
<td>78 grams</td>
</tr>
<tr>
<td>Potassium bromide</td>
<td>1.2 grams</td>
</tr>
<tr>
<td>Water to make solution</td>
<td>1 liter</td>
</tr>
</tbody>
</table>

For use, dilute one part of this stock solution with from one to two parts of water. The greater strength of working solution shortens the developing time by a few seconds, but also hastens the time at which fogging of the highlights occurs by several seconds. The more concentrated developer is not satisfactory for chlorobromide or bromide papers. The correct time of development is from 45 seconds to one minute for chloride papers.

HANDSTAND (left). This photograph would take several types of toners, ranging from a rich blue-black to a warm sepia.

Photo, Earl Theisen
TONING BY DIRECT DEVELOPMENT

When the amount of hydroquinone and potassium bromide is increased, the alkali and metal decreased, and the solution generally diluted, the result is a developer which yields more warm or brownish tones, the extent of which, within limits, depends upon the extent to which the developer has been modified in this direction. Quite often, tones of this nature are obtained when not desired by allowing the temperature of the normal solution to be lowered. This alters the relative effectiveness of the constituents to one another. Such unasked-for tones may also be accounted for by a mistake in diluting from stock solution to working solution, or by a contamination of the developing solution with some foreign substance, the most common of which is hypo such as might be carried back from the fixing bath.

A developer formula for producing warmer tones on the normally blue-black chloride papers might be similar to the following:  

AGFA 135:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot water (125°F or 52°C)</td>
<td>750 cc</td>
</tr>
<tr>
<td>Metal</td>
<td>1.6 grams</td>
</tr>
<tr>
<td>Sodium sulfate (anhydrous)</td>
<td>24. grams</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>6.6 grams</td>
</tr>
<tr>
<td>Sodium carbonate (monohydrated)</td>
<td>24. grams</td>
</tr>
<tr>
<td>Potassium bromide</td>
<td>2.8 grams</td>
</tr>
<tr>
<td>Water to make</td>
<td>1 liter</td>
</tr>
</tbody>
</table>

For use dilute one part of this stock solution with one part of water. Prints should be exposed so that development will be completed in from 1 1/2 to 2 minutes.

Where neither warm olive tones nor the blue-black tones obtained with Agfa 103 are desired, the following developer containing glycine may be used to obtain rich black tones on blue-black chloride papers which are more nearly similar to those obtained on fast chlorobromide enlarging papers than any of the others. It is capable of producing very nearly uniform tones throughout a reasonably wide range of developing times and, therefore, may be used for quantity production.

AGFA 130

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot water (125°F or 52°C)</td>
<td>750 cc</td>
</tr>
<tr>
<td>Metal</td>
<td>2.2 grams</td>
</tr>
<tr>
<td>Sodium sulfate (anhydrous)</td>
<td>50. grams</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>11. grams</td>
</tr>
<tr>
<td>Sodium carbonate (monohydrated)</td>
<td>78. grams</td>
</tr>
<tr>
<td>Potassium bromide</td>
<td>5.5 grams</td>
</tr>
<tr>
<td>Glycine</td>
<td>41. grams</td>
</tr>
<tr>
<td>Water to make</td>
<td>1 liter</td>
</tr>
</tbody>
</table>

The coloration of the prepared solution is normal and does not indicate that it is unfit for use. For development, this stock solution is diluted with an equal amount of water. The normal developing time may extend from about one minute to approximately four minutes.

LIBERTY. This type of picture is made effective by using a blue-black tone. The backlighting effect helps to strengthen the strong silhouette of the statue.

Photo, Nathaniel Field
WARM-TONED PAPERS

The same principles as outlined in developing the cold-toned chloride papers may be applied to the development of most of the warm-toned chloride and chlorobromide papers, although the range of tones possible is far from being as great as that expected from the blue-black chloride papers. This may be explained by the fact that the warm papers already possess a warm characteristic which is incapable of being made much colder or less brown. Or they may contain such a large proportion of bromide emulsion that they are not capable of response in tone control. Strictly bromide papers may be developed to a warmer tone by these special methods, although the nature of the image is usually of such an unpleasant muddy character that it is undesirable.

The inquisitive worker may change the proportions of the constituents of his developer himself and thus become familiar with whatever changes in tones are available in the paper he is using. A handy way to take care of this is to prepare stock solutions, say 10%, of each of the ingredients, and then to measure out various volumes, 10 cc representing one gram of chemical. For example, the ready-to-use Agfa 103 formula might be made as follows:

AGFA 103

- 10% Metol .................... 35 cc
- 10% Sodium sulfite ............ 450 cc
- 10% Hydroquinone ............ 115 cc
- 10% Sodium carbonate ....... 780 cc
- 10% Potassium bromide ...... 12 cc

Water ........................................ 1392 cc
- 608 cc
To make ..................................... 2000 cc

Or the Agfa 135 formula:

AGFA 135

- 10% Metol .................... 16 cc
- 10% Sodium sulfite ............ 240 cc
- 10% Hydroquinone ............ 66 cc
- 10% Sodium carbonate ....... 240 cc
- 10% Potassium bromide ...... 28 cc

Water ........................................ 590 cc
- 1410 cc
To make ..................................... 2000 cc

By this means a wide range of experiments is possible with a minimum of tedious weighing. Of course, the solutions made up, particularly the reducing agents, will be stable for only a relatively short time.

It should be remembered that wide deviations from the standard formulas published by the manufacturers may affect the stability of the developer itself, and may cause fogging or staining of the photographic paper. A great deal of work and care has been expended in working out the published formulas, and variations from these established methods are at the photographer's own risk.

Chlorobromide and warm-toned chloride papers may often be developed to a somewhat colder, less brown tone, by means of a standard developing solution to which has been added a small amount of potassium thiocyanate. Usually from two to five grams of this chemical per liter of ready-to-use Agfa 103 developer is satisfactory, although the actual amount required under specific circumstances will have to be determined.

Chlorobromide and bromide papers often lend themselves to development in special warm-tone developers, the resulting color sometimes being of a very brilliant nature depending upon the extent to which the manipulation has been carried. Because of the wide range of colors available through changes in dilution and time of action with this procedure, it is difficult to recommend specific formulas for development. The following formula utilizing glycin and hydroquinone will serve as a guide as to how to proceed along this line:

Stock Solution:

- Sodium sulfite (anhydrous) ......... 63 grams
- Sodium carbonate (monohydrated) ...... 88 grams
- Glycin .............................................. 7 grams
- Hydroquinone ....................... 7 grams
- Potassium bromide ......... 1 gram
- Water to make ......................... 1 liter

The following variations may be utilized to produce a wide range of tones:

- Dilution with water: 1:0 to 1:8
- Addition of 10% potassium bromide solution (cc/liter): 0 to 80
- Relative exposure times: 1 to 4 or 8
- Approximate developing time in minutes: 1½ to 12 or even 30.

Range of tones formed: Black, engraving black, warm black, sepia, to red-brown.

Adurol may be substituted for glycin, but for best results the sodium carbonate should be reduced to 55 grams and the range of
dilutions, etc., should be different:
Dilution with water: 1:0 to 1:30
Addition of 10% potassium bromide solution (cc/liter): 0 to 240
Relative exposure times: 1 to 9 or 15
Developing time: 1½ to 30 minutes
Range of tones: Warm black, warm sepia, red-brown sepia, to bright red.

GOLDEN GIRL. Backlighting on the model's hair adds interest to this close-up
Photo, Peter James Samerjan
PRINT SURFACING AND MOUNTING

Don D. Nibbelink, A.R.P.S., A.P.S.A.

Pictorial Photographer and Photographic Author, Agfa Ansco Co.

A surfacing medium such as wax, lacquer, or varnish is often used by photographers either to protect the emulsion or to reduce the reflectance. The merits of each substance and the technics for application are given.

All illustrations by Don D. Nibbelink.

There are two major reasons for applying a surfacing medium to a finished photographic print. The first is to protect the print surface, and the second is to decrease the diffuse reflection or scattering of light from the surface of the print. While there are specialized surfacing media which will fulfill one of these specifications, the majority of such preparations serve both purposes.

PRINT PROTECTION

Photographic prints are occasionally subjected to various types of maltreatments when used for display or for other purposes, resulting in minor abrasions, finger marks, etc. For instance, the print may be exposed to gases which would have a deleterious effect on the gelatin or the paper base. Moisture may collect on the print surface, softening the emulsion to such an extent that it would be extremely susceptible to scratches or other minor abrasions. Then, too, the print may have been made by a control method.

Prints of this type or oil-colored prints are likely to become soiled or even smudged unless given a suitable protective coating. The protective media are of three different basic substances—waxes, lacquers, or varnishes.

Waxes. The wax selected should be preferably as colorless as possible, since a heavy orange or deep-yellow floor wax (which may be suitable in every other respect) will tinge the print highlights with its own color, even if used in a very thin coat. A recommended commercial floor and furniture wax for protecting prints is Ford's High Grade Polish. This particular wax may be applied directly on the mount—front and back—as well as the print itself. If applied properly and polished while still moist with a folded cheesecloth, the waterproofing is so effective that a mounted print treated in this manner may be held under a running water faucet without being damaged.

EFFECT OF PRINT SURFACING. The high key portrait shown above would be scarcely affected by waxing because blacks are affected proportionately more than whites. The print below, however, would need surfacing because of the full range of tones and the predominance of deep blacks.
PRINT SURFACING AND MOUNTING

WAXING. Many workers feel that a print wax gives a happy medium between a dull matte finish and an extremely high gloss. Waxes are usually "polished" on with lintless cloth.

The method of applying waxes—whether liquid or solid—is essentially the same. Print waxing differs little from waxing furniture. The wax, which should be in a fresh and moist condition, should be taken up on a soft lintless cloth and applied in a thin even coat to the surface of the print. Polish with a succession of two or three additional lintless cloths. If the print is unmounted, care should be taken that the polishing is done on a clean, flat surface, as small pieces of grit or dirt beneath the print will become apparent as protruding bumps on its surface. Contrary to opinion, general waxing of this nature does not appreciably alter the print quality through added brilliance—particularly in semi-gloss surfaces. However, it does have the advantage of making spotting and etching on the print less apparent.

Lacquers. One of the best commercially available protective print lacquers is the Kodak Print Lacquer. This solution is perfectly matte when dry so that it should not be used as a means of altering print reflectivity. If any greasy marks or fingerprints are on the print surface, they should be removed with a good grade of household cleaner before the lacquer is applied. Carbona, carbon tetrachloride, or any grease solvent cleaner may be used for this purpose.

If unmounted, the prints are then covered with the lacquer by a brief immersion of the entire print in a clean tray into which a sufficient quantity of the lacquer has been poured. No longer immersion than a few seconds will be necessary, but during this operation all air bales should be removed from the print so that the solution has the opportunity to reach all parts of the important print surfaces. Immediately following the application, the remaining lacquer in the tray should be returned to its original container.

If mounted, an alternate method of application with a soft brush or a lintless cloth has the advantage of allowing less of the highly volatile (and flammable) lacquer to be lost through evaporation. If, due to evaporation, the stock solution becomes viscous, it may be thinned with addition of Print Lacquer Thinner.

Once coated, the prints should be hung up to dry in a well-ventilated room. Heat should not be used to hasten the drying process which should occur within a few minutes. If a thicker protective layer is desired, it may be added to the prints after the first application has dried for about twenty-four hours. Should the prints then become soiled in handling, they may be gently washed with mild soap and water.

PROTECTION OF OIL- OR WATER-COLORED PRINTS

Regardless of the preparation used to protect oil-tinted photographs, it is advisable to dry such prints for at least one week before applying any surfacing medium. Otherwise the colors may be smudged or may fade. Water-colored prints may be treated in this manner within an hour after the colors have been applied. Although lacquer can be used to coat tinted or oil-colored photographs, special precautions must be
taken since the oil pigments, as well as many water colors, may be soluble in this lacquer. To prevent this occurrence, a 1½ to 2% solution of plain gelatin is prepared, into which the whole print is dipped. Either commercial, edible gelatin, or pharmaceutical gelatin is satisfactory. The gelatin is allowed to stand for 30 minutes in cold water or until completely swollen, and then dissolved in warm water to the proper dilution. Any excess gelatin may be stored for future use, but a mild antiseptic such as Thymol (obtainable from most drug stores—2 cc of a 1% alcohol solution to every 100 cc of the gelatin solution) should be added to prevent the formation of mold.

The gelatin size may also be applied to both front and back of the print by spraying or brushing gently so as not to smudge the coloring. It is important to treat the reverse side of the print with the gelatin, as the lacquer may penetrate the paper fibers to react with the oil pigments. After the gelatin size has become completely dry, the print lacquer may be applied as described above. On the other hand, the gelatin size itself may offer sufficient protection so that additional lacquering is not necessary.

If, in a protective solution for colored prints, a higher degree of gloss is desired, the worker has the choice of several recommended preparations. Marshall's Dull Finishing Varnish yields a medium gloss, while Marlac, produced by the same company, will produce a surface nearly equal in reflectivity to a glossy print. Both preparations are applied in a similar manner, the work preferably being carried out in a dust-free room. A little of the solution is poured on the print and is brushed gently over the remainder of the surface, first one way and then the other with a soft, high-grade varnish brush. To prevent dust from settling on the surface, it may be advisable to lean mounted prints face-in against a wall. In a few hours drying may be hastened with a fan. Unmounted prints should be left to dry in a dust-free room. Prints treated in this way should be left for 12 to 24 hours before further use. In framing such prints, it is then not necessary to place them behind glass.

**PRINT REFLECTIVITY**

Essentially, the greatest number of prints are after-surfaced to increase print brilliance—a factor which is realized by many photographers who have long been "glazing" or ferrotyping glossy prints or waxing matte prints, to "snap them up."

Surface reflectivity is independent of the image and in effect reduces the density of the silver, making it appear as if the shadow area of the picture were lightened by a veil of gray. No amount of additional exposure or development will make the deepest shadows any darker, since the limits of maximum density have been reached as they were predetermined by the nature of the print surface. The higher maximum-density values of "sheen-surfaced" papers result in a greater brightness scale (increased visual contrast) and a longer range of tones. Prints made on such papers usually exhibit more of the so-called "print quality." Thus the main reason for trying to approximate the characteristics of glossy paper by means of a surfacing medium becomes apparent.

In addition, there are several other advantages to be derived from the use of such media. The phenomenon known to photographers as the annoying "drying down" characteristics of matte-surfaced papers is avoided. This means that no longer does one find it necessary to shorten slightly the exposure of matte prints so that they will have an average density closely comparable to a print made from the same negative on glossy paper. Spotting and etching marks on the print surface can be completely hidden. Better photographic copies can be made from varnished or lacquered prints than from those with a condensed tonal range that is the result of a dull matte surface. Lastly, the desirable appearance of a matte-textured surface is not greatly altered.
Brush Application. Lacquers and varnishes may be applied in a thin and even coat with a brush. An appropriate thinner added to the stock solution will make this easier.

The main difference being an increase of that surface's reflectivity—and at an extremely low cost per print.

What makes this great difference possible? Simply, it is the smoothing out of small surface irregularities in the print. When viewed as a magnified cross-section, a matte surface appears like a mountainous succession of hills and valleys; protuberances, although small in actual size, are nevertheless large enough to act as a diffusing surface to scatter the incident light by which the print is viewed. On the other hand, a matte paper that has these tiny surface irregularities filled in by an application of a highly reflecting medium shows a marked reduction in the light-scattering properties of the paper. Consequently, the print quality is improved. Although the black areas appear blacker than before, the highlights and other light print areas are little affected. Here the capacity for reflection is largely determined by the whiteness of the paper base, which is in itself a diffuse rather than a specular reflector—the light reaching the base after being transmitted through a layer of transparent gelatin.

The materials most generally used for this purpose again may be divided into waxes, lacquers, and varnishes. Each has its respective advantages and disadvantages, but are alike in one respect in that all should be applied after the print is mounted—particularly so if heat or pressure is used in the process, as in the case of dry mounting.

Spraying Print with Lacquer. The author is shown demonstrating the use of a fixatif atomizer. Work is done about one foot away and the print is masked so that work can go full to the edges. Too much should not be applied and any drops blown onto the print are immediately blotted up.

Waxes. Household waxes, such as Simoniz, Johnson's, Duco, or even floor waxes, are used by some workers to brighten their prints, but more satisfactory preparations are available from photographic supply stores. Recommended are "Gem Gloss" or "Probus Print Lustre," which are applied like the protective waxing of prints. As many photographers object to a brilliant "shine" in their prints, wax is a satisfactory answer to their problems of achieving only a slight increase in reflectivity of the finished print.

Diagram of Print Surfaces. A, a glossy print surface; B, a matte print surface; C, a varnished print surface. Note that the varnish fills up the irregularities of the matte print, causing less incident light striking its surface to be diffused.
Drying Prints. If mounted, freshly surfaced prints may be dried when suspended, face down, between two books.

It must be remembered, however, that as a method of increasing print reflectivity, waxing is least efficient, particularly in prints that are of a high-key nature or that are printed on a surface that inherently possesses a medium degree of natural sheen. Upon prints of this type, waxing can do comparatively little regardless of how much polishing its users advocate, and may, in fact, slightly "cloud over" prints made on a silk or crystal surface. Conversely, waxing is more efficient on a rough matte print of a low-key nature.

Varnishes. One of the most desirable attributes of varnishes, generally speaking, is that they afford more complete protection than other surfacing preparations. However, the prime requisite for which to look in a varnish is that it be as colorless as possible for, due to the very nature of the resins from which varnishes are made, even the most colorless have a slight yellowish tinge, while the impure variety is dark brown. This, of course, is less noticeable if the varnish is applied to a buff- or cream-base photographic paper, and this objection is further overcome if the varnish is applied in as thin a coat as possible. In order to do this, many photographers prefer to mix the following solution:

1 part varnish
1 part linseed oil
2 parts turpentine

If possible, the best artists' quality mastic varnish should be used, avoiding bakelite varnishes, as they have an undesirable tendency to oxidize and apparently discolor the emulsion gelatin within a few weeks after being applied, particularly at high temperatures. These ingredients are mixed well and shaken in a bottle which should be capped when not in use. The working solution can be applied with either a brush or a lintless cloth, after which the excess is removed and the print polished vigorously with another cloth. The print should then be left in a dustless place to dry.

Lacquers. A satisfactory print-surfacing medium should: (1) be clear; (2) dry rapidly; (3) be easily removed from print with thinner, if desired; (4) be inexpensive; (5) have a brilliant sheen when dry (the amount of sheen is usually a controversial matter of personal opinion); (6) not oxidize rapidly; and (7) have adequate resistance to minor abrasions. Lacquers fulfill these specifications more closely than do other preparations, lacking only in their ability to resist abrasions. This, however, is only noticeable when the print surface has been treated roughly or if the lacquer coating is fairly old. This difficulty is lessened if the surface is rough matte or if the print is mounted behind a cut-out mount where the mount surface is elevated above that of the print.
The mounted print to be lacquered is placed in a horizontal position and the edges of the mount carefully masked off with strips of cardboard that are weighted down at the corners by any convenient objects. This leaves only the actual print surface exposed. The working solution is preferably placed in a small, deep bottle and is sprayed evenly onto the print with a Fixatif atomizer (Weber’s No. 4 is recommended), such as used by artists to fix charcoal or pastel drawings. Inexpensive folding atomizers may be obtained at any artists’ supply store or 5-and-10-cent store.

After the print has been lacquered to your satisfaction, to prevent dust from settling on the sticky surface the mount masks are removed and the print immediately leaned face-in toward a wall or else suspended face down between two books that only touch the mount. The lacquer should be dry enough for ordinary handling within an hour. If, upon examination at this time, a

DULL MATTE SURFACE. Lacquered and unlacquered surfaces are compared

Satisfactory lacquers and thinners are as follows (paint stores should be able to supply at least one of these high-sheen lacquers):

1. Bloomfield Chemical Co.
   Lacquer No. 700
   Thinner No. 700
2. Pittsburgh Paint Products
   Minimax Clear Lacquer R1-23104
   Minimax Clear Thinner F1-8611
3. Atlas Powder Co.—Zapon Division
   Zapon Clear Lacquer S-109-C
   Zapon Thinner 290-RT
   Clear Industrial Lacquer K65050
   Clear Industrial Thinner K65050

The technique of applying these lacquers differs from that of other print-surfacing media as it is most conveniently coated by spraying. A working solution is made by diluting one part of lacquer to two-and-a-half parts of the corresponding thinner. Spraying is recommended as this is the easiest way to coat the print thinly, evenly, and also permits the lacquer to dry rapidly.
few dust particles have adhered to the lacquered surface, they may be easily removed by simply rubbing the print surface lightly with a soft cloth. Recently lacquered (or varnished) print surfaces should never be placed in contact with each other but should be separated by sheets of cellophane or tissue paper. This is a wise precaution, particularly if prints are to be packed for shipping even after the lacquer has dried.

**MOUNTING**

With a majority of the print surfacing media and technic used, it is advisable to mount the print first and then apply the wax, varnish, or lacquer as the case may be. This is, of course, to prevent any of the media from sticking to the hot dry-mounting press or an iron, should the print be mounted in this fashion.

The various mounting methods are sufficiently familiar to most workers so that only a few general suggestions will be mentioned. These should be given consideration particularly if the print is to receive one of the surfacing treatments. Care should be taken to see that the print is perfectly flat. It should not have the slightest suggestion of a wrinkle nor should any small particles of dust or dirt remain on either the face or the reverse side. Dirt on the back of the print or the face of the mount will be evidenced as tiny bumps on the print surface, while dirt on the print surface itself may become embedded in the emulsion during the mounting process. Since the reactivity of the print is usually increased by a surfacing treatment, it seems as if these small print defects become more apparent after the lacquer, for instance, has been applied.

One other suggestion concerns the method of placing a black line around the print to enhance its appearance on the mount. The following method utilizing black India ink is applicable to many subjects.

A wide square-tipped pen point of the type which has been split into thirds to facilitate the flow of ink is selected. Bend one of these prongs downward to about a 30 degree angle so that it will serve as a guide for the remaining two sections when the India ink line is drawn around the four sides of the trimmed print before the print is mounted. The guide section insures a margin of slightly less than 1/3 of an inch wide (on a salon-size print) with little opportunity for the pen point to slip inadvertently onto the print area proper.

If necessary at a later date, the lacquer may be removed with applications of the recommended thinner and the surface recoated. Pure thinner can also be used for cleaning the atomizer or vessel used to hold the working solution.

The results of lacquering are very interesting when examined by comparison of untreated and treated step-wedge prints. Characteristic curves obtained from identical prints show that those which are lacquered have a proportionately greater tone separation in the higher densities, an increased density range, and a slightly increased over-all contrast. Practically, this means the shadow detail is greatly improved as is the quality of the whole print.
CONSTRUCTION PROBLEM
The success of this indoor color picture comes from the genuine concentration of the boy as he works out a new construction. Note how the plain background throws the emphasis upon the subject.

From original Kodachrome
NEWSPAPER VISITORS (above)  EDWARD FABER
These six lively youngsters came to visit the Minneapolis Journal one day and an alert news photographer was quick to see a real local color shot for his paper

REFLECTIONS (below)  BARBARA MORGAN
Everyone loves to look into the queer mirrors at the fun house. A 35mm camera equipped with a 35mm wide angle lens made this color picture possible. Daylight Kodachrome was used with lens opening at f/4.5 and a shutter speed of 1/60 second
PILOT OF TOMORROW
Children in action furnish endless subjects for interesting color pictures. Usually two photoRood lights will give sufficient illumination for a scene like this.
AT THE CIRCUS
The white suited clown at the top gives an effective contrast against the more dominant reds in the other pictures

From original Kodachromes
FARM SCENES
The general farm scene in the lower left by Frank Scherschel gives the introduction to closer color subjects such as the turkey by Bill Stahl and the corn and bursting flower.
Children just naturally assume interesting poses when they are absorbed in doing something. Although the photographer arranged this pose it has all the naturalness of similar scenes which occur thousands of times in every locality.
Much has been said about the mixing of chemicals in developers and other solutions, but water—an all-important ingredient—is often disregarded. Through its impurities, water may become a major cause of failure, and this article discusses the special problems of hard or dirty water and water in which gases or organic matter are dissolved. Controls of impurities, as well as their effects, are covered.

Water, as supplied to the majority of home and industrial consumers, is usually purified and does not as a rule contain a prohibitive amount of impurities which may be injurious to photographic solutions in the normal processing of photographic films and papers. In some localities, where well and river water are the only sources available, impurities in the water may be highly undesirable. In most cases, however, these can be safely removed to allow the use of the water for most photographic purposes.

Impurities which may be found are:

1) Hard water containing dissolved solids such as calcium, magnesium, and iron salts.
2) Suspended matter such as dirt, rust, microorganisms, vegetation, or other materials found in or on the ground.
3) Dissolved organic matter from decomposed vegetation may color the water red, yellow, or brown.
4) Free acid due to industrial discharge into streams and rivers.
5) Dissolved gases such as air, carbon dioxide, and hydrogen sulfide.

Effect of Impurities on Developers

Hardness of water may be usually recognized by the increased amount of soap required to produce lather. It is caused mainly by the salts of calcium and magnesium. Developing solutions prepared with water containing these salts often precipitate a sludge which may cause spots on film if allowed to settle on the emulsion surface. This sludge usually consists of insoluble calcium salts and is formed by the reaction of soluble calcium salts found in the water with the sulfite and carbonate in the developer. The quantity and speed of formation of the precipitate depends, of course, on the amount of calcium present in the water. Magnesium salts have a lesser tendency to precipitate unless they are present in large quantities. These precipitates are not likely to be injurious to film if allowed to settle so that only the clear liquid is used.

The amount of sulfite and carbonate removed from the developer due to this reaction has, as a rule, little effect on the photographic properties except in a case of a developer containing a low concentration of borax or a comparatively small amount of carbonate. It has been found by artificial hardening of water, that more than 0.1% of calcium or magnesium salts were necessary to obtain any noticeable loss of speed or contrast with a developer containing 0.3% of sodium carbonate. The waters tested in different parts of the United States contained less than 0.08% of hardness calculated as calcium carbonate. It is therefore unlikely that any loss of contrast of the negative image may occur due to a decrease of the sulfite and carbonate content, except possibly with some fine grain developers having a low alkali concentration. In such a case, a larger quantity of the alkali would need to be added to obtain the desired speed and contrast. This amount naturally will differ, depending on the hardness of the water.

The formation of a sludge of hard water salts in the developer can be prevented by the addition of water softeners such as sodium hexametaphosphate, 10 to 15 grains per quart, depending on the hardness of the water. Sodium hexametaphosphate, which is marketed by Calgon, Inc. of Pittsburgh, Pennsylvania under the name “Calgon,” combines with the sodium sulfite and carbonate to form a soluble salt. Various acid...
and alkaline types of this chemical are available commercially. Although it is not absolutely necessary, the neutral type is preferred for photographic developers.

2) Other dissolved salts such as iron salts may cause water hardness to a certain degree. These are not, however, usually present in sufficiently large quantities in most waters to be of any harm, except possibly in certain well waters. Most of the iron found in water is usually removed during purification of water for home and industrial use.

Some well waters contain a fairly large amount of dissolved iron present usually as basic iron salts. The iron content, however, varies even in wells which are relatively close to each other and which are of the same depth. Air oxidizes the dissolved iron to form a precipitate of iron oxide which may be removed either by filtration or decantation. It is therefore only necessary to stir such water vigorously in order to dissolve sufficient air to react with the iron present.

3) As a rule, suspended vegetable or animal matter has little or no effect on developers or their action, providing it is allowed to settle. Iron rust or any suspended matter may produce spots and stains which may be difficult to remove once the film has dried, however.

A few layers of cloth or cotton flannel over a faucet or the end of a hose serves as a fairly efficient filter for wash water containing insoluble matter.

4) Many streams, especially in mining or industrial districts, sometimes contain free acid due to drainage. This acid concentration is usually too low to have any effect on developing solutions and may be therefore disregarded.

5) Developers prepared with water containing a fairly large quantity of dissolved gases such as air are apt to discolor in a comparatively short time due to oxidation of the organic reducing agents. Air may also collect in the form of small bubbles on the surface of the film retarding development of the emulsion underneath each particular bubble, thereby causing spots.

Carbon dioxide is harmless in developers. Large amounts, however, may form bubbles on the emulsion causing spots, the same as air. Water containing hydrogen sulfide gas is dangerous for use in preparing developers, because of its great tendency to fog film. Hydrogen sulfide can be removed from water by precipitating with lead acetate before mixing the developer. In order to avoid the addition of an excess quantity of lead acetate, it is advised to add small amounts of a weak solution until precipitation ceases.

**EFFECT OF IMPURITIES**

Hard water salts are soluble in an acid solution and are therefore not precipitated from most acid fixing baths.

Dissolved gases and suspended materials such as dirt, rust, and vegetable matter have practically no effect on the fixing properties of a fixing bath. It is advisable, however, to remove insoluble matter to avoid scum or spots on the film after drying.

The majority of water impurities do not affect the permanence of films or prints, providing all excess water is thoroughly removed from the surface of the emulsion. Dissolved salts and suspended matter often form a scum on the film which may affect the printing qualities.

**WATER SUPPLY**

It is often difficult to foretell through chemical analysis just what effect water may have on photographic processing. When in doubt, the best and safest method of testing water is to compare the properties of a photographic solution prepared with the sample water with one prepared with distilled water.

In some localities where only hard water is available, it is advisable to allow the photographic solution to settle overnight after mixing and then either filter or decant the clear liquid for use.

The use of sea water should be avoided whenever possible, except in cases of extreme emergency. Sea water contains a relatively large amount of soluble salts which may retard the action of the photographic solution used.

In general, sulfides are the only water impurities to be feared in photographic solutions. The majority of other impurities, although they may cause spots or stains on emulsions, are otherwise harmless when removed by settling or filtration.
YOUNG CHINESE GUERRILLA. This photo is a striking example of the fine quality print that can be obtained when care and accuracy are exercised in preparing photographic solutions. A good shot can be easily ruined by haphazard developing. It is the final result that counts and no matter how flawless the composition of the original picture, the effort will have been worthless if the print is a bad one.

Photo, Chao Chen Yang
ADVANCED ENLARGING TECHNIQUES

Don D. Nibbelink, A.R.P.S., A.P.S.A.

Pictorial Photographer and Photographic Author, Agfa Ansco Co.

Photographs—particularly those intended for salon exhibits—often need special handling during the enlarging process. Some of these special methods are discussed here—including diffusion, groundglass control, masking, and the little-known technic of “flashing.” This article is written for the darkroom worker who has mastered simple enlarging and is ready for the more complicated projection control.

Many photographers hope to make prints which will be suitable for acceptance to an open-jury salon—one in which anyone anywhere may enter. Because this is a difficult achievement and one which is usually reserved for the most skilled workers, the phrase “salon photograph” describes photographic qualities that seem elusive to a majority of photographers.

But there is really nothing mysterious about good print quality. Many amateur and professional photographers have negatives of salon calibre in their files, but are not sufficiently well acquainted with enlarging technic so that prints from these negatives will stand up under the intense competition of international exhibitions.

In other words, even with a good negative, it is often the knowledge, or the lack of knowledge, of enlarging technics which can “make or break” a particular photograph. Enlarging does not begin and end with the pressing of the light switch to expose the sensitive paper. It encompasses far more than that, and good enlarging technic encompasses procedure which begins long before the negative is placed in the enlarger and does not end until after the print has been processed.

In the following paragraphs, a few of the more important aspects of good enlarging will be discussed in the hope that this may serve to point out the way towards better enlarging quality. While not new, many of these points and precautionary measures that constitute good enlarging practice are often overlooked.

PRINT DIFFUSION

There are numerous diffusion technics which have been recommended as a method of projection control. Among the various instruments or expedients suggested to accomplish the diffusion are those of open-mesh fabric tightly stretched over a small wooden frame, crumpled cellophane to be held in front of the lens, intentional vibration of the enlarger during exposure, and commercially prepared diffusion discs which are available as enlarging accessories.

All of these means for introducing diffusion have their place in the making of enlargements. If used judiciously, they create a pleasing pictorial diffusion in the lines and outlines, or “drawing,” of the print. However, in the large majority of cases, the diffusion should not be overdone or carried to the point where it is immediately apparent and calls attention to itself. Fortunately, pronounced diffusion is seldom necessary because slight diffusion is generally sufficient to eliminate wiry sharp detail in subjects for which a broader treatment with emphasis on mass and atmosphere is most effective. The same slight diffusion is also sufficient to avoid any grainy appearance in large prints made from miniature negatives. Another advantage is the minimizing of retouching marks on the negative.

The main reason for using a diffuser during enlargement is that it allows one to make diffused prints from critically sharp negatives, while at any time in the future, if it is desired, a sharp print can be made from the same negative.

When diffusion is introduced during enlargement, it is the darker lines or shadows of the print which are softened and spread out at the edges. Yet since the shadows are often printed down to such an extent that they represent rather dark areas in the final print, the effect of diffusion is somewhat obscured and less noticeable than might be expected. When diffusion is effected during exposure of a negative in the camera, the opposite condition prevails, and it is the
PRINT CONTROL. The straight print at the left was made without dodging or other control methods, while the finished salon print at the right shows improvement in many details. There have been several structural changes (the wedding ring is eliminated; the shadow of glasses is removed). Notice in particular the difference in separation between the subject and background, accomplished by means of pencil work on a thin sheet of groundglass bound to the negative. Keep in mind that the salon print must face rigid competition and close scrutiny to every detail.

Photos, Don D. Nibbelink

highlights which are spread out and softened at the edges. Among most pictorialists, it is generally agreed that this results in a more pleasing effect.

One diffusion technic which has been largely overlooked, but which retains both the advantages of a sharp original negative and the desirable highlight diffusion, is as follows: Before making the print, the original negative is first copied by contact printing onto a sheet of commercial film, developed in a borax formula so that a well-exposed, soft positive transparency results. This should be rather flat and gray, without any brilliant highlights or black shadows, and quite unlike the sort of transparency that is desirable for lantern slides. From this positive transparency, a negative is made by projection, with suitable diffusion introduced during the exposure. In this way the duplicate negative will be diffused just as it would have been if exposed in a camera focused upon the subject. Thus, the making of a duplicate negative by projection printing with diffusion is comparable to re-photographing the original scene with a diffusion screen attached to the lens, so that a pleasing softening of the highlights, rather than the shadows, will appear in the final print.

When completed, the duplicate negative is used to make the enlargement, rather than the original negative. By this procedure, with small expenditure of additional time and effort, a decidedly pleasing effect of diffusion can be introduced in the picture. If it is decided that some further diffusion of the shadows is desirable, in addition to diffusion of the highlights, after the duplicate negative has been made, such diffusion may be introduced in the print during projection printing in the usual way.

GROUNDGLASS ON NEGATIVE TONE CONTROL

Rarely does a photographer produce a negative in which the tones are just exactly as he wishes they might be to produce the most artistic and pleasing print. Occasion-
ally the clouds may not be as bright as de­sired, and the cloud highlights may not be emphasized as the photographer feels they should be. Or perhaps too weak a light was used on the background of a portrait, which resulted in insufficient separation of the subject and the background.

These common negative defects and sev­eral others can be easily remedied by binding the negative to the smooth side of a thin piece of groundglass, with cellulose scotch tape, and then working in the missing negative details with powdered graphite, which can be easily shaved from a soft pencil lead. The graphite is worked into the groundglass over a light viewer with an artist's stump of the kind used for charcoal drawing, or by any other convenient method. A satisfactory substitute for a stump can be made out of a piece of thin cardboard, tightly rolled so that it is shaped like a pencil with a blunt point at one end. This implement is used for blending pencil strokes together and for smudging any relatively large area of the pencil work so that it is even in tone.

During retouching, the groundglass and negative should be examined as a unit at all times so that the two will remain bound together and will not get out of register. A good idea is to make a series of small proof prints as the work progresses, to counter a natural tendency of most workers to incor­porate an excessive amount of pencil work, especially in the first few trials with the method.

Although the addition of the groundglass to the film negative might imply a tre­mendous increase in printing time and result in a greatly diffused print, such is not the case. The small amount of added diffusion is barely perceptible and often enhances the rendition of objectionably sharp details. Naturally this groundglass technic is not recommended for pictures of machines, and such, but is particularly suited to landscapes and portraits. The increase of exposure time of the print may be found to be not more than a comparatively small per cent of the printing time required for the negative before the groundglass was taped in place.

The accompanying illustrations show the possibilities offered by this technic for a por­trait in which desirable separation between the subject and the background has been added on the groundglass. It would be im­possible to accomplish the same result by dodging or nearly any other means of pro­fection control. Fortunately, the ground­glass retouching technic is very helpful and one which does not require any great degree of artistic ability to obtain results that are natural and pleasing.

**MASKING THE NEGATIVE**

Another feature of enlarging technic which is often overlooked by many photographers is the necessity for masking off those portions of the negative which are not to be included in the enlargement. Some enlargers are equipped with automatic masking devices which may be adjusted conveniently and satisfactorily. On the other hand, it may be necessary to have a series of masks with dif­ferent-sized openings to accommodate par­ticular pictures. These can be cut from the sheets of black interleaving paper found between each piece of sheet film, or from a discarded black paper envelope.

Because the enlarger light passes, in turn, through a negative in which the silver deposit tends to scatter light, and through a lens which is rarely free from some flare and in­ternal reflections, the light transmitted by the lighter areas of the negative tends to become somewhat scattered, with attendant loss of image definition when it reaches the sensitive photographic paper. Consequently, there is often an appreciable scattering of light from a more transparent area of the negative into areas representing neighboring middle tones or highlights in the print. Although this scattering effect may seem inconsequential in prints of smaller size, it is sometimes very apparent when pictures are enlarged to a considerable degree, particu­larly when the negatives have received a rather heavy exposure. In effect, this leads to loss of contrast and the crisp, sharp images so desirable for the best photographic quality.

The adverse effect of light scatter in en­larging can be minimized by the use of paper with proper contrast, and by masking the negative to prevent any stray light from reaching the easel adjacent to the print. Keep in mind the necessity for masking the
negative not only to determine the useful portion of the negative, but also to prevent light from passing through those areas of the negative which do not represent portions to be used in making the print. Troubles from light scatter during enlargement are also lessened if the walls of the darkroom near the enlarger are painted some dark shade, with a matte surface, and if a dark-colored smock is worn by the photographer when making enlargements.

CHECKING SAFELIGHT ILLUMINATION

Quality enlargements often result as much from a knowledge of things to be avoided as they do from procedures to be religiously observed in one's enlarging technic.

One of the most important points to keep in mind, even before starting to make enlargements, is that the darkroom should be really dark and the safelight really safe. Unsafe darkroom illumination with a safelight of the wrong color, or one that is too bright, or that leaks white light, can result in fog that may veil the highlights and consequently make the quality of the final print suffer. This can be divided into two separate categories. One is extraneous light entering the darkroom, and the other, improper safelight illumination.

Of these two, the latter is probably the more frequent source of poor quality in prints, as outside light entering a darkroom is readily noticeable and correctable, particularly when the worker's eyes have become accustomed to low illumination levels after being in the darkroom for several minutes. Improper safelight illumination may be the result of several factors. The safelight filter may have spectral transmission properties that are not designed for use with the sensitive material employed. Although papers in general are sensitive to blue light, some are most sensitive to blue-violet and some to blue-green light.

The safelight filter should transmit light of those wavelengths to which the paper is least sensitive, and the manufacturer's recommendations should be followed. For instance, the safelight filter intended for use with contact paper should not be expected to give the proper type of illumination with fast bromide enlarging paper.

Other causes of fogged enlargements may be traced to a safelight lamp that is brighter than recommended, and to work which is being carried out too close to the safelight. Prints should not be held up directly under a safelight during development for this is poor technic and also may lead to fog from exposure to safelight. Although close observation of the print throughout development is advisable, it should be kept in mind that excessive handling and lifting the print out of the solution when it is in the developer may result in stains. Also the color of safelight illumination is not suitable for critical judgment of results.

The recommended method of checking safelight illumination is to place a piece of partially covered photographic paper face up for five or ten minutes in a position in the workroom where processing and handling of the paper is carried out according to normal darkroom procedure. This represents about the average time paper remains under darkroom illumination before it reaches the fixing bath. A general recommendation for enlarging papers is that the test should prefer-
EFFECT OF DODGING. At the left is an uncropped and undodged print, giving the impression that the announcer is about to read a soap commercial. In the dodged and cropped version at the right, drama has been infused and the photograph now looks like the broadcast of an important news event. Dodging can add much to a print, but it must not be done indiscriminately.

Photos, Agfa Ansco

ably be made with as fast a bromide enlarging paper as it is possible to obtain. The sensitivity of such papers is naturally greater than the slower chlorobromide enlarging papers, and fog will usually be noticed first with this type of material.

The paper is then placed in a tray of developing solution and processed as if it were a normal print. If there is a noticeable difference between the exposed and unexposed areas on the test strip, it is reasonably certain that the darkroom illumination is unsafe and there is danger of fogging many prints. Steps should be taken immediately to remedy this condition. This may be corrected by either removing the safelight to a greater distance or by using another lamp, by directing the rays of the safelight so they are reflected from a wall or ceiling and do not fall directly on the prints at any stage in the procedure, or by replacing the safelight filter by one recommended by the manufacturer for the particular paper that is being used.

PROJECTION CONTROL

Dodging is a necessary evil. It should not be regarded as a technique which should be followed every time an enlargement is made, in an attempt to make it more "pictorial." Instead, it is a means for compensating for some fault in the negative, because, were the negative a perfect specimen technically, the dodging not only could be, but should be, eliminated. Dodging alone will not necessarily make a salon winner from a mediocre negative, but it is a method of enlarging control which definitely can be extremely helpful in making good enlargements.

The ordinary dodging procedures are so familiar to most photographers that they scarcely require amplification. In most darkrooms one will find an assortment of dodging implements—opaque cardboards with various-sized holes cut in them, round or oblong pieces of cardboard which have been fastened to a wire, or even a tuft of cotton on the end of a broom straw. All of these can be useful, and no dyed-in-the-wool
projection-printing enthusiast should be without them. Yet there is at least one unusual method of dodging which has been largely overlooked and which supplements ordinary dodging procedures since it will accomplish many things that plain dodging will not do. This particular method of dodging is known as flashing.

FLASHING

Briefly, flashing consists of “printing in” rather than “holding back” as a process of projection control. It is similar to the usual dodging except that it is accomplished with the negative removed from the enlarger negative carrier so that the image of the finished print is partially the result of printing from the negative, and partially a density from exposure to the imageless enlarger light.

In many cases, small areas of the negative may be so dense that an excessive exposure may be required to “burn through” them. This often results in damaging the negative by over-heating, particularly if a large print is being made from a small miniature negative.

There are also times when reduced print contrast in local areas would greatly improve the appearance of the print. Both of these desirable attainments and many others, such as subduing unwanted negative details, may be accomplished without undue difficulty by means of flashing.

The procedure, in detail, is as follows: After the total print exposure has been given, the negative is removed from the enlarger negative carrier so that white light may be allowed to fall wherever needed on the sensitive paper, without forming an image. It is important to return the negative carrier to the lamphouse assembly after the negative has been removed, before making the flashing exposure.

In many types of enlargers there may be a serious light leak from the place where the carrier would otherwise be located, perhaps causing the print to be fogged in undesired areas, either directly from the escaping light or by light reflected from the darkroom walls. After the negative carrier has been replaced, it is advisable to stop down the diaphragm of the enlarger lens two or three stops further than was used for the actual print exposure. This is necessary so that the light permitted to reach the paper is about the same average brightness as the light of the projected image, so exposure times will be long enough to allow smooth, easily-controlled flashing.

Some workers have advocated the use of a small pen flashlight for flashing or intentional fogging exposure, but far more controllable results are obtained with the use of the enlarger itself as the source of the fogging light. This is because the enlarger lamp-house assembly is at a fixed distance from the paper, and it is practically impossible to hold the flashlight at the same distance during the flashing exposure, or from one exposure to the next.

Since the intensity of the light which exposes the print would be approximately quadrupled if the distance between the light source and the paper were halved, this law of light intensity is a decided factor in making precisely controlled fogging exposures. Since it is next to impossible to hold the flashlight at the same distance from the print during exposure, it is extremely difficult to duplicate results on successive prints by the flashlight method.

There are many worthwhile practical applications of flashing which result directly from its unusual characteristics. These advantages will become apparent when one gains a thorough understanding of imageless light and methods for its control.

CONTROL OVER LOCAL CONTRAST

It is an accepted fact that contrast is a very important element for controlling emphasis in a photograph. When viewing a print, the observer has a natural tendency to look at the areas of great contrast before he does those of lesser contrast. If there were a means of controlling contrast in a print locally, the photographer would thus have at his command a method of directing the visual attention of an observer to any portion of the print that he desired.

Flashing is such a means for local control of contrast because it affects the highlight areas appreciably more than it does the shadow areas of the same print. Dodging during projection of the negative image does
not lower contrast, but only succeeds in giving increased exposure in certain areas without change in the relative density differences between the tones. Flashing, on the other hand, darkens the print highlights relatively more than it does the print shadows, and thus effectively reduces the contrast between different tones in portions of prints receiving this treatment.

This attribute of flashing may be put to use in many ways. For instance, suppose that it is desired to direct the observer's attention approximately to the center of a print where the most important subject matter may be located. By lightly flashing the print borders, the local contrast in the margins of the print has been reduced, and in doing so the possibility is lessened that the observer will look at the unimportant print details first. This may be accomplished by shading the center of the print so that it will not be affected by the enlarger light which is allowed to fall only upon the marginal areas. The implement used for shading can be any opaque flat object, such as a fairly large piece of cardboard. This is kept rapidly in motion so that the difference between the flashed and the unflashed portions of the print will not be objectionably apparent. Particularly on the first few trial prints utilizing this technique, it is recommended that the flashing be kept to a minimum until the worker has become thoroughly familiar with the entire procedure.

Another example of the application of local contrast control is found in backlighted landscapes or snow scenes in which much of the print quality is dependent upon reflections of the sun on mud, ice, or water. Occasionally in pictures of this type, these reflections are specular and as such appear as many small, perfectly blank highlights when the print is made. Although these reflections in the print are only as bright as the paper base, they give a psychological appearance in the observer's mind of looking directly at an extremely brilliant light source, which the eye has a natural tendency to avoid.

Therefore, it becomes desirable to subdue the apparent intensity of these specular reflections. This cannot be accomplished by increasing the normal print exposure, which may block up important shadow details; nor can it be accomplished by dodging each tiny reflection locally, due to the smallness of each highlight and the opacity of the silver in the negative representing each highlight.

Flashing again offers the solution to the problem. Once the normal total print exposure has been given, the negative may be removed, and the print flashed with an extremely short, controlled exposure of the imageless light. Since the flashing exposure affects the highlights more than it does the shadows, the exposure has the result of subduing each of the highlights the desired degree without appreciably darkening the remainder of the print.

The following application of flashing is also interesting. Let us suppose that we wish to print a portrait which has an extremely overexposed, objectionable pattern as its background. Trying to subdue the pattern background by ordinary printing methods would only result in making the pattern more pronounced. Also, overheating of the negative may be an accompanying danger. This bothersome procedure may be dispensed with by simply allowing the background density to be the result of the imageless enlarger light.

If it becomes necessary to dodge around intricate contours, such as in the above instance of printing in a portrait background by means of this flashing technique, it may be accomplished easily, even though the image is no longer in place to serve as a guide in the projection control.

After the total print exposure has been given, the red enlarger safelight is placed over the lens. While the image is projected down upon the paper through this safelight, a line is lightly drawn with a soft-lead pencil approximately ¼ inch inside the contour around which you wish to dodge. Then the negative is removed from the enlarger. Even though the image has now disappeared from the paper, guide lines exist to aid in flashing only those areas of the print which should be treated. Care should be taken that the flashing exposure falls ¼ inch outside of the pencil lines. This is to keep the dodging light from being projected on top of the graphite which would create a noticeable line in the print and necessitate spotting to effect its removal. The graphite itself may
ADVANCED ENLARGING TECHNICS

FLASHING METHOD. One method of flashing print borders is to hold back the enlarger light with a convenient dodging implement. The notched edge of the cardboard prevents obvious borderlineS between the flashed and non-flashed areas be removed during the processing by simply rubbing the fingers over the print surface while the print is in the short stop or the hypo.

A modification of flashing can be used to produce a variety of interesting results in an enlargement. For instance, sharp black print borders or diffuse black print borders can be made, or the principal image can be framed by any number of interesting outlines so that an appearance of artificial portholes, keyholes, field glasses, etc., can be produced in the darkroom to frame the print effectively. These variations are accomplished by placing an opaque mask of the desired shape and size on the print paper after exposure, and then flashing the remainder of the print area.

If, for example, one wishes to create an effect of viewing a harbor scene through a ship's porthole, a circular mask should be placed over the center of the print and the remainder not covered by the disc should be completely blackened by the flashing exposure and subsequent development. If sharp “porthole” outlines are desired, be sure that the mask is in good contact with the print, using any convenient objects as weights.

On the other hand, should it be desirable to produce diffuse or soft outlines, this may be accomplished by raising the mask a short distance from the sensitive paper.

PROCESSING THE ENLARGMENT

An important source of print-quality control is the selection of the print developer and the way in which the print is processed. Although it is possible to exercise a small degree of control over local print densities during development, this is definitely to be avoided. While prints are being processed, it is recommended that they only be handled by means of print tongs. Furthermore, all manual manipulation—such as frequent inspection of the print during development by holding the print near to the safelight, or rubbing the print with the fingers in an attempt to increase the density of an objectionally light area of the print—should be kept to a minimum. Otherwise, serious stains may result which are usually particularly noticeable in the print highlights.

One of the outstanding faults of prints which suffer in quality is insufficient development. Photographers should resist the temptation to “pull” the print from the developer if they even suspect that the image may be appearing too rapidly. Regardless of whether this error in technic may be intentional or not, the print is often characterized by flat, muddy tones and an insufficient maximum density. This latter point is very important, as a good maximum density helps to control the appearance of quality in a print just as much as do sparkling print highlights which retain the proper detail. Fortunately, the two-tray development procedure often provides the answer to controlled print gradations.

THREE-DIMENSIONAL ILLUSION. A straight print of a sailboat has been improved by the flashing method which gave a porthole effect. Notice that the soft borders of the “porthole” make it appear as if it were slightly out of focus.

Photos, Agfa Ansco
TWO-TRAY DEVELOPMENT

This method of print development embodies the principle of using two separate solutions, one of which is an inherently soft-working formula, the other a hard-working formula. These developers may be used either separately or in conjunction with each other. Thus, with one of the solutions yielding a soft gradation, it is possible to bring out highlight detail. Deep blacks may still be achieved by placing the same print for a portion of the development time into the formula giving a steep gradation.

This two-tray method is helpful in many practical ways. In normal printing procedures, one may find, for instance, that the proper grade of paper contrast for a specific negative is somewhere between grades 2 and 3. Increasing the recommended development time will do little to add contrast to a particular grade of paper. Nor is overexposure, with a compensating under-development time to reduce print contrast, satisfactory, because a print which has not received its full development may have muddy tones and a consequent loss of quality. However, by utilization of the two-solution technic, it is possible to control print gradation with precision, and either contrast grade number 2 or number 3 can be made to yield a gradation about halfway between the two.

Another instance where it becomes advisable to control print contrast closely is found in making varying-ratio enlargements from the same negative. A two-diameter enlargement from a negative may require a normal grade of paper, yet a ten-diameter enlargement from the same negative usually requires an appreciably greater print contrast due to the scattering of the projected negative image.
ADVANCED ENLARGING TECHNICS

RECOMMENDED TWO-TRAY DEVELOPERS

The composition of the two developers recommended for the above procedure is as follows:

AGFA ANSCO 120 (THE LOW-CONTRAST DEVELOPER)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Avoirdupois</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot water (125° F. or 52° C.)</td>
<td>750 cc</td>
</tr>
<tr>
<td>Agfa Anasco metal</td>
<td>12.5 grams</td>
</tr>
<tr>
<td>Agfa Anasco sodium sulfite, anhydrous</td>
<td>36 grams</td>
</tr>
<tr>
<td>Agfa Anasco sodium carbonate, monohydrated</td>
<td>36 grams</td>
</tr>
<tr>
<td>Agfa Anasco potassium bromide</td>
<td>1.8 grams</td>
</tr>
<tr>
<td>Water to make</td>
<td>1 liter</td>
</tr>
</tbody>
</table>

For use, dilute 1 part stock solution with 2 parts water. Normal developing time, 1 1/2 to 3 minutes at 68° F. (20° C.).

AGFA ANSCO 130 (THE HIGH-CONTRAST DEVELOPER)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Avoirdupois</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot water (125° F. or 52° C.)</td>
<td>750 cc</td>
</tr>
<tr>
<td>Agfa Anasco metal</td>
<td>22.2 grams</td>
</tr>
<tr>
<td>Agfa Anasco sodium sulfite, anhydrous</td>
<td>50 grams</td>
</tr>
<tr>
<td>Agfa Anasco hydroquinone</td>
<td>11 grams</td>
</tr>
<tr>
<td>Agfa Anasco sodium carbonate, monohydrated</td>
<td>78 grams</td>
</tr>
<tr>
<td>Agfa Anasco potassium bromide</td>
<td>5.5 grams</td>
</tr>
<tr>
<td>Agfa Anasco glycine</td>
<td>11 grams</td>
</tr>
<tr>
<td>Water to make</td>
<td>1 liter</td>
</tr>
</tbody>
</table>

The prepared stock solution is clear but slightly colored. The coloration in this case does not indicate the developer has deteriorated or is unfit for use.

For use, dilute 1 part stock solution with 1 part water. Normal developing time at 68° F. (20° C.) for Brovira, 2 to 6 minutes; for Convira, Cycron, Cyclofor and Inditone, 1 1/2 to 3 minutes.

Greater contrast can be obtained by using the developer stock solution full strength. Softer results can be obtained by diluting 1 part stock solution with 2 parts water.

After a few trials the full limits of control with this method of development will be appreciated. One will also become familiar with each developer's characteristics. For example, shortly after being placed in the 120 solution, the print image rapidly appears and then proceeds to build up density slowly. Greater detail may be controlled. Notice that the print developed only in 120 is a trifle soft but full of detail; the print developed only in 130 has excellent blacks but is lacking in highlight detail; the one which received a portion of its total development time in both solutions incorporates the most desirable features.

EFFECT OF TWO-BATH DEVELOPMENT. The print at the left has fine highlight details, but is excessively soft, while the center print has good blacks, but lacks highlight details. At right, the happy medium.
TEXTURE SCREENS

Morris Germain, A.R.P.S.
Instructor, School of Modern Photography

Negatives which do not obviously call for printing on a glossy or fine grain surface are often improved upon when printed through a texture screen. Many pictorialists have found this an excellent way of improving their salon prints. The author tells about the various screens and how to use them—and there is also valuable advice on the subject of making your own texture screens.

A texture screen is used in printing or enlarging to give a texture effect to the print that is not inherent in the surface of the photographic paper. There are many papers available with texture surfaces such as canvas, fabric, silk, and linen. However, they are not as distinctive as prints made with a print-in texture screen. In addition, the use of a texture screen will camouflage coarse grain. This should be of special interest to those who make large size prints from miniature negatives.

Texture screens can be purchased or they can be made by the photographer. There are many fabricated screens available at the photo supply stores.

All screens, purchased or homemade, are on photographic film (with a few exceptions mentioned later) and must be of the same size as the print to be made. In actual use, the screen is placed in contact with the photographic paper, emulsion side of the screen facing the sensitive surface of the paper. The photographic paper is exposed through the superimposed screen. A heavy piece of plate glass, somewhat larger than the screen, is placed over the screen and paper to insure contact. Perfect contact between the screen and paper is essential for best results. A printing frame with glass would serve admirably for both contact and projection screen printing. The spring back of the printing frame would provide a sure and simple method for maintaining proper pressure. For enlarging, the printing frame loaded with the texture screen and pho-
photographic paper is used in place of the regular enlarging easel. For contact screen printing, the frame is loaded with the screen, negative, and paper, and the exposure is made in the usual contact printing manner.

**MAKING A TEXTURE SCREEN**

For making your own screens, select an appropriate texture surface. Some of the conventional materials used are monks cloth, burlap, stucco walls, grass mats, and wall paper of suitable design and surface texture. Many of the surfaces will suggest additional possibilities. You can select the more individual character for your own screens which will be different from the commercial texture screen.

Match the type of screen to the photograph itself. The primary purpose of the screen is to enhance the finished print. An indiscriminate choice can ruin the whole effect.

**HOMESPUN TEXT**

**TIKAN RASTERS SCREEN.** The oil painting effect is appropriate for a seascape such as this. 
*Photo, Karl Borlaben, F.R.P.S.*
Fabric or pliant material must be stretched taut on a wooden frame or curtain stretcher to eliminate wrinkles or folds in the cloth.

When this negative is dry, make a positive by contact printing, also on contrast or process film. This final positive must be brilliant, contrasty, and not too dense. The minute transparent interstices must be brilliantly clear and offer no impediment to light transmission when the image is being printed. Any veiling over or slight fog in the “open” spaces will make a poor quality screen. The small black markings of the screen pattern must be opaque and show contrastly against the transparent field. If the homemade screen, like the purchased one, is properly made, the impediment to exposure time is negligible. Any of the standard brands of process film will work equally well. In processing, it is good practice to follow instructions recommended by the manufacturers of the film. Bear in mind that you use film for both the negative and positive. Therefore, one developer and fixing bath is used for both. The author has consistently had good results with all brands of process film developed in Eastman D-72 and fixed in any standard acid hardener fixing bath. Always use fresh fixing bath. An overworked or exhausted fixing bath will form precipitate or sludge that may adhere
to the emulsion and degrade the printing quality of an otherwise perfect image.

PRODUCING A SCREEN EFFECT

By flashing a short exposure of a suitable texture on the film before or after the exposure is made in the camera, a screen effect is incorporated in the negative. The screen exposure is always less than the image exposure. It may vary from half to one-tenth of the image exposure. This is to insure against over-prominence of the screen texture. The result is most elegant when the screen effect is subordinate to the image. This double exposure or integrated screen and image is especially suitable when a large number of prints are required from one negative, as in greeting cards or advertising.

By placing various materials over and in contact with the surface of the printing paper, suitable screen effects can be produced without the necessity of using fabricated film screens. Some of the materials used for this purpose are wire mesh, thinly-woven silk, bolting cloth, chiffon, architect's tracing paper, drawing paper, dry mounting tissue, parchment paper, and groundglass (used with the matte side in contact with the emulsion of the paper).

Another method is to print through the back of single-weight paper. This will give a reversed image and can be corrected by reversing the negative in the enlarger or printing frame, i.e., emulsion side facing the light source in both instances. A variation to the above method is to fix out, wash, dry, and flatten a sheet of single-weight paper and use it as a screen.

Due to the dense structure of some of the materials recommended for screen effects, especially those made of paper, there may be objection to the over-lengthy exposures required. They can be made more translucent with the following method, which will shorten the exposure time considerably:

Take one part of castor oil and mix with five parts of alcohol. Treat the paper with this solution by rubbing it well into the structure of the paper with a tuft of cotton and polish off with a soft cloth. This can be followed by placing the treated paper between two clean blotters and passing a hot flat iron over both sides, thereby avoiding any possibility of transferring traces of oil.

OIL PAINTING. Here again the Titian Rasters screen makes a photograph imitate an oil painting. Photo, Esther Henderson
Variography is the altering of the linear perspective of a photograph. The word was coined primarily to take the place of the usually-misused term "correction" as applied to the practise of making parallel, in prints, lines that converge in a negative but which were parallel in the original subject. In addition, variography includes all other distortions of form introduced by tilting the negative and paper in relation to each other during projection printing.

Perspective is "the appearance of objects to the eye as affected by distance and as indicated by their relative size, distinctness, and the convergence of their receding lines."

Perspective has two aspects: aerial perspective, which is the result of the changing color and distinctness of an object at increasing distances from the eye or camera, and which can be controlled only by the film, filter, and processing; and the linear perspective, which involves an apparent change in the form of objects as they occupy different positions in the picture field. As we have said above, variography by its definition refers only to linear perspective.

Practical Uses

Figure 1 is a typical example of the perspective found in casual snapshots. The camera was tilted sidewise, it was pointed up, and it was well to one side of the center of the building. The perspective is sharp and unpleasing, although it is absolutely correct for the position occupied by the lens.

The horizontal lines may be made parallel, and the vertical lines may be made parallel, by tilting the negative and paper in relation to each other during enlargement just as the film and the building were non-parallel when the exposure was made. Figure 2a shows the effect of tilting the negative lengthwise to make only the horizontal lines parallel, and Figure 2b shows the position of the negative when this is done. The portion of the negative where the lines are close together is moved away from the paper to increase the magnification of that portion, spreading the lines apart. The portion where the lines are far apart is moved toward the paper to decrease the magnification so that they come closer together. The result is that the converging lines become parallel.

**FIG. 1.** An example of bad perspective. Neither the verticals nor the horizontals are parallel. See Figure 4a for so-called "correction".

**FIG. 2a.** In this variograph, only the horizontal lines have been made parallel. This was done by tilting the negative lengthwise, as in Figure 2b.
Figure 3 shows the effect of tilting in the other direction to make only the vertical lines parallel. Notice the deformation of the shape of the photo as a result of the variographing. This is overcome by cropping.

By combining these two tilts, as in Figure 4a and 4b, we achieve a complete straightening-out or, as some call it, "correction."* But is the picture now "correct"? The lines in both the horizontal and vertical systems are mutually parallel, and at first blush one would assume that the camera was directly opposite the front door and pointed straight at it. But look closely and you will see that the front door is visible through the left arch, and is not behind the center of the middle arch as it should be. This proves that the picture has not been "corrected."

It is likely that the word "correction" came into use because of the misconception that perspective could, under all conditions, be altered in this way to create an orthographic rendering; but, as we have seen above, it is not possible to do this either in a camera or in any enlarger. In fact, this "correction" is actually distortion both of the true form of the object and of its form as it appeared to the photographer. However, variography serves a very useful purpose in making things look the way we think they ought to look. Variography must be practised with restraint. Indiscriminate "correction" can defeat its own purpose, just as the use of heavy filters can destroy every trace of aerial perspective in a pictorial landscape.

Just as variography can make supposed "corrections," so also can it be used for purposeful, evident distortion. Figure 5a shows how Mt. Hood appears to the unprejudiced eye: in 5b, variography has added several thousand feet to its altitude.

TECHNIC

When negative and paper are not parallel and the diaphragm is wide open, the shallow zone of sharp focus (depth of focus) cuts across the paper and the image is sharp in only the small area where they intersect (as

*With a view camera the swings and tilts of the back might have been employed to achieve a similar effect in the negative.

FIG. 2b. (left) Showing the position of the negative to get the effect seen in Figure 2a

FIG. 4b. (right) Both the negative and the easel were tilted to get the effect shown in Figure 4a

FIG. 3. In this variograph, only the vertical lines have been made parallel. Contrast this to Figure 2a

FIG. 4a. Complete "correction" of the parallel lines. But notice that distortion is the result. The center door appears behind the left-hand column.
Probably the most convenient means of tilting the negative is with controls like those in a Graflex enlarger. One wheel tilts the negative lengthwise, the other crosswise. It is under absolute and accurate control at all times, and the most delicate adjustments in two planes can be easily made without fumbling. For tilting the easel, the Variograph Easel Holder on a tripod is ideal. The easel is attached to a spider on a universal joint, and a locking collar fixes the tilt at any angle up to 35°.

As we have said, variography—like the use of filters—should not be carried to a ridiculous extreme. But, if used with intelligence, it has great possibilities in the creation of pleasing pictorial prints, caricatures, and architectural renderings. Bear in mind that you cannot "correct" anything by tilting the negative and paper, and there will be little danger of your carrying it too far.

Variations in distance from the lamp to different parts of the paper will require compensation during exposure so that the image will be of consistent densities at opposite edges of the paper. The print should be "dodged" by moving a piece of black paper, cardboard, or some other straight-edged opaque object, across the paper during exposure from the high corner to the low corner so that the portions farthest from the lamp will receive a longer exposure.
THREE COMMON FAULTS. The left-hand picture is partly blurred because the action was too fast for the shutter speed. This is particularly apt to occur when picturing babies, whose moves are uncontrollable. The center photograph shows some evidence of camera shake and is further blurred by lack of sharp focus. The photo at the right shows overexposure, common with indoor shots. The concentrating flash has thrown far too much light on the subject’s face.

THE FAMILY ALBUM—IT DISPLAYS MANY COMMON CAMERA FAULTS

THE TYPICAL FAMILY ALBUM used to contain the artificial formal portraits of relatives and friends, and as a record of people it was fine, gracing the parlor table with its ornate binding. When amateur photography came in, however, the staid old family album went out. Photography as a practice was broadened by the enthusiastic and absolutely unfeathered concepts of the amateur who knew no rules, especially the rules of painting which the album portrait photographers had slavishly followed. As a result, the family album is limitless and anything goes. It is still a record of family, friends, familiar surroundings, and places visited. It has also become a proving ground of photographic ideas.

The album is also—unfortunately—the display piece for many common photographic faults. In general we tend to overlook faults when found in the family album mainly because fondness of, or intimacy with, the subject will take precedence over camera technique in importance—in the photographer’s mind, at least. In other words, a photographer might think that an out-of-focus picture deserves a place in the album because it is “so good of Jane” or a light-struck one may find its way onto the page because it is “the only one of Frank in uniform.”

The best way to avoid the temptation of cluttering up a family album or private collection with unworthy pictures, is to study camera faults—yours and those of other people. And then correct them. Family pictures are important and interesting records of people and places, but they should be more than mere record shots; they should be revealing candid, interesting portraits or pictorials. So let’s look at a few camera faults. They are faults which will immediately distinguish the rank amateur from the accomplished photographer. They are defects which are due to carelessness or lack of thought at the time of exposure. They constitute a menace to the effectiveness of the family album—the most prolific and important repository of American photography.

These faults involve the judgment of the photographer at the time of exposure and do
1. UNDEREXPOSURE

The photographer should recognize the limitations of his instrument, as a "pushing" of the camera's possibilities is one of the major causes of failure. Too many pictures are taken where there is not enough light for the lens being used—especially true of indoor work. The box camera may be used for indoor candids, but only under special circumstances. And, with more expensive cameras, the desire for speed has been a major cause of underexposure. It is still a good general principle to expose for the shadows and let the highlights take care of themselves. And use of an exposure meter will remedy many exposure faults.

2. OVEREXPOSURE

This is particularly prevalent, oddly enough, when artificial light is used without proper diffusion—and local overexposure results. Overexposure is also frequent when the ultra-high-speed films are used with slow speed cameras. The film is also a major cause of trouble in snow or water settings, when accurate exposure readings are not taken.

3. BAD FOCUSING

There is no excuse for inaccurate focusing when a range finder is available. Out-of-fo-
cus pictures often result, however, when fixed focus cameras are used too close to the subject or when the distance is calculated wrong for focusing cameras. Learn to judge distances accurately and also learn to know the near limits of your camera lens' range. A depth of field scale will help here.

4. WRONG FRAMING

A defective view finder may be the cause of trouble, but more than likely it is carelessness—carelessness in framing at the time of exposure. This is understandable when the average vest pocket or box camera is used, as the brilliant and the groundglass finders are harder to use than the wire frame or the optical view finder or the groundglass. The major troubles seem to be too much un-interesting foreground and a somewhat brutal cutting-off of heads. Pictures should be carefully composed at the time of taking and, if this has not been done, they should be cropped before entering the album pages. It is safe to say that almost every photograph taken by the amateur can be cropped to some advantage—unless, of course, decapitating has taken place, in which case the situation is somewhat hopeless.

5. WRONG DISTANCE FROM SUBJECT

Amateurs usually show a peculiar fear of getting up close enough to the subject—and one of the chief faults of the average family album is that it contains too many distant landscape shots and medium shots of people—and not nearly enough close-ups. On the other hand, an occasional daring photographer has gotten up too close, and a distorted and often out-of-focus close-up is the result.

6. CAMERA MOVED

In general, photographers cannot hold a camera still for an absolutely sharp picture for more than 1/25 second. In other words, although your nerves may be notoriously steady, it is still a good idea to use a tripod or at least a camera support of some kind, when taking pictures at slow speeds. This is common sense and only the candid camera "fiend" will feel compelled to take hand-held exposures at 1 second. It is safer to use a shutter speed of 1/50 second or faster when the camera is hand held.

7. SUBJECT MOVED

People who have f/2 lenses and take every picture at 1/1250 second will have no trouble with this. But many action scenes will be too much for the average camera—trains,
APPLE BUTTER TIME. This picture preserves the family cooperative spirit and, at the same time, makes a fine documentary photograph of this annual activity on an Indiana farm. Such pictures as this make fine additions to the family album.

Photo, J. C. Allen

8. DISTURBING BACKGROUND

At the time of exposure, most of us are so intent on the people being photographed that their surroundings do not matter. So here again is the time-worn bit of advice: watch out for distracting backgrounds, for clapboard houses, telephone poles, spotty shrubbery, etc. There has been quite a vogue for the angle shot, with the sky forming a background—and it is still good advice to use the sky, when some other more appropriate background is not possible.

9. BAD POSING

Under this heading come a multitude of photographic sins, some of which are the photographer’s fault and some the subject’s. The three cardinal sins are squinting in the sun, obvious pointing or other conventional pose, and “mugging.” They all denote a self-consciousness which is characteristic of many family subjects. The photographer can help by putting the subject into a comfortable position, by restraining from asking him to assume unnatural poses, and by discouraging as much as possible the instincts of the amateur actor who wants to stick out his tongue, wiggle his ears, or put his hand in his coat, Napoleon-like.

10. MISCELLANEOUS

It is, of course, impossible to foresee the many faults which may occur during exposure of the average family album picture. Two likely occurrences—both the result of carelessness—are the double exposure and the finger over the lens. They have their obvious remedies! Other causes of failure are: dirty lens, failure to remove lens cap, failure to pull out or lock the bellows of lens barrel, pointing the camera directly into a bright light, faulty camera loading. The pitfalls seem to be many, but they are not anywhere near as numerous as the pleasures derived from a good picture for the family album, a picture which tells its story of a person or an event in an interesting and compelling way.
SILK SCREEN PRINTING PROCESS

Howard B. Dilkes
Graphic Arts Counselor, Carlsbad, Calif.

This comparative newcomer to the photo-mechanical field is based on the principle of the stencil and is finding wide use for reproducing line drawings and photographs in both black and white, and color. A detailed step-by-step description of the preparation and printing of the screen is given for both amateurs and professionals.

Silk Screen Printing was originated by the Chinese centuries ago. The work was done by hand and in a crude way, but very artistic results were obtained on tissue paper sometimes in as many as ninety colors.

The process consists, briefly, in printing with ink or pigment through a stencil of silk which has been produced either from a line drawing or from a photograph (through a halftone screen). The process has now been developed to such an extent that it is used for printing on glass, wood, metal, porcelain, cloth, cardboard, plastics, and other materials. The silk screen printing process can be developed for commercial use or it can be used as a hobby for making Christmas cards, greeting cards, book plates, and numerous other subjects.

Screen process paste paints and other necessary supplies may be purchased from any graphic arts supply store. For experimental work, the following is suggested:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ferrotype plate</td>
<td></td>
</tr>
<tr>
<td>1 sheet of celluloid (.010 or .015 inch thick)</td>
<td></td>
</tr>
<tr>
<td>1 photoflood lamp in reflector</td>
<td></td>
</tr>
<tr>
<td>1/2 lb. potassium bichromate</td>
<td></td>
</tr>
<tr>
<td>8 oz. spirits of ammonia</td>
<td></td>
</tr>
<tr>
<td>1 jar of opaque</td>
<td></td>
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<tr>
<td>1 can polishing wax</td>
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<tr>
<td>1 jar of opaque</td>
<td></td>
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<tr>
<td>1 can polishing wax</td>
<td></td>
</tr>
<tr>
<td>1/4 lb. alum</td>
<td></td>
</tr>
<tr>
<td>6 x 10 carbon tissue (Autotype)</td>
<td></td>
</tr>
<tr>
<td>2 8 x 10 ground celluloid</td>
<td></td>
</tr>
<tr>
<td>1 qt. screen process paste or paint</td>
<td></td>
</tr>
<tr>
<td>1 gal. kerosene or naphtha</td>
<td></td>
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</tbody>
</table>

CARBON TISSUE SCREEN PLATES

The carbon tissue method of making silk screen plates or stencils is excellent. The positive used in making the screen may be either handmade or made from a photograph. In either case the method is exactly the same, so we will first take up the line drawing on celluloid or tracing paper. The first step is to sensititize the carbon tissue. Have hands clean and dry and do not touch the surface where the design will be placed.

Prepare the bichromate solution by adding 1 ounce of potassium bichromate to 1 pint of water. This gives you approximately a 5% solution. Stir until thoroughly dissolved, then add enough liquid ammonia, slowly, to turn the solution from red to lemon yellow. The solution is now light-sensitive and should be kept in a dark place, where it is still good for about two weeks.

MOUNTING AND STRETCHING SILK ON FRAME

Step 1: Cut silk slightly larger than frame. Start tacking on a long side. First tack in center, then pull and tack as indicated by arrows. Step 2: Stretch opposite side. First tack in center, then pull tight diagonally and tack as indicated by arrows. Step 3: Stretch a short side in the same manner, pulling silk tightly and tack as indicated by arrows. Step 4: Complete procedure by stretching the last side, trim off edges of silk close to tacks. In tacking use 5/16” carpet tacks staggered 3/4” apart.

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Clean and wax the ferrotype tin. Then pour the sensitizing liquid into a porcelain tray, being sure that it is about 65° F. Now immerse the carbon tissue, paper side down, and rock back and forth. Allow it to stand immersed in the solution for about 30 minutes. Then place it (paper side up) on the ferrotype plate. Smooth it down carefully and draw a small squeegee over the back lightly so all portions of the tissue are in contact with the plate. Use the squeegee just sufficiently to remove air bubbles and surplus water. Do not use pressure.

You can now allow it to dry naturally or place an electric fan where the breeze will blow directly on the tissue. Remove the fan in about two hours. You can remove the tissue from the ferrotype plate by lifting it at one corner and pulling it off. It is ready for removal from the plate when it starts to curl of its own accord. Remember that the carbon tissue is now sensitive to light and it must be handled in a darkroom until the succeeding operations have been completed. In the darkroom you may use a photographer’s lamp for illumination, the same kind of lamp used for bromide paper. Sensitized tissue should not be kept longer than two or three days and we suggest using it the same day as sensitized if possible.

Now you must get ready for the temporary support of plain celluloid. With a soft cloth, rub the wax over the surface of the celluloid. Then, with a second soft cloth, polish the wax removing all surplus wax until you have arrived at a brilliant finish. At this stage apparently no wax will remain on the celluloid. This operation must be done carefully for uniformity and removal of surplus wax. The waxing should be done an hour or two before the printing of the tissue to allow sufficient time for complete evaporation of the volatile solvents that are in the wax paste.

**EXPOSING THE TISSUE**

Now that the carbon tissue has been sensitized, you are ready for printing. Printing, of course, is done by contact exposure whereby the positive is placed in perfect contact against the face of the carbon tissue. The sensitized carbon tissue is susceptible to light in that, wherever light strikes it, it will harden and become insoluble in water. Those portions that are protected from exposure to the light, in this case by the opaque black you have applied to the celluloid, remain soluble in water. Printing may be done either by sunlight or artificial light. Sunlight is satisfactory except that it varies from day to day, according to the time of day and in different portions of the country.

A photographic printing frame is used to hold the carbon tissue and the positive in perfect contact by means of pressure against glass. A carbon arc lamp may be used for the exposure, but inasmuch as they are expensive we do not suggest their use at the beginning. Photoflood lamps are better and should be mounted in a reflector, as this will increase and concentrate the brilliancy of the light and reduce the time of exposure.

Place the transparent positive image on the glass, right side up, so that if viewed from the glass, the positive reads in reverse. Directly on top of it, located in proper position, place the tissue with the gelatin or glossy side in contact with the positive. The paper side of the tissue will be uppermost. Put the back of the frame in place and clamp firmly.

The positive is ready for exposure. The sheet of carbon tissue should be from one to three inches longer all around than the design. Before actual exposure, paste on the face of the glass strips of black adhesive tape so that it covers the edge of the tissue for about one-half inch all around. This is known as the “safe edge” and protects the edge of the tissue from exposure to the light. This makes a soluble margin to the tissue which is desirable during future operations.

The time of exposure (with the frosted celluloid or tracing paper positive using a photoflood lamp with the reflector) will be about 10 minutes with approximately 30 inches between the light and frame. This factor will vary with the type of reflector used and, of course, it will vary with the distance between the lamp and frame, the greater the distance the longer the exposure. For large frames more than one lamp will be required. The use of two or more lamps will also decrease the exposure. It is necessary that the rays from the lamp hit all portions of the tissue with equal brilliancy. Hard and
fast direction cannot be laid down on this factor as explained under sun exposure, but with the time factors as given, a little experimenting will quickly show you the proper time of exposure for your equipment.

**TEMPORARY SUPPORT**

After the exposure has been made, remove the tissue from the frame and immerse immediately, face down, in a tray of cold water. The temperature of the water should not be over 65° F. Allow to remain for about 2 minutes or until it becomes limp. At this time remove it from the water handling carefully, with the fingers grasping the ends. Place it on the temporary celluloid support gelatin side down and then pass a squeegee over it several times to remove air pockets and surplus water. A firm pressure should be used— but not too firm or you will ruin the design and perhaps cause the gelatin to wrinkle, distort, or run out from beneath the edges of the paper.

Turn the electric fan on the back of the tissue, but do not use any heat in any form. It should be allowed to dry for about fifteen minutes. The time of drying required at this stage will vary according to the atmospheric and climatic conditions, etc. When the back of the tissue feels dry you are ready for development.

**DEVELOPING THE TISSUE**

This tissue is developed by placing it, still on the temporary support, in a bath of hot water at a temperature of from 100 to 110° F. The tissue should remain in the hot water from ten to twelve minutes. At that time the paper backing should begin to separate from the tissue. You may assist by lifting the paper at one corner and gently pulling the paper from the tissue. But the paper should remove clean. If it does not come off clean, allow it to remain in the water for a longer period. Now take hold of the temporary support on which the tissue is still mounted and rock gently back and forth through the water, keeping it immersed at all times. The soluble parts of the tissue, which is the design or that portion protected from the light by the black part of the positive, will begin to dissolve in the water. The water starts to discolor and this operation should be continued until all of the soluble portion has dissolved and left the support. Do not attempt to assist the development by touching the film with the fingers, brush, or cloth. As soon as all of the soluble gelatin has left the sheet of celluloid, development is complete. The film may be removed from the water and no attention paid to light from here on.

The film should now be washed in clear cold water. If desired, it may be hardened at this point by immersing for a few minutes in a 5% solution of alum. You are now ready to mount the tissue on the screen.

**THE SILK SCREEN**

Take the temporary support with the image on it and place it on a flat surface that has been built up so that it is slightly smaller than the inside of the stencil frame. Glass, metal, or hard cardboard is all right for this purpose. The gelatin side of course is uppermost. Place the screen, silk side down, directly over the wet tissue. This operation must be done carefully so the silk does not move or rub over the tissue and, once it has been placed in position, it must not be moved again. Now gently blot the stencil from the inside, using fresh blotters repeatedly. This is done to remove the surplus moisture and to make sure that the soft tissue film is in perfect contact at all times with the silk. A fan again may be
used to hasten the drying which will vary a great deal.

As soon as the tissue is completely dry, the stencil frame may be removed and the celluloid peeled gently from the tissue. If the celluloid does not remove clean, the tissue is not dry. Allow it to remain a while longer.

PRINTING

Now the screen is ready for printing. Mount the screen on the screen base by joining the screen base with push pin hinges (see sketch). Tape the edges of the screen inside and out with gum tape to prevent the paint from leaking. All open spaces in the screen except the design must be covered.

Prepare the material intended to be used for printing the design by having it trimmed to uniform size with two straight right-angle edges for guides. Cut a piece of celluloid a little larger than the screen frame and tape it on the screen base on the far side under the screen. Let the screen down in contact and place enough screen paste paint in one side of the screen frame to cover the design with one sweep of the squeegee across the design (sketch). Raise the screen on the support and place the material to be printed on under the celluloid (which now has the design printed on it), moving the printing material around until you have the desired position. Then cut the small pieces of the printing material about one-half inch square and tack them in position on the edges. These are guides to get the same position on all copies. Remove and clean the celluloid for future use. Start printing the required number of copies and stand each one as printed in a drying rack.

After the printing has been completed, clean the screen. This operation is important, in that if the paint dries in the mesh it will ruin the screen. Clean the screen carefully by laying it face down on a blotter, pour a little kerosene on the back and rub gently with a soft clean rag, then go over the face of the screen from the center to the edges. Repeat this operation until the design looks clean and the mesh is open as it is viewed through to the light. Remove paint inside of screen with a spatula before starting to clean. As in every phase of photography, cleanliness is of prime importance.

WORK WITH PHOTOS

After succeeding with printing line drawings, you are experienced enough to start with halftone work. This work requires a halftone positive from your photograph, made to the desired size. This can be obtained from any good photoengraver or lithographer at a small cost. To start with, order a 50-line positive of medium contrast. The subject will increase in contrast when transferred to the screen. When transferring a halftone carbon print to a screen, turn the screen or the carbon print 15 degrees from the center to eliminate any possible pattern which may form by the halftone and the silk screens coming together. When good results are obtained from a 50-line positive, you can then go to 100-line for finer work. The process from here on is the same as described for making line screens.
THE USE OF SILVER IN PHOTOGRAPHY

Newton Heimbach

Film Emulsion Department, Agfa Anco Co.

The importance of metallic silver to the history of photography can hardly be estimated. In this interesting article, Mr. Heimbach discusses the historical experiments with silver, the properties of silver and the silver content of films, developed images and processing baths. Three methods of recovering silver from fixing baths are explained.

If one were to name the more indispensable raw materials to the photographic industry, metallic silver and its salts would occupy a leading role. Actually it might be said that photography as we know it today could not exist without this all important metal. It is indeed difficult to imagine what course the photographic arts might have taken had the singularly ideal physical and chemical properties of silver not been available to the early pioneers in photography.

HISTORICAL APPLICATION OF SILVER

To the alchemists of the sixteenth century belongs the honor of having first noticed the change that took place in silver chloride (known to them as "Luna cornua") by exposure to light. But they regarded the "darkening effect" as a species of transmutation of metals. It remained for Scheele, the Swedish chemist, to find in 1777, that this compound, with exposure to light and subsequent treatment with ammonia, formed a black deposit of metallic silver. Similar effects were soon noted with other silver salts and so it was gradually found that a majority of silver compounds were more or less light sensitive.

The first attempts to apply this property as a means of copying and recording scenes or objects, took the form of silhouettes on special paper treated with silver nitrate. Little importance was attached to these early experiments chiefly because nothing was known about chemical development and fixation as a means of "stabilizing" the image obtained by this procedure.

Finally in 1839, a French painter named Daguerre made public the photographic process which became the first practical method for photographing objects. On a highly polished silver plate, Daguerre deposited a thin layer of silver iodide by fuming with iodine vapors. Faint images could be recorded on these plates by prolonged exposure to light which he soon found could be intensified to such an extent by subsequent treatment with mercury vapors that necessary exposure time could be reduced from several hours to several minutes. Moreover, he discovered that the image could be "fixed" or made permanent by final treatment with a salt solution which dissolved out the unexposed silver iodide without affecting the image "developed" with mercury vapor. This discovery of the so-called "latent image", the possibility of developing the same, and the fixing of the image were the most significant steps toward a realization of photography as a practical science. Simultaneously with these discoveries, silver and its salts assumed a role of fundamental importance to general photographic procedure a role unchallenged today by other light sensitive materials.

PROPERTIES OF SILVER, PREPARATION OF SILVER NITRATE

Silver, one of the oldest metals (discovery prehistoric), derives its name from the Anglo-Saxon "seolfor", and its chemical symbol, Ag, is an abbreviation of the Latin "Argentum." It is found in nature in the free state and in the ores argentite, pyargyrite, and born silver. In a fused state, it is the whitest of the metals, but in a colloidal or finely divided form, its color varies from yellow and reddish-brown to a blue-black or black. This fact is readily recognized in the familiar tone range in the silver images of negatives or positive prints from the warm brown tone through the black or neutral tone to the cold blue-black tone. Silver is one of the most easily reduced of the metals, a factor which...
THE COMPLETE PHOTOGRAPHER

lends itself admirably to chemical development of the latent image by weak reducing agents in the developer. No other metal forms a greater number of insoluble salts. Of particular interest photographically are the chloride, bromide, and iodide, known collectively as the silver halides. These three salts are particularly light sensitive and are utilized in definite proportions as the essential ingredients of the various photographic emulsions. Of the more soluble silver salts, the nitrate is the most important. It is far less light sensitive than the majority of the other salts of silver, and for this reason is exceptionally well suited as a starting point.

The importance of silver nitrate to the photographic industry is best illustrated by the fact that in the United States alone from 1,000,000 to 1,200,000 pounds are used annually for this purpose. Of this amount, from 20 to 25 per cent is used in the manufacture of professional motion picture films, while the remainder is utilized for the various amateur films, X-ray materials and printing papers.

Silver nitrate is prepared commercially from metallic silver previously refined to a very high purity, with special attention to the elimination of small traces of other metals, particularly iron and copper which are especially dangerous in emulsions. This bar silver is dissolved in a bath of nitric acid, being simultaneously converted to the soluble nitrate. The clear solution obtained is then concentrated in special evaporators, and with subsequent cooling the silver nitrate is precipitated from the solution as flat plate-like crystals. In order to insure the utmost purity, the collected crystals are again dissolved, this time in water, and the crystallization operation repeated. The dried silver nitrate crystals, if not used immediately, are generally stored in semi-dark containers such as brown glass bottles as a special precaution against possible slight decomposition by the action of light.

SILVER CONTENT OF FILMS, DEVELOPED IMAGES, AND PROCESSING BATHS

It is not within the scope of this discussion to dwell at length upon the conversion of silver nitrate to silver halide in the preparation
THE USE OF SILVER IN PHOTOGRAPHY

of photographic emulsions, nor is it possible to discuss in detail the actual silver contents of the many films available today. Nevertheless, it is of interest to the reader, in following the course of silver through the various phases of photographic procedure, to have some conception of the amount of silver present (as silver halide) in a typical film.

It is to be expected that hardly any two different films will have the same silver content since both coating thickness and silver halide concentration play special roles in the ultimate properties of the film. Films designed for high resolving power frequently have thin emulsion layers of from 6 to 10 microns (1 micron = .000039 inch); whereas in other materials, for example X-ray films, it is desirable for various reasons to have thicker coatings of possibly 15 to 20 microns. Moreover, X-ray films contain emulsion layers on both sides of the film support, differing in this respect from the greater majority of photographic materials.

In view of these marked differences, the figures on silver content which follow are at best only approximations based wherever possible on average photographic materials.

A sheet of 8" x 10" cut film portrait, for example, may contain anywhere from 0.010 to 0.015 oz. of silver (present as silver halide). A dime coin has a silver content of about 7 such sheets. On the other hand, a sheet of X-ray film has a silver content of about twice the above amount, or possibly 0.030 oz. of silver. The average professional 35 mm. negative motion picture film contains approximately .0025 oz. per foot of film. Since anywhere from 100,000 to 200,000 feet of negative film may be used to prepare the final 8,000 foot negative of the usual length of motion picture film, this would represent a silver content of 250 to 500 oz. An average of perhaps 250 release prints (positives) are made from this negative, representing a total of about 2,000,000 feet of positive film having a content of possibly 200 to 225 pounds of silver.

It is interesting to note that of the available silver in a negative film only a small portion (10 to 20 per cent) is actually utilized in the developed silver image. The other 80 per cent is dissolved out as unexposed silver halide in the fixing bath. Obviously, with continued use, considerable concentrations of silver are accumulated in fixing solutions. To the average amateur who processes relatively small quantities of film, the silver content of exhausted fixing baths is of little importance, since its recovery would be unprofitable. On the other hand, in larger scale processing, particularly in professional motion picture laboratories, the recovery of silver has become an important and profitable procedure.

SILVER RECOVERY FROM FIXING BATHS

A great many factors have a part in determining the amount of silver present in an exhausted fixing bath. The quantity of film fixed out, the silver content of the emulsion, the amount of undeveloped silver halide are among the most important. In the average laboratory, it is general practice to recover the silver when a concentration of 3 to 4 per cent is reached.

A measure of the amount of silver present in the fixing baths can be readily obtained with an instrument known as the Argentometer, in which a photo-electric cell registers the amount of light transmission of a small sample of diluted fixing solution to which has been added a small amount of sodium sulfide. A brown turbidity or color is produced (due to the formation of silver sulfide), the depth or intensity of which is directly proportional to the concentration of silver in the solution.

A variety of methods has been proposed for the recovery of silver but only three are of any appreciable importance. Namely, the sulfide method, the zinc method, and the electrolytic method. For the small laboratories, the sulfide or zinc methods are more adaptable from the economic standpoint while in the larger laboratories the electrolytic method is by far the more desirable procedure.

The sulfide method depends upon a precipitation of the silver as insoluble silver sulfide. The precipitating agent is sodium sulfide. Careful control is maintained throughout to prevent the formation of a colloidal sulfide which precipitates with difficulty. Particular care is exercised to prevent the formation of hydrogen sulfide, which has an offensive odor and readily fogs photographic materials even in low concen-
aspect of any object is influenced by many factors—the light source, its own inherent qualities, the reflective qualities of surrounding objects, and the emotional qualities of environmental objects in relation to the main object. When we look at the world about us we seldom analyze what we see and the way we see it; we accept a visual impression which our minds evolve as significances, and which our hearts and spirits recreate in terms of emotional values and symbols.

When we photograph, our enjoyment of the world becomes more exciting but less simple. We find we must visualize an image—the image of the final print—which is to be our interpretation of what we are photographing. In order to achieve the print we must visualize the negative; in order to achieve the negative we must know what the lens gives us and what the processes of exposure and development will reveal. The photographic procedure is no more difficult than knowing the meaning of words and putting them down to make sense, or the speaking of them, to communicate thoughts to others.

Just as words suggest and never reveal complete meanings, so do photographic values suggest but never imitate the values of the subjects photographed. Suggestion is more potent than actuality from the emotional viewpoint. Any two values in nature might be commonplace and of no aesthetic significance; transcribed in terms of a fine photographic print they might assume an important relationship.

There are no rules; there are only perceptions, emotions, and statements. What we see with our eyes, plus what we perceive with our spirit, makes us more than mere biological organisms. When we speak of "seeing" we mean selective perception; the light reflected from the subject is accepted on our retinas, transmitted to our brains, then organized according to our mental and emotional will. Our object in photographing is to communicate to the spectator of our photograph that which we feel about the subject before our camera. We must know that no two human beings will ever see or feel anything exactly the same, yet universal meanings and qualities are recognized by all. It is our problem to relate these universal qualities to the subjects which we choose to photograph.

Recalling that light is the chief substance and quality of our medium, we may generalize and state that we perceive objects because they give forth, reflect, or interrupt light. The differences in objects are recognized because of varying intensities, "hardness," and color of light falling upon them, because of varying reflective qualities of the object—textural, color, and formal differences, because of the distance of various parts of the object from artificial light sources, because of environmental conditions, because of possible motion in the object itself in relation to its environment. Commenting further on the above, we can say that the form of the object and the direction of the light source reveal planes and edges; that color and intensity together produce values of color; and that we often may employ perspectives of light values coincident with, or in opposition to, the linear perspectives of our compositions.

**NATURAL LIGHT**

Much has been written about light and its control in photography. Countless tables have been prepared, rules have been promulgated, "compositions" by lighting have been discussed. Most unfortunate of all are the presumptuous "rules of lighting" in which the subject—be it a glamor head or a potato—is subjected to a light attack from arbitrary angles. We have "basic" lighting, "Rembrandt" lighting, "Paramount" lighting, and so on. They are mostly habit-formulas, resulting in shallow, conventionalized effects. Most frequently neglected is the simplest lighting of all—the lighting which is appropriate to the subject in relation to the way it is to be seen. If one really looks at his subject, the proper lighting becomes obvious and theatrics go out the window. There is nothing we can do with our floods, our flash, our speedlites, or our arcs that can equal for sheer beauty and quality the light from the sun and sky. True, for special work—color, high speed photography, engraving, etc.—artificial light is indicated. But for general interpretative work natural light is supreme. The best photography in the world has not been done with artificial light.
LIGHT IN OUTDOOR PHOTOGRAPHY

LIGHT EFFECTS

Unless the sun is directly behind us—in line with the axis of the lens—we will always have some parts of our subject in shadow; the greater the angle of the sun in relation to the lens-axis the more shadow obtains. The maximum shadow occurs when the sun is shining directly into the camera. However, in practical cases, there will always be some edge-light somewhere in the picture area.

We are accustomed to think of large discrete objects producing shadows—a mountain, house, a person, in whole or in part. Gross shadow effects such as these are easy to understand. However, there are complex shadow effects which make considerable trouble for us if we do not comprehend them. They are the shadows of minute parts and surfaces which blend into continuous tone and effectively reduce in intensity the surfaces and textures of the subject. Let us see if we can describe this problem simply: first let us consider a perfectly polished silver ball suspended in a black room. Turning a spotlight on it we will see only the reflected image of the light source—all else will be black. (In a uniform light room, the sphere would continuously reflect the environment with a high degree of intensity.) A chalk-surfaced smooth sphere under the same conditions as the silver sphere in the dark room will reflect high values of diffuse light from its entire surface which lies in the path of the illuminant. Of course, the highest value of reflected light will come from the direct angle of reflection—light, sphere, camera angle. This peak of reflected light we call the highlight.

We must remember the principle of reflection—that the angle of reflection is equal to the angle of incidence.

If we take a chalk-white, matte-surfaced sphere and light it from a source directly back of the camera and as close to the lens axis as possible, we will achieve an effect of roundness due entirely to diminishing intensities of light reflected from the point of the sphere nearest the camera and light to the edge or limb of the sphere. As we look from the near surface-center of the sphere towards its edge, we see that more and more of the incident light is reflected off into space and less and less reflected toward the camera. A sphere seen with this “axis” light against a light background appears to have a dark edge. This is not a true shadow. We may call it the edge-effect. (Of course, it is apparent on a moment’s thought that if the light source was in front of the lens that there would be a small area of true shadow on the edge of the sphere.) Shadow implies obscuration of light. The edge-effect is caused by different degrees of reflection due to the incidence-reflection principle. Some of Edward Weston’s wonderful figures on sand are done with the sun directly behind the camera, and the resultant edge-effect gives the illusion of a drawn line. There is a fine separation of two close values—skin and sand—effected by this type of lighting. It is infrequent that under natural conditions the light will be directly behind the camera—a slight deviation to one side or another will produce shadow effects on the opposite side of the subject. Recapitulating, this type of lighting suggests form in varying values of light, not by contrast of light and shade.

LIGHT AND SHADOW

Moving the light source up or down, right or left, from the lens axis produces a shadow effect; we are then concerned with light and shade. We can have two kinds of shadows at this stage—a shadow due to the position of the light source relative to the lens-axis and subject, or a shadow due to some interruption of the light source external to the subject itself. We can have a few objects producing shadows, or we can have an exceedingly complex subject such as an oak tree with its myriad leaves reflecting light and casting shadows singly and collectively. To clarify this idea we can refer to an early Italian painting—a Giotto for example—and we will observe how the forms are indicated by variations of color and color values; there is no impression of a light source (as we think of it in photography) and no cast shadows. The opposite of this might very well be found in the paintings of Corot—patterns and textures built up with a very strong sense of light and shade.

These examples of lighting will give the photographer a start in studying shadow effects on all types of subjects. Lighting should be observed on all occasions, even when the camera is not used.
We may achieve "shadowless" light in two ways—by placing the light source on the axis of the lens* or by using a very diffuse light. In outdoor photography this simply means that we work with the sun at our backs, or that we work in shade, or before or after sunrise, or on cloudy days. However, in a practical sense, there is always some suggestion of direction of light, no matter how diffuse. Only under controlled artificial light conditions can we achieve a perfectly even diffused lighting.

TEXTURE

Returning to our sphere suspended in the darkened room, let us imagine it is composed of the same substance as the matte, chalk-white sphere, but that the surface is grossly roughened to the consistency of crude stucco. We will note that the general over-all reflections will be the same in character, but of reduced intensity, because the surface is not consistently smooth. We will note this matter of great importance—every bit of roughness of the surface produces its own highlight and its own shadow. Except in flat "axis" light, all parts except the highlight area of the sphere will appear darker than the smooth surfaced sphere. Facing a stucco wall at sunrise—with the sun directly back of the camera and the wall running at right angles to the lens axis—we would receive the greatest amount of reflected light (in relation to the power of the early sun) and the least impression of texture. As the sun rises in the sky, the wall will reveal more and more texture (all the myriad little roughnesses developing their own little shadows, and any unevenness of the wall showing up with increasingly acute light). At high noon, only the tops of the roughnesses will catch the light and then the wall will pass into shadow, illuminated only by diffuse skylight or the reflections from nearby objects.

If the wall were matte in surface—that is, of the same color but smooth and without sheen—there would be little difference between the sunlit quality and the diffuse light quality of the wall. There would, of course, be a great difference in intensity. If the wall were glossy and textured there would be an additional sharp reflection from each bit of "roughness." Millions of tiny highlights would be formed and millions of these tiny highlights would build up the value of the wall as a whole in direct sunlight. Under diffuse light conditions this glossy character would not be so apparent; the highlights would be broader and less intense, because the sky is a very broad source of light.

Look carefully at the myriad details of nature and see for yourself how many kinds of surfaces and textures and reflections are all about us. Think of these qualities in terms of photographic images. Analyze the various intensities and figure how they will lie in the exposure scale of the negative and print. The reason for countless photographic errors and disappointments will suddenly appear. It is the failure of the photographer really to look and see what goes on about him instead of relying on superficial casual impressions.

HANDLING A NORMAL SCENE

Of course, there is always the problem of execution; it is easy to make sweeping statements about "seeing" and "doing." Yet, we must start somewhere with very definite facts, and make some personal conclusive tests on which to build our understanding and our technic. Presuming we have made selection of the subject and visualized the final print, our first step of procedure is to establish the light values of the subject. As our first working example, let us consider Church and Churchyard, Cape Cod (Figure 1). I wished to retain the mood of the typical soft Cape Cod sunlight and yet achieve a certain brilliance without harshness. This required that there be a minimum amount of black in picture areas representing substance and texture. The deepest black of any consequential area was in the shaded side of the dark tombstones. They were not true black by any means, but I could allow them to go almost black in the photograph. I found the Weston meter values for these dark areas was 6.5. I placed this value opposite the "U" of the meter. With the development I was to

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*The source of light should be back of the camera; if in front of the camera a simple diagram will show that the subject will cast a visible shadow larger than its image, which will be noticeable on objects immediately behind. Obviously, the sun is always "behind" the camera in this type of lighting.
use (alternate water-bath), I knew I was to get just a suspicion of printable tone in these areas. Exposing for this setting of the meter (1/12 second at f/22, Isopan Film) placed the other values of the subject on the Weston scale as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Weston Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The dark tree</td>
<td>13</td>
</tr>
<tr>
<td>The rear of the church</td>
<td>50</td>
</tr>
<tr>
<td>The grass</td>
<td>150</td>
</tr>
<tr>
<td>The shaded side of the white tombstones</td>
<td>100 to 150</td>
</tr>
<tr>
<td>The sky</td>
<td>400</td>
</tr>
<tr>
<td>The sunlit wall of the church</td>
<td>500</td>
</tr>
<tr>
<td>The white trim of the church and the sunlit parts of the white tombstones</td>
<td>nearly 1000</td>
</tr>
</tbody>
</table>

Obviously, the scale of intensities of the subject exceeded the scale of the meter; if the 6.5 was on the "U" (the effective threshold), the 1600 would lie one step above the "O". The average reading of the meter, pointed at the center of the scene, was about 300-400. Had the average reading been placed opposite the "Arrow" of the Weston scale, the shaded parts of the dark tombstones would have been one and a half stops below the "U", and would have been rendered as blank black areas. The dark tree in the center would also have appeared as a black hole. Other important values would have been rendered too low. This is a good example of the frequent error of relying on the average readings of subject intensities; the meter is not at fault—the photographer is not using it properly. He must see every important value, visualize its counterpart in the print, and expose and develop accordingly.

Normal development of this negative would have resulted in a rather harsh image; underdevelopment would have flattened out the middle and low values. It was developed in Pyro A B C with the alternate water-bath method. This retained some "opalescence" in the highest values and gave strength and contrast to the low and middle values. The best print illustrates the effect desired; the reproduction itself cannot retain the finer values.

**FLAT LIGHT**

Now let us pass to a very different type of subject material—*Snow in the Forest, Yosemite Valley* (Figure 2). The light conditions were quite "flat"; the entire subject was in shade. However, there was a light source—the sky—and the light from the sky came down on the forest and was more intense in the open glades than under the snow-covered trees. We see no sharp shadows, but we do see shadowed areas, and areas of soft light and shade on the snow. While the light was "flat," the subject has roundness and form, and a sequence of tonal values. Once these qualities are recognized in the subject, we can proceed to build our photographic values as we desire. Let us pause for a moment and recall the "feel" and aspect of snow in shade. It is rich, solid, soft in texture. In bright sun...
the snow is crisp, glaring, minutely textural and very white. Snow in shade is plastic and has solid values of gray. We may underexpose at times with sunlit snow to exaggerate texture, but we should give ample exposure to snow in shade so that the smooth plastic quality will be revealed. In this particular case the foreground values averaged about 100, and were placed opposite the “C” of the meter. The lighter snow in the clearing beyond fell about opposite the “O” of the scale. Development was about one and one-half times normal. The values of the dark twigs were about one stop above the “U” or less; they hold just a suspicion of detail in the negative. Average exposure and normal development might have resulted in a slightly drab tonality.

Of course, much control is possible of photographic values in making the print, but nothing takes the place of a rich, full-toned negative and a good long-scale paper. To rely on soft or hard papers to overcome negative deficiencies becomes an unfortunate habit that dulls the appreciation of the finer qualities of the photographic image.

**CONTRASTY LIGHT**

Our next subject—Windmill, Owen’s Valley, California (Figure 3) concerns a subject of extreme values, a desert scene with exceptionally harsh and bright light, permeated with a pale, blank haze which did not help matters at all. The clouds were above 1600 on the Weston meter, and the shaded windmill tower as low as 13. So as to give some value and texture to this low value, it was placed one stop above “U” on the Weston meter. The clouds, therefore, lay over one stop above the “O” of the meter scale. An

**FIG. 3. WINDMILL, OWEN’S VALLEY, CALIFORNIA.** Here is a very contrasty subject, with widely separated values. To bring out the tones in the windmill, the clouds were somewhat sacrificed.
average reading would have resulted in rendering the tower completely black, but would, of course, have favored the distant hills and clouds. The mood of the light and the subject precluded rendering of the tower, or any exposed part of the scene, as a true black, for everything was filled with some degree of light. The clouds appear flat because of their placement on the top of the exposure scale. Development could do little to correct the too-close values due to over-exposure. Water-bath development was used to give maximum density on the low values of the tower and, at the same time, to reduce the printing density of the clouds. It would be a simple matter to make a more brilliant print, but loss of mood would obtain.

**TONE**

This is a good place to interpolate an important observed fact. Most workers under-expose landscape subjects, and the resultant prints show a “lunar” quality and mood. Empty shadows and harsh tonal relationships do not convey the mood or quality of sunlight. Over-filtering and short exposure certainly yield theatrical effects, but the more subtle qualities are obscured in the exhibitionism. We must remember that black and white photography conventionalizes colors and values in terms of various tonalities of gray in the print. In the days of the wet collodion plate, blue was rendered very light; white skies were accepted as a conventional photographic interpretative value. The fact that reds and greens were rendered as black did not interfere with the accepted symbolism, even though the entire range of sensitivity was inaccurate according to our present standards. The early landscape photographs rendered the sky with the impression of light; we render it more with the impression of tone. One advantage we have over the workers of the wet plate days is that
we can, at our discretion, render the sky (or other values and colors) light or dark. We have a great control of values and we should exercise this control with greater freedom, and avoid following the mass photographic tendencies instead of our inner convictions and emotions.

**REFLECTION**

The effects of reflected light within the subject merit our careful attention. The many compensations of our vision sometimes obscure the real values of such reflections—both in color and intensity—but the photograph may reveal them with startling emphasis. The effects of inter-reflections of light are most noticeable in color photography; a white building may be suffused with green from a surrounding lawn; a brilliant scarf will impinge its color on the face of the subject wearing it. In black and white photography these colors and intensities are rendered as apparent lightening of values and unless the source of the reflected light is within the picture area, a "phony" effect might obtain. *Laguna Pueblo, New Mexico, Sunrise* (Figure 4) illustrates a striking example of reflected sunlight. The flares on the walls on the right are nothing but reflections of sunlight from light-colored adobe walls facing the sun. At first glance one might think this the result of some poor manipulation or dodging. But, throughout the picture everything is bathed in a glowing light; the light earth, the light material of the buildings, and the soft, cloud-flecked sky contribute in reflecting the low angle of light from the sun. Recalling the law of incidence and reflection, as the sun rises in the sky, the quality and directions of the reflected light will change.

The aforementioned flares on the walls were, of course, visible to the eye, but it is a safe bet that the average person standing at this picture point at the time it was made, would only see the flares in a casual way. He would take it for granted as a logical effect were his attention called to it. Little might he think how acute the effect might be when transcribed to the photographic print.

Therefore, what we must do is to look carefully and take nothing for granted. We must see and feel qualities to the fullest extent both in nature and in the transcription to the print. In the case of this photograph the exposure was rather full; a thin negative would have produced some intense blacks which would have been out of key with the mood. Likewise, a darker sky might have a superficial dramatic effect, but it would have been in opposition to the mood. The sky was actually a maze of bright thin clouds and horizon haze—it was a hot, glowing morning. Many times such scenes as this have been underexposed. An average meter reading, including some of the sky, would indicate far too high intensities for the main subject. The average values for the shaded wall on the left were placed slightly under the "A" of the Weston meter scale.

It should be obvious by now that our main objective of procedure is to know the intensities of the reflected light from the subject—from all its essential parts. We cannot trust our eyes with accuracy; not only do the ocular and psychological compensations of vision impair our judgment, but the color of the subject is confusing to us in relation to the color sensitivity of the negative material used. A notable example of this difficulty lies in the relative insensitivity of panchromatic film to greens in relation to the eye. When we look at green trees—especially dark green conifers—they appear "lighter" to the eyes than to the film. If we do not increase the exposure to overcome this deficiency, the trees will appear darker than we anticipated in the final image. For example *Yosemite Falls* (Figure 5) was exposed by placing the average of the foliage (50 on the Weston meter scale) on the "A" of the meter dial. For practical purposes, although the foliage values were placed on the "A", the effective values were about one stop less. The sky was 200 and the waterfall more than 800. The relative range of intensities was therefore 1 to 16. Had orthochromatic film been used, the range of values would have been closer 1 to 8. However, the sky would have been rendered lighter. Note the value of the shadows on the upper cliff, the shadows on the cliff to the right of the lower Fall, and the intense blacks of the shadows in the foliage. To the eye the foliage shadows were by no means as deep, but the light reflected into them from the surrounding dark green
foliage made little or no impression on the film. To the contrary, observe again the high value of the upper cliff shadow; it was illuminated by reflected light from the sky and relatively near cliffs. No filter was used; had a K1 or K2 filter been employed, all shadows would have been intensified, especially the ones lightened by bluish light from the sky. A green filter would have increased the intensity of the greens, but would also lower the values of the blues and the bluish shadows. Had the sky been covered with light clouds—a bright haze perhaps—the reflected light therefrom would have been of higher value and wide spectral quality. In any case, a blue filter would lighten the shadows, intensify the aerial planes, and soften the entire tonal balance.

A common effect of ground reflection which often causes trouble is represented in Winter, Yosemite National Park (Figure 6). The intense reflected light from the snow appreciably lightens the tree trunks near their bases. This effect actually and visibly exists, but is intensified by the reduction of scale in the photograph. However, in the photograph one has the feeling of fog in the lower part of the image and to all intent and purposes it is a defect. There is nothing we can do in the taking of the picture to correct this effect, but we can legitimately resort to dodging and darken down to a logical degree the affected portion of the negative. The object is to convey, in photographic quality, an impression of that which was seen and felt; an exaggeration can be as distressing as an omission. Dodging in this case is a definite aid to clear statement.

Frequently we will have parts of the subject illuminated by reflected light without seeing or sensing the source of the reflection. Everyone has seen photographs in which an obvious reflector or flash fill-in has been used, and which yields such an exaggerated value that all semblance of "naturalness" is lost—in other words a "phony" lighting. The sensitive worker will often use a cloth, metalized, or other type reflector—or flash fill-in—to create a logical shadow-high value relationship when required. The usual synchro-sunlight image is rather ghastly in its gross exaggeration of shadow values. Best of all, is the proper use of the light that exists,
THE COMPLETE PHOTOGRAPHER

compacting or expanding the values of the image in relation to the subject intensities by exposure and development control of the negative. Only when the "natural" light—be it of daylight or artificial source—is inadequate to yield a satisfactory image, should we resort to the aid of reflectors or flash as "boosters" or fill-ins.

We have spoken of the values of reflected light which might be hard to understand if the source thereof was not included in the picture. However, through a series of connotations, remote sources of reflected light are recognized or implied. Head of skier (Figure 7) illustrates this point. The type, the costume, the snow and droplets on his face all serve to define a mood and an environment. The light reflected into the shadowed side of his face comes partially from below and thereby is indicative of snow surrounding him. It is a perfectly natural lighting, but, unfortunately, the exposure was a bit too short to give a good balance of light and shadow. This print is selected to show what happens with too short exposure; the values were guessed at, and not carefully figured. We note the modulations of reflected light, but we do not get an accurate impression of crisp bright sun and snowy surroundings. (This is from a section of a Contax negative, and there is not the control possible in miniature camera work that obtains with large negatives. However, that limitation does not excuse underexposure!)

A potent source of dissatisfaction with the use of reflectors or fill-in flash lies in placing the light or reflectors at the wrong angle to the subject. A soft, diffuse reflected light should fall on the subject from approximately the same angle as does the main light. If the reflected light is harsh enough to cause a definite shadow, it should then come from a point along the axis of the lens (shadowless lighting). There is scarcely anything more distracting than the strange secondary shadow formed by a sharp reflected or fill-in light. This relates in the main to outdoor photography with sunlight as the main light; there are many occasions when specific theatrical effects require obvious cross-lights and shadows.

Reflectors can be made of various substances. A board covered with crumpled metal foil gives a bright, but harsh, directional light, second only to a direct mirror reflection of the light source in sharp brilliance. Both are usually far too intense for ordinary use. A matte metal paint is better, but the reflection may not be broad enough. An egg-shell or chalk white paint, or a white fabric give excellent broad effects similar in quality to skylight.

FLASH FILL-IN

Readers will undoubtedly recognize the "phony" harsh quality which results from false reflection balance. In the case of continuous reflective sources (metal, paint or fabric reflectors) constant active light sources (photo floods, for instance), or the natural reflection from parts of the subject or its environment, the eye and the meter can adjust and evaluate the intensities and the exposure can be carefully planned. In the case of flash fill-in we must know exactly what the flash will give us, both in intensity and
modeling effects. There are many tables prepared to indicate the proper amount of flash required for straight flash work or fill-in, and some of these are very satisfactory as a basis of judgment. However, the conditions of light and subject vary endlessly, and it is imperative for the photographer to visualize carefully the effects he desires. But first, he must establish the values of the following:

1. The effective intensity of the flash-bulb in the reflector to be used with it.
2. The efficiency of the synchronizer at various speeds.

Once these values are established, the guide number can easily be determined. The Harris numbers are a great boon to flash users, but they must be adapted to individual equipment and preferences.

Second, the photographer must establish a proportion of values between the main sunlit portions of the subject and its shadowed parts to be filled-in with flash. We know the flash is constant in intensity, depending on the type of bulb, the reflector, the shutter speed, synchronizer, and distance from the subject. The reflective qualities of the environment also affect the flash intensity. But perhaps not many of us think of the intensity of various subjects illuminated by flash. Obviously, a dark object such as a piece of slate, would reflect back the camera only a portion of the light returned by light-complexioned skin. The guide numbers are based on average flesh tones, and the writer has found that these tones are placed on about the middle of the exposure range. At least, he calculates his exposures with flash so that average flesh tones will fall on this point of the scale (the arrow of the Weston meter dial).

Assuming that the guide number selected will yield for average skin values, illuminated from camera position, a negative density of about four stops above the "U" of the Weston meter (on the arrow of the dial), it is perfectly obvious that with a small calculation we can "place" the values obtained by the flash bulb on any part of the scale we choose.*

For example, let us consider Figure 8, A to D. First, we will set down an intensity scale (with comparative Weston meter designations)—

<table>
<thead>
<tr>
<th>F/32</th>
<th>22</th>
<th>16</th>
<th>11</th>
<th>8</th>
<th>5.6</th>
<th>4</th>
<th>2.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>A</td>
<td>C</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(relative stop values)

| 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 |

(relative units of intensity)

(Weston meter scale)

Second, we will measure the daylight light values of the subject. The value of the skin in sunlight was about 400; of the skin in shade, 25. The values were placed as follows:

\[
\begin{array}{c}
25 \\
400 \\
1 \\
2 \\
4 \\
6 \\
8 \\
16 \\
32 \\
64 \\
128
\end{array}
\]

The low value was placed one stop above the "U," and the high value 5 stops above the "U." The range of intensities were, therefore, 1 to 16. Proper exposure for the skin values in sunlight was 1/50th second at E/16. Figure 8A shows the result of such exposure. It is obvious that some fill-in would be needed.

With Number 11 G. E. bulbs, I find the guide number for outdoor fill-in for 1/50 second is 200; 200 divided by 16 equals 12.5. Therefore, the bulb was placed 12 1/2 feet from the subject, as close to the axis of the lens as possible. The camera was 6 feet from the subject, so the light was well back of it. (Important: no matter what distance the camera was from the subject, the exposure for the sunlit portions would remain the same. But the light intensity of the flash varies as the square of the distance of the flash from the subject. Hence, with the camera at 6 feet, and the light at 12 1/2 feet from the subject and synchro-flash exposure was given at 1/50 and f/16.) Now, had this been at night, with no sun or daylight, the same value of light was about 400; of the skin in shade, 25. The values were placed as follows:

\[
\begin{array}{c}
25 \\
400 \\
1 \\
2 \\
4 \\
8 \\
16 \\
32 \\
64 \\
128
\end{array}
\]

This means the above placement yields 16 units of light-value for skin tones; it does not have any direct relation with F/16, 16 feet, etc.

Let us see what the combined intensities are with the synchro-sunlight exposure:

\[
\begin{array}{c}
2 \text{ plus } 16 = 18 \\
1 \text{ plus } 16 = 17 \\
32 \text{ plus } 16 = 48 \\
64 \text{ plus } 16 = 80
\end{array}
\]

* placement of flash intensity on skin values

\[
\begin{array}{c}
1 \text{ plus } 16 = 18 \\
2 \text{ plus } 16 = 18 \\
3 \text{ plus } 16 = 18 \\
4 \text{ plus } 16 = 18 \\
8 \text{ plus } 16 = 18 \\
16 \text{ plus } 16 = 18 \\
32 \text{ plus } 16 = 48 \\
64 \text{ plus } 16 = 80
\end{array}
\]

This means the above placement yields 16 units of light-value for skin tones; it does not have any direct relation with F/16, 16 feet, etc.
FIG. 8A. Made without flash fill-in. Note the dead shadow and its unfortunate blend with the background. With the sunlight on the skin measuring Weston 400 and the shadow at Weston 25, the exposure on Plus-X film was f/16 at 1/50 second.

FIG. 8B. Made with a flash fill-in. One No. 11 bulb was 12½ feet from the subject and the exposure was made at 1/100 second between f/16 and f/22. The fill-in is too strong and the bulb has cast an unnatural shadow onto the background.

FIG. 8C. Made with flash fill-in, the No. 11 bulb being 18 feet from the subject. Exposure was made at 1/100 sec., a little less than f/16, one third between f/16 and f/22. Here the fill-in is about right for a natural balance between sunlight and shadow.

FIG. 8D. Made with a No. 11 bulb 6 feet from the subject, the exposure being f/16 at 1/100 second. Gross overexposure is the result and the effect of sunlight and shadow is about gone.

FIG. 8E. Made with a card reflector. The reflector was not of sufficient intensity, but there is an absence of sharp reflector shadows and a softer modeling in the shadow area has been achieved.

As the sunlit values plus flash lie between the 32 and 64 placement, the exposure was made not at f/16, but at 16/22 (one-half stop above f/16.)

This brought the effective scale to:

1 2 4 8 16 32 64 128

The exposure range is slightly more than 1 to 2 (Fig. 8B).

However, it was then desired to work with a greater range of contrast. The simplest way was to reduce the effectiveness of the flash by one-half. Evoking the inverse-square law, the same settings can be employed if the flash is removed to about 18 feet from the subject (still close to the lens axis).

Dividing 200 by 18, we get f/11. Retaining f/16, it is obvious that the effective
light in outdoor photography

flash exposure will be about one-half that of the first flash exposure. Its placement would be on the "A" of the Weston dial, or on the 8 of our scale:

* Placement of flash intensity of skin values
1 2 4 8 16 32 64 128

The combined intensities of sunlight and flash now are:

* 2 plus 8 = 10 for shadow values
1 2 4 8 16 32 64 128

The exposure range is now about 1 to 4. The exposure was made (Fig. 8C) with the stop set a little less than f/16—about 1/3 between 16 and 22. The range could have been increased by giving a longer shutter exposure (the flash was at its optimum of 1/50 second) but that would have meant the sunlit skin values would be placed too high on the exposure scale.

Suppose we do not think clearly, and carelessly place the flash at the camera, 6 feet from the subject. Figure 8D illustrates the result—a dead, flat image with skin values greatly overexposed. Correct flash exposure would be at f/32. F/16 being used, the exposure is four times over. The following scale illustrates what happens:

* correct flash values
1 2 4 8 16 32 64 128

* sunlight values
0 1 2 4 8 16 32 64

Combining sunlight and flashlight, we get:

* 32 plus 64 = 96 for sunlit values
1 2 4 8 16 32 64 128

* 2 plus 64 = 66 for shadow values
1 2 4 8 16 32 64 128

The exposure range is now less than 1 to 1½, and the effect one of flat lighting. While the above scales and placements are only approximate—by no means sufficiently accurate to please an exact scientific worker—they are close enough to practical requirements to satisfy the average professional photographer working in black and white or in color.

Let us take another example, Noon in the Meadow (Fig. 9). The light conditions were extremely harsh and brilliant with bright top light, deep shadow values. Without a reflector or fill-in, the range of intensities would have been far too great to manage. Exposing for the children would have burned out the background; exposing for the background would have resulted in almost total underexposure for the children. Even with flash fill-in it was hard to retain the proper mood of the light because too much fill-in would be obviously phoney and too little would yield a dark, heavy quality—false to the mood of the scene. The actual Weston meter light values were: 400 on the sunlit meadow, 13 on the children in shadow. Reducing these figures to exposure scale proportions, we find:

13 400
1 2 4 8 16 32 64 128

Exposure range is 1 to 32. I placed the sunlit meadow value on one stop above the "C" of the Weston meter (the 6th stop above the "U") to retain a sense of glare. The edge lighting on the children (sunlight) was very intense—about 800/1000—but it was of no particular consequence to our calculations as we wanted these edge-lighted areas to be rendered very white. The film (Superpan Supreme) and the flashbulb (Press 25), used with a shutter speed of 1/100 second, indicated a factor of 100. At 18 feet from the subject, the flash values of skin would be placed on the arrow of the meter dial, or on the 16 of the range, using 1/100 second at f/5.6. However, as a lower value was desired for the children and as 1/100 second at f/8 would be right for the sunlit meadow, 1/8 was used for the synchroflash exposure, placing the values on 8 of the scale. The scale was:

* 2 plus 8 = 10 for the children
1 2 4 8 16 32 64 128

* 64 plus 0 = 64 for the meadow
1 2 4 8 16 32 64 128

0 value is given for the flash effect on the meadow; a moment's thought on the inverse square law will show that the flash effect on the distant meadow was without consequence. The exposure range was a little more than 1 to 6. The only apparent discrepancy is the quality of the flash-illuminated tree trunk on the left, contrasted with the black, unlighted trunks in the distance. It would be quite legitimate to "dodge" down the left-hand tree trunk to make these values more logically related. The use of an ordinary reflector would have been impossible here because the correct position for the reflector in relation to the subject would have been in the shade of the trees.
The effect of diffused flash would closely approximate the effect of Plate 8E, in which an ordinary white matte card was used as reflector. While putting some type of diffusing material over the flashbulb or using a large matte surfaced flash reflector would reduce the sharpness of the light, we get a true diffused quality of light from a large area of source. Hence, a three-by-four-foot reflector (matte surface) is going to give a broader and softer light than a smaller area—and certainly a much broader light than a screened flashbulb.

CONCLUSION

In conclusion, we should clarify a few basic points:

1. In any article such as this which attempts to encompass a huge subject, only a few facts can be stated, a few generalities discussed. It is hoped that what has been set down will serve as a basis for extensive experimentation and thought on the part of the reader. If the problems were simple and consistent, rules could be simple. Unfortunately, the problems are endless and often complex.

2. The only thing that counts is the final expression, the picture itself. This is a complex product of the photographer’s emotion, perception, and skill. He should approach photography from the simplest possible direction, using artificial aids as the exception, not as the rule.

3. He must always remember he is working with light, and the response of the medium is in direct relation to the “laws” of light. He cannot violate these fundamental principles without achieving a false impression of reality. But he can employ these principles to obtain unlimited vistas of personal expression.
LIGHTING A PORTRAIT
Fred R. Archer
Photographer, Teacher of Photography

While lighting does not “make” a portrait, its use or misuse is often an important factor in successful portraiture—either amateur or professional. Floodlights and spotlights are covered in this description of useful techniques for straight and glamor portraiture. And the five basic light units are described in connection with their use for straight portrait lighting, sidelighting, and backlighting.

The most interesting subjects around us are people, and the most interesting project a photographer can essay is to portray this gamut of human life passing in review before his camera. This interest, without adequate preparation and study, has been responsible for the myriad bad portraits foisted upon the public by amateur and so-called professional alike. In a great many cases the amateur’s portrait is the better, for he usually has worked to a better technic and, as his pictures are not made for remuneration, he has the time to do a more honest job.

The photographer who wishes to succeed in the field of portraiture must be a discerning person, he must have the ability to seek out the best in his subject and to portray that subject to the best possible advantage. He must acquire a good technic, but in its use he must remember that the subject before his camera comes first. Many atrocities are created by the photographer who wishes to become an artist and who flaunts his so-called artistry to high heaven and to the point of losing all regard for his subject.

We must realize that the main reason a person has a portrait made is in order that some other person may see how he or she looks and that a good portrait must show our subjects as they are, avoiding over-flattery or fictitiousness. Be truthful, but show this truth in the most favorable way.

With all due respect to technic or to the beautiful equipment you may possess, lighting stands foremost in making the portrait.

FIGS. 1a and 1b. A floor plan and elevation scheme showing the placement of the four basic lights—the main spot (A), the fill-in flood (B), the hair spot (C), and the background floor (D)
LIGHT SOURCES

In order to discuss lighting clearly and in relation to our subject, it is necessary to digress at this point and go back to our earlier training to refresh our minds as to the law of light.

The sun is our main source of light. It is a brilliant light and it lights the surfaces of our subject on the side facing it and casts a shadow on the opposite side. The light from our main source falling upon other surfaces or objects near and around our subject is reflected in part and this scattered light illuminates the surfaces of our subject not facing the light. In this manner our subject becomes visible in form through the light from a main source and an enveloping or fill-in light. The main source is the light which gives us the highlights and which casts the shadows. The fill-in light reveals the shadow details and a combination of main source and fill-in reveal form.

Sunlight is our best photographic light, but it is not always available and, as working in a studio where everything is handy is much easier, we resort to the more readily controlled artificial light with which to work out our problems. These light sources are relatively small and it becomes necessary to use several sources to approximate the form depicting light of the sun and the large reflecting area of its enveloping light.

ARTIFICIAL LIGHT

When working with these artificial sources of light, the important thing to remember is that the main source light is the light that casts the shadows. If we forget this, we usually wind up with many cross shadows and a perplexing and unbelievable photograph. Use as many sources of light as necessary to get form, but do not let them cast conflicting shadows.

The lighting equipment need not be large or expensive. Whether you use large and costly studio lighting equipment or small portable lights, comparable results may be obtained.

As to the types of lights to use, spotlights or floods, remember that spotlights give sharp-edged shadows but can be diffused to soften these edges and that spotlights give best results for character rendering. While spotlights are more brilliant than the floods or reflector lights, these lights used without diffusion will work very well for these character lightings where spot lights are not available.

For portraits other than those stressing character and strong skin texture effects, the reflector light, such as the Victor or Sun Ray, is usually better. The writer prefers to work with these lights and small spots such as the Dinkey Inkies for his portrait work, as they are portable and the light is strong enough for relatively short exposures, but is not so strong that the subject squints or that the pupils of the eyes contract. The heat on the subject is also minimized and not uncomfortable as is often the case with the larger studio lights; and comfort of the person being photographed is a prime factor in good portraiture.

Five lights will cover almost any lighting job you undertake; four will usually do. These should be bought with regard to the pocketbook and the efficiency of the light. If possible, one or two should be spots.

The spotlights will be used especially in photographing men. Men seldom want to be shown as a nobody. If there is character in the face, they want it to show. Lines earned by hard work and struggle with this living of ours should not be diminished or exaggerated, but rather softened by our lighting. The spotlights will bring out the character and the floodlights will soften the lighting to avoid harsh contrasts that make pictures hard to look at.

The floodlights will be used for softer effects especially when photographing women, for most women want to be flattered in their pictures. They do not want the age lines to be accentuated by our lighting but want us to soften them so they fade out of prominence.

At this point we should inject this truth. There can be no rules for lighting. Faces are different and features vary, so all statements as to the actual placing of lights cannot hold true but will vary with the individual face being photographed.

It is always best to know something about your subject which will give a basis for conversation, some meeting on a common ground to relax the subject and give time to
study the problem and to adjust the lights to a near solution before bringing the camera into play. Does your subject have a long neck, a short neck, a long nose, a short nose, crossed eyes, eyes abnormally close, overhanging brows, a crooked nose, hollow cheeks, square jaw line, bald head, sunken eyes, protruding eyes, prominent ears, birthmark or what not? You must decide what to do about it before doing it or you will wear your subject out while you move lights and camera about in trial after trial.

GLAMOR EFFECTS

To photograph a beautiful woman so that she is beautiful in the resulting picture will be your hardest job.

A lighting used so much by portraitists when photographing women is one in which the main light comes from directly in front of the subject and at about eye level. This eliminates nearly all shadow but often loses feature characteristics of the subject by being so flat a light. A far better and fully as flattering lighting can be had by using this main source from a higher angle. It is a good lighting to start with and is almost foolproof, as fewer things can go wrong with it than with other types of lighting.

Given the time, the place, and the girl, we start this lighting (Fig. 1) by placing our main light (A) directly in front of our subject and at a height that will cast a shadow under the nose about one third of the way down to the lip line. We have tentatively placed our main light. Are we satisfied with the result? Should we raise this light or lower it to accentuate the cheeks or lessen the sharpness of the hollows in them?

To determine just the position of this light as to height, move the light away from the subject and closer to the subject. This gives the effect of raising and lowering the light without taking up the time of actually doing so. Once the height is decided upon, we can move the light to the proper distance from the subject which gives the best efficiency and regulate it to the desired height. Do not work the lights too close to the subject, as the relative fall-off in light will make a difference in value between brow and chin.

We now have our main light set. The result is often good at this point, but unless we are working for an exotic result of a strongly chiseled face, the result is too contrasty (Fig. 1C). This is especially true for a salable portrait and the eyes are somewhat lost. The eyes being the most expressive features of the face, this is usually bad.

To soften this contrast and to reveal shadow detail, we add a fill-in light (B). This is a soft light probably with diffusion and of sufficient strength to lighten the shadows to the required tone. Here again no definite rule can be set, the photographer must know what he wants and work for that result. To strengthen or lessen the amount of any light, move it closer or away from the subject as the rule of the inverse square applies.

This fill-in light is placed as near to the lens as possible and at a height that does not throw an extra shadow under the chin. In this position any shadow thrown by this light will be directly away from the lens and therefore will not be seen in the final result.

We now have the contrast we need, but the relationship between the subject and the background has not been established.
FINAL LIGHTS

A light (C) is now placed so as to light the hair and shoulders. This tends to separate the subject from the background and gives luminosity to the hair.

This light comes from behind the subject and as near overhead as possible, but must not spill over on the nose or forehead. A boom light is ideal for this purpose, as it can be placed more nearly overhead and the lamp standard will be outside the picture. With the regular light, the standard will have to be placed outside the camera angle so that it will not show. This means that this light will come from slightly to one side or the other of the subject being photographed.

All we need now is to add character to the background and to establish the outline of the subject against the background in order to gain depth in our picture. This is done by shining the fourth light source (D) onto the background in such a manner as to have light against dark and dark against light in our picture as revealed to us on our ground-glass.

Once mastered, this type of lighting can be varied to cover many of the glamor lightings of Hollywood.

Figure 2 shows an example of this lighting as used on a simple portrait, one such as the family might like. Here the main light comes from slightly right of center, the fill-in directly below the main light, the hair light from back left, and the background light from low and to the right.

Figure 3 shows the same subject photographed in a more "glamorous" lighting scheme, with the main light farther to the side to cast deeper shadows from back left, and the background light from low and to the right.

All we need now is to add character to the background and to establish the outline of the subject against the background in order to gain depth in our picture. This is done by shining the fourth light source (D) onto the background in such a manner as to have light against dark and dark against light in our picture as revealed to us on our ground-glass.

While this type of lighting works well for most faces, it has an exaggerating effect on full round ones and if used on this type, the subject should be photographed in three quarter face and seldom from front face.

Light from a high position tends to narrow a face which is not round by allowing
shadows to creep under the cheek bones. As the light is lowered, these shadows fill in and the face fills out and seems more rounded.

In Figure 4 we have an example of a high front light accentuating the hollows in the cheeks. The eyes of the subject are not deeply set under the brows, so they are still well lighted and a subject of this sort lends itself to many exotic lightings. The main light here comes from high and directly in front of the face. The fill-in is about subject eye level and directly below the main light. A strong hair light from right and back accentuates the blond hair and the background light comes from low behind the subject and is pointed up onto the background which naturally fades towards the top of our picture allowing the light on the hair to stand out.

The main light is a small spotlight, the fill-in a Victor reflector with silk diffusion, the hair light another spot, and the background light another reflector without diffusion.

In Figure 5 we have made a slight change. The main light has been slightly lowered and we have strengthened the fill-in. This has rounded out the face and changed a somewhat exotic picture to one of more pleasant charm.

If our subject has a short turned-up nose and we try to judge the height of our main light by a shadow under the nose, this light would be so high that the eyes would usually be hidden in deep circles of shadow. On the other hand if the nose was long, this nose would be visually lengthened by a shadow.

THE SIDE LIGHT

Another type of lighting that works well on most people is a side light. With this type of lighting, one side of the face is lighted by a main side slight and the other side filled in with a softer light. This visually narrows down the light area and seems to give us an effect of slenderizing the face.

This type of lighting is another of the so-called safe types of lightings and is very effective on young people as well as when making strong character studies.

To obtain this lighting (Fig. 6), place the main light (A) on one side of the subject and at about the level of the subject's head.
move it forward and back until it fills in the eye as much as possible without spilling over onto the opposite side of the face (Fig. 6C).

Theoretically we should place a fill-in light of lesser intensity on the opposite side from the main light, but as very few faces are perfect enough for this, objectional shadows would appear around the eyes and dark furrows would run from the nose to the corners of the mouth. It is therefore better to bring this fill-in (B) from in front of the subject as in the former lighting.

When the fill-in light has been placed, to give us the tone value desired, we add the hair light (C) as before and then relieve the background with a light (D) directed from the opposite side of the subject from the main light. Directing the light on the background from this side allows it to be stronger behind the dark side of the face and weaker behind the light side, thus carrying out our pattern of light against dark and dark against light.

In Figure 7 we have an example of this lighting. In this picture, the subject is very close to the background and the top light used on the hair is also lighting the background. Figure 8 shows us the same subject in almost duplicate position of the head, but lit with a broad front light, which as we mentioned before would make a round face seem more circular. In this picture the hair light was used to lighten the left cheek and
LIGHTING A PORTRAIT

this also helped to complete the moon effect.

In lighting the hair, pay attention to the color so as not to over-light blond hair or under-light dark or red hair. Each natural color seemingly has different reflecting qualities and should be studied for their own values.

How to determine the amount of fill-in light to use will also come by experiment, but if one determines the result wanted by visualization before he lights the subject, valuable time will be saved.

For straight portraiture the writer finds that a difference on the meter of only one stop between the shadow and highlight face reading is often all that is needed to carry a good range of tones, especially in women’s portraits. For men or character studies, the difference should be greater in order to expand the scale for more dramatic effects.

BACKLIGHTING

Backlighting is a valuable asset to the photographer who is working for the strong effects and textures used so much in advertising photography and for strong character studies. In ordinary practice backlighting usually resolves itself into halos around blonde heads and as a rim lighting to enhance a strong profile. But it can be combined with other lightings to good advantage.

It is a simple and effective lighting (Fig. 9) and, when used as a rim light, consists of the main source coming from back of the subject and from a height that will carry a rim of light on the profile which will not be so wide as to become obtrusive in the final result. This means that the main light \( (A) \) is as far around in back as it can be placed without the lamp standard showing. This light should be a spot and should be well shielded from the lens in order to avoid lens flare.

The fill-in light \( (B) \) is now placed so as to light the shadow side of the face from the same side as the main source but from an angle about halfway between the profile and full face. The tone value here must be watched carefully, as enough fill-in must be used so that the main light coming from the back does not overbalance the lighting and block up on the negative.

The light used on the hair \( (C) \) now comes from high and far enough forward so as to light the hair, but should not catch the ear or cheek of the subject.

Care must now be administered in lighting the background or the rim light will be destroyed. The background should not be black, but should be toned by lighting \( (D) \).
so as to reveal both highlight and darkness in the subject. Background lighting is very important. A background of pure white lacks character, while one of black usually overburdens the picture. Light the background to reveal the tonal values in the subject. Figure 10 is a good example of a strong profile enhanced by rim lighting and shows careful handling of the background light. We now have these important lightings at our command and we can experiment by combining them for individual effects (Fig. 11).

FIG. 9a and 9b. The backlighting set-up. Notice that (A) is still the main light source.

FIG. 10. A strong profile shot, taken as shown in Figure 9.

FIG. 11. A variation on the direct profile, the camera having been moved to the right.
ARTIFICIAL LIGHTING TECHNIC
Adrian TerLouw
Eastman Kodak Company

In a straightforward and understandable way, the author of this article presents the problems and possibilities of artificial lighting in relation to emphasis and contrast. Here is literally a step-by-step technic, showing not the "rules" of lighting, but rather the almost infinite possibilities which can result from experimentation.

All illustrations from Eastman Kodak Company.

Lighting is one of the important creative elements in picture making. Along with arrangement of subject matter and selection of viewpoint, lighting makes up the trio that brings into being the picture concept born in the mind of the photographer. It is, therefore, easy to understand why there has been so much mystery about lighting. The growing photographer wants lighting presented to him in the same concrete form as lens lore and processing procedure. He wants his lighting problems to be resolved into a series of well-defined formulas and diagrams. While lighting does have its technical formalities that can be presented in this manner, lighting in the role of the contributor of the dramatic element in a picture is closely akin to imagination in the methods that must be employed to develop it. This is illustrated by the following story.

A young photographer visiting a photographic exhibit was standing before a group of masterful pictures and expressed his admiration to a bystander saying, "I wish I could do work like that. If only I could get the lighting technic of the man who made those pictures." The bystander happened to be the photographer who made the pictures, and, taking a fancy to the young man, introduced himself and invited his new acquaintance to his studio. Here he showed the young man exactly how he had lighted the pictures at the exhibit. When he had finished, it all seemed simple to the young photographer, and, taking a fancy to the young man, introduced himself and invited his new acquaintance to his studio. Here he showed the young man exactly how he had lighted the pictures at the exhibit. When he had finished, it all seemed simple to the young photographer, and he felt that in the lighting diagrams he had drawn he really had the secret of lighting for dramatic pictures.

Just about that time a man and a woman walked into the studio with some bundles. They wanted a picture, and quickly. Our young friend stayed around to watch. While the bundles were being unwrapped, the photographer was getting the story he was to tell. He wanted to know so many things—how big was the final cut to be? What kind of paper was to be used for printing, and what reproduction process? Was it a right- or left-hand page, how was the page laid out?

At last he seemed satisfied with the information he had and he went to work. He started pushing the various items around on a table, building patterns, eliminating, and simplifying. At first his movements seemed rather aimless, but gradually a pattern developed. He brought in a spotlight and directed it across the set. There was more moving around until the strong shadows made a web that fixed the eye on the object that was to stand out in the picture. From that point on the picture took shape rapidly. There was a final careful balancing of the secondary light to bring out shape and texture, a check on the groundglass, and a negative was exposed. From there on, the work was entrusted to a darkroom man who soon had a trial print from the wet negative. A close inspection of this print revealed a few weaknesses in the picture which were soon rectified and the final negative was made.

The finished picture was a fine piece of work. Although the subject was ordinary, the photograph captured and held the attention. There was an air of simplicity about it that belied the time that the photographer had spent in creating the careful pattern of light and shade on his groundglass.

As the young man turned to study the lighting on the set, he made a disturbing discovery. "Hey!" he exclaimed, "This lighting is all backwards! It's just the reverse of everything you showed me just a little while ago. Which method is right?"

"Both," answered the photographer with a smile. "Each was right for the particular
picture I wanted to make, and yet neither will be entirely appropriate for the next picture."
The bewildered young man with his nice theories blown to bits shook his head sadly and inquired, "Just how do I know when to use one technic or another?"
The moral of this tale is: Strong and effective pictures are not lighted by referring to a file of choice lighting diagrams. Lighting is developed along with the basic picture idea. It is an integral part of the picture idea.

Therefore, it is just as reasonable to expect an infallible master lighting formula as it is to expect a magic recipe for dramatic ideas. Picture ideas and the lighting methods necessary to realize them come from a fertile imagination supported by a foundation of knowledge about how light behaves in attracting our attention.

Now you ask, "How do I go about learning this kind of creative lighting you talk about?"
Briefly, you keep your eyes open all the time watching forever the constant play of light and shade on objects about us. Then you cross psychology with physics and season it with a little common sense and you have the foundation for lighting. This may seem a bit vague but let's try to pin it down by taking up some of these things one by one.

CAPTURING INTEREST

Let's start off by making a few observations on the ways in which pictures capture our interest and hold our attention. Our minds are constantly forming a succession of mental images. In large parts, these are of the daily scenes. When we wish to capture the interest of someone, the most successful method is to present him a ready-made image of something associated with the idea we want him to think about. Ordinarily, the images of things about us pass through our mind in rapid succession so that if we wish to hold the attention we must construct our picture so that the eye will linger in the picture space and have a tendency to return to the particular feature of the subject that most strongly stimulates the onlooker to think about the idea with which we are concerned. In the initial stages, we find that the composition of the picture has a great deal to do with how well the interest is held. Lighting is, of course, a big part of the composition.

As we continue to examine the picture, we find that the subject matter becomes increasingly important. Here we find that pictures that stimulate the imagination can hold the attention the longest. We find that our pictures hold the interest the longest when we handle the picture material so that it is suggestive rather than revealing. The ideas a strong picture can imply are always more stirring than anything it can literally portray.

One thing our mind insists upon if we are to hold its attention is that all the images passing through it must be concerned with only one thing. Many pictures, like the walrus in Alice's Adventures, "talk of many things." Others, although they are about one subject, do not concern themselves with sufficient intensity.

The picture that completely absorbs the attention presents just one subject, and presents it with a hard impact. The force of the impact in most pictures is dependent upon the pattern produced by the lighting. New lighting will create the emphasis that puts the exclamation point in pictures.

EMPHASIS AND CONTRAST

In creating pictures, it is important to remember that we read pictures, not from left to right, but from light to dark. When a pattern of light and shade is presented to the eye, the parts that register first are the boundaries of the areas that differ most strongly in their brightness. It is important, therefore, that this line and the areas or shapes it separates should be the most significant in the whole picture. Very often they are not. For example, in an outdoor scene the line of separation between the sky and the roof of a wholly unimportant building may be the strongest contrast in the picture. The eye will inevitably be attracted to this part of the picture, rather than to the important details that should have been emphasized.

In planning the lighting for a picture, we should, therefore, begin by establishing the strong contrasts first. They will determine where the emphasis in the picture is to fall.
Let's compare the two pictures of the cube. (Figures 1 and 2.) The tones on the three faces of the cube in each of the pictures are identical. Yet there is a strong difference in the stopping power of the two photographs. In Figure 2 the strong contrast between the upper face of the cube and the black background immediately attracts the eye and the line pattern in the background helps keep the attention within the picture area. Superficially we would agree that the lighting in Figure 2 is the more effective. But, suppose that the right face of the cube bore some important detail which was to be emphasized. In that case, the lighting in Figure 1 would be superior to that in Figure 2. However, we could undoubtedly work out another more dramatic treatment that would raise the brightness of the right-hand face and set it off in contrast with the background, thus making it stand out as strongly as the upper face in Figure 2.

LIGHTING PROCEDURE

So far we have been evolving general principles. To clarify them and appreciate just how they were done in practice, may I suggest that at this point you take time out and look through the magazines that carry better photographic advertisements and fashion illustrations. You will find some of the pictures strong and effective; others, by comparison, are much less effective. When you analyze their weaknesses you will find that in many cases they arise from a failure to use lighting contrast properly. A study of this kind will help you to avoid many of the pitfalls when you actually get to work, and it will help you to appreciate just how important the accurate placement of light and shade contrasts in the picture area becomes when you try to make pictures that are strong and dramatic.

To visualize just how these general principles work out in practice, let's visit the studio of our imaginary photographer and work with him as he photographs a ball of twine.

The first thing we have to do in making this picture is to decide what sort of picture we are going to make, how are we going to treat our subject, and what we are going to emphasize. As we hold the ball of twine in our hands and turn it about, we are attracted by the interesting texture pattern formed by the strands as they are wound on the ball. The knot also attracts our attention. So let's decide to photograph the ball in such a way...
FIG. 3. Taken with a single photoflood near the camera and about 3 feet from the subject.

way as to emphasize its texture pattern and focus attention on the knot.

We start off by setting the ball on a simple draped support about six feet away from the background and illuminating the ball with a single large floodlamp placed near the camera axis and about three feet away from the subject. The result (Figure 3) is primarily a record of the outline or contour of the ball with a reasonably clear delineation of the pattern formed by the strand. For some purposes, this might be an entirely acceptable photograph, but an analysis of the emphasis produced by the tone contrast reveals that we have not achieved our goal. The maximum brightness difference lies between the general tone of the ball, which is quite uniform, and the dark background. This treatment tends to emphasize contour rather than the texture pattern. It is not what we set out to do, so we cannot consider the picture satisfactory.

One solution would be to illuminate the background so that the texture pattern would stand out more prominently. This would result in a delicate high key picture that might be good for some purposes, but would hardly provide the emphasis on the knot that we have decided upon.

Another approach to this problem is to move the light away from the camera off to the side. By watching the image on the groundglass, a position can be found where the texture pattern is definitely emphasized and yet the general shape of the ball quite well delineated. Placing this light in exactly the right location is very important. Many refer to this light as the key light since it determines in large part the general pattern of the picture and establishes the point of emphasis. Because of its importance most photographers build up their lighting by placing the key light in the proper position first of all. Then they proceed to introduce additional light to add increased emphasis or to balance the picture.

This photograph (Figure 4) made with the key light alone rectifies some of the weaknesses of the first picture, although the maximum contrast still lies between the general tone of the ball and the background. Therefore, let's leave the key light in this position for the present and proceed to begin balancing the picture by working on the background.

It is rarely desirable to have an absolutely uniform background tone, yet we also want to avoid a background pattern that is so pronounced that it attracts our attention more strongly than the subject itself. In
general, tone differences within the background area should be less than those within the subject itself. Where the background is to be some shade of gray, the tones should be intermediate between the highlight and shadow tones of the subject. This is extremely important in pictures that are definitely high or low key. For example, white background in a high key portrait frequently makes the skin look dirty, whereas a background tone just slightly darker than the highlights of the skin, yet lighter than the shadow tones, will tend to enhance the delicate skin gradation.

This same principle can be applied in the picture we are making by lighting the background so that it is darker on the highlight side than on the shadow side (Figure 5). To accomplish this, we employ a spotlight focused to form a spot with a soft edge. The brightness of the background tone must be carefully adjusted so that the brightness difference between the background and the shadow side of the subject is less than that on the highlight side. This balance was not achieved in this picture and, as a consequence, the attention is strongly directed to the contour on the shadow side of the ball rather than on the highlight.

We can remedy this weakness by darkening the general background tone. This sounds quite simple, but, in practice, frequently presents difficulties. These are solved by making the background exposure separate from that for the subject itself. When doing this it is very important that the studio be relatively large, or that the entire set be surrounded by non-reflecting surfaces. When making the exposure of the subject itself, black velvet is used as a background. For the second exposure, this drape is removed and the background alone illuminated. The brightness difference between the background and the subject in the print can be regulated by the relative length of the exposures given in the first and second exposure. A photoelectric exposure meter is very useful as a guide to the exposure times necessary to give the desired balance. The precise balance, however, can be determined only by making a print.

This work on balancing the background brightness should be put off until any supplementary illumination has been introduced. Therefore, in the present case let's put off changing the background until we rectify another weakness. Let's look at this last picture we made with the key light and the background light (Figure 5). Although
FIG. 7. The key light, cross light, and the background light have been combined. There is still a dark area at the left, however the emphasis does lie on the side of the ball with the knot, let’s see if we can’t improve it. What we want is to enhance the texture pattern in this area. Stepping up the strength of the key light by bringing it closer or using a higher wattage lamp will not succeed. We need a cross light. This light is placed farther around to the side than the key light and produces a strong relief lighting in the area that we want to emphasize. Many times it is helpful to turn off the other lights and work with this light alone. As a matter of fact, we really should look upon this light as an auxiliary key light. In this picture we see reproduced the appearance of the ball with this cross light alone (Figure 6). All the other lights have been turned off. In this next photograph (Figure 7) we see the key light with the background light and the cross light. Notice how the emphasis on the knot has been increased with the result that the high contrast on the shadow side of the ball is less distracting. Many times the addition of this cross light on the highlight side will influence strongly background balance, and for this reason, it is best to leave the final work on the background until last.

As we examine this picture (Figure 7) we notice that the large dark area on the shadow side devoid of detail has considerable attention value. We might be tempted to illuminate this part by providing general overall illumination. This is frequently done in
portrait work, and in work on large sets such as commercial interiors. In the present case, however, we do not want to weaken the shadow too much and so, instead of providing general illumination that would reduce the texture contrast, we add a cross light on the shadow side. This cross light is introduced primarily to provide an impression of texture in the shadow area. In this picture, you see the effect of this shadow cross light alone (Figure 8). Notice that it is placed far around to the side so that it highlights the strands and makes them stand out in bold relief. The intensity is relatively low so that it does not raise the general brightness level of the shadow side to such a point that it would diminish the long brightness scale of the picture.

An examination of this final picture (Figure 9) reveals that we have accomplished our goal quite successfully. Notice that, when your eye first falls on the picture, it is naturally directed to the interesting texture pattern of the ball and quickly comes to rest on the knot. The background tone tends to set off the ball so that it seems to be separated from the background and we have a reasonably good feeling of the roundness of the ball of twine.

If you were to walk into the studio at the time the finished lighting was all set up and the last negative was being made, you might feel that the lighting arrangement was rather complicated. However, when you analyze this lighting arrangement you realize that each unit was added progressively in order to accomplish a certain desired result. Each unit was added to correct a certain weakness in the picture that existed with the simpler lighting. This means that we must learn to recognize just exactly how our pictures can be improved by adding additional light. This experience can be gained only by actual work with light and constant observation of just how the direction and quality of illumination helps to bring out certain features in objects around it. A photographer must constantly be on the lookout for interesting lighting effects, and when he encounters them he must take pains to analyze just why they are produced by the particular lighting arrangement that exists at the time. With a fund of information of this kind at his command, he can then proceed to duplicate the lighting conditions in his own studio when occasion demands.

**USING ONLY THE KEY LIGHT**

In this final picture of the ball, we used four lights. From this you should not get the impression that we always use a multitude of lights. For example, just because we placed a separate light on the background in the picture of the ball, does not mean that the background should always be illuminated. Sometimes we deliberately keep light off the background. The picture of the glue maker (Figure 10) is a good example of this. This picture holds our attention because the lighting stresses the essential and obscures the unessential details. In his usual custom, the photographer began by placing his key light. This was a 500-watt lamp in a diffusing reflector. As he tried different locations he found the one he used in making this picture. An examination of the groundglass revealed that it illuminated the important details. It cross lighted the kettle, the tripod and the gas burner, and the workman, so as to produce in all these essential elements the

![FIG. 10. Photograph of a glue maker, showing the use of a key light only. Here the photographer wanted to emphasize the huge kettle as well as the face and figure of the worker.](image)
FIG. 11. A lens inspector, photographed by the diffused light of a window. A study of such natural light effects will teach us a great deal about artificial lighting technics.

high brightness variation necessary to make the eye see and the mind recall an image most distinctly. The photographer decided to stop with this key light because the addition of more lighting units would have revealed a great tangle of irrelevant objects overhead and in the background.

This picture teaches a number of important lessons in lighting. In the first place, it makes us realize the importance of the key light and its accurate placement. It also stresses the effectiveness of simple lighting. In building up our lighting, we should carefully avoid introducing any lights that do not contribute to the picture. Use as few lighting units as possible and keep the general lighting pattern simple. This leads to strong and effective pictures. From the point of view of placement of contrasting tones, we might feel that the "hot spot" on the kettle is a bit too strong and detracts from the workman's face. This could have been rectified in the original lighting by placing a diffusion screen so that it shaded this part of the picture. It could also have been corrected by local control in printing. This raises a rather important point. Through experience a photographer can learn whether it is most efficient to complicate his lighting set-up in order to control certain contrasts in the original negative, or whether it is more effective to rely on control in printing to bring the various parts in their proper relationship. Sometimes one is better and sometimes the other. Only experience can teach the photographer just which procedure he should adopt in any given case. A word of caution, however. It is not advisable to get into the habit of careless lighting merely because an expert printer can frequently make an outstanding picture from a poor negative by careful control.

OTHER EXAMPLES

The picture of the lens tester (Figure 11) illustrates the effectiveness of soft diffused daylight. All too often we feel that every indoor picture must be made by artificial light. This is not necessarily so and some of the most effective industrial interiors have been made by the natural illumination. This picture was made solely by the light of a window behind and above the camera. The important parts of the subject are well separated from the background and an effective picture has been achieved by extremely
simple lighting. One important advantage of simplicity in lighting is that it permits the photographer to give his full attention to achieving a naturalness in the expression of those individuals who appear in the picture.

The photograph of the super calender (Figure 12) illustrates another type of photograph in which simplicity of lighting contributes to the strength of the picture. One light coming down from above acted as a key light and placed the emphasis on the roll of paper and the strip of finished product as it was coming out of the machine. A fill-in light from down near the camera illuminated enough of the machine to reveal its general character and helped light up the second roll of paper strategically located in a point that strengthened the composition. By hiding the workman's legs with this roll of the finished product, greater emphasis is placed on the material being made than the man operating the machine. The presence of the man operating the machine is important, however, since it gives a sense of size and proportion.

CONCLUSION

In each of the pictures we have just discussed, the general principle of the lighting is the same, and yet the position of the lighting units was different. You may ask “How do I know just where to start to find key lights?” That is something you can learn only by constant observation. If you are alert you will see a constant succession of interesting lighting patterns in the daily things about you. Many of them will suggest treatments that will make good pictures. For example, you may be dining with your wife or sweetheart in the peaceful quiet of a candlelit restaurant when you notice the striking beauty brought out by the lighting when she sits in a certain position. It may be a sacrilege to even suggest that you stoop to analyze the lighting at such a time, but there are photographers who might even hurry through dinner in order to get home and try to reproduce the effect. They noted the characteristic low key and dark surroundings and the striking difference in the effect of the small light source (the candle flame) near the subject as contrasted with the flood of light produced by most artificial illumination.

Perhaps you may be wandering through a department store when a serving dish of pewter or spun aluminum catches your eye. The salesgirl picks it up to show you the dish and the effect is gone. Ask her to put it back and then figure out just where the light comes from to bring out the surface characteristics which attracted you so...
THE COMPLETE PHOTOGRAPHER

strongly. If they were sufficiently outstanding to arrest your attention as you were walking past, there is a chance you have the basis of a good still life if you can capture the lighting effect with your camera.

In analyzing lightings of this kind, don't neglect to watch for the effect of secondary light sources such as walls and ceiling or even the clothing of the salesgirl as she stands in a certain position. In the garden, notice the striking differences in the texture and radiance of the blooms as the sun passes across the sky. For example, in some localities there is a light morning haze that is invaluable in lighting up the dark shadows in color pictures. In some gardens certain beds are highlighted by the patterns of the shadows cast by the trees at certain times of day and year. Be on the lookout for such striking effects and lay plans to take advantage of them.

Notice that in every case I have urged you to put your observation into practice. This is the secret of learning to handle light. You can't learn lighting without actual work with lights, and don't get discouraged if you can't get just the effect you want quickly. Expert photographers may experiment for several hours before they discover the combination of subject arrangement and the key light position that leads to the deceptively simple picture that later comes out of the darkroom. A good photographer works at lighting through all his waking hours. The more you see these men at work the more you realize that nothing can replace honest perspiration, figuratively and literally, in mastering light.

ANALYSIS OF . . . MADELINE WEBB, MURDERESS

This photograph and its analysis will be of little help to those who want to learn quickly how to make "good pictures." Yet those who realize how important it is to keep one's mind alive and open to the multitudes of external and internal problems of photography will find here plenty to think about.

Numerous verticals and horizontals create the effect of an ordered, rather static relation between the parts and the normal rectangular shape of the picture. Only the two soft-focus lines near the lower border are clearly oblique. A slight departure from the vertical-horizontal network is also noticeable in the crossbars of the open gate, the lowest bricklines and a few details in the window above the door. All this is not sufficient to dramatize the ensemble visually. Even the downward movement from the left head to the head and arm of the "condemned one" keeps too close to the diagonal of the picture rectangle and no attempt is visible to emphasize the main figure in this drama. The body almost disappears, dark against dark. The only optical detail with a slightly hypnotic effect can be found in the two light buttons on the left figure's dark coat. They are like two magic eyes following the guilty person. But even this possibility appears somewhat casual and easily overlooked. Thus the ensemble effect is neither photographically exciting nor dramatic as a composition. The photographer had the assignment to cover the study and he did his job.

Psychologically this picture becomes much more interesting. Since it is an obvious "understatement" in every visual respect, most of its psychological effect takes place in the beholder's mind. Even this audience-effect depends on the printed text which informs us of the drama. True, there is a tired, pensive sadness in the two faces, but it would not be difficult to find such expressions on some faces in a college campus, a hospital, or in the subway train after office hours. The theme of murder and condemnation is added by verbal information. The only visually psychological subtlety can be detected in the steel bars in the foreground. Being completely out of focus, they lose all descriptive, factual reality and become a symbolic idea or a shadow of imprisonment spread over the whole scene. A cameraman on the job has usually neither time nor is he expected to consider such effects consciously.

So far this whole analysis would suggest an insignificant routine job. Yet many people may find this shot an unforgettable experience. Why? Perhaps because there is nothing in the main figure that marks her as a personification of evil, murderous perversion. Her features are those of a million Janes, Annes, and Sallies—and so this murder becomes a tragedy which has trapped one unfortunate victim who under different circumstances might have been spared as so many of us are. The drama and guilt in this story moves away from this victim and creeps into the audience of a society who shares the responsibility for what has happened. Who is good? Who is bad? The lesson of this simple newspicture becomes much more formidable than if it had shown a highly dramatized atmosphere of murder and viciousness.

Leo Katz
MADELINE WEBB, MURDERESS

An exclusive New York Mirror photo, showing the prisoner leaving the Women's House of Detention. DATA:
4 x 5 Speed Graphic, 5 1/4-inch lens, fast ortho film, f/8, 1/25 second, Press 50 flashbulb
Some of the fascination of the ancient cliff dweller ruins is conveyed in this photograph of soft highlights and dark shadows, a framed shot calculated to give some idea of the protection of these ancient apartment houses.

DATA: 4 x 5 Graflex, 8½-inch Zeiss Tessar lens, slow pan film, f/64, 4 seconds
Solarization is an artistic and unique photographic method which places emphasis both on line and on tone variation. The black line effect is achieved by careful lighting in the first place and then partial reversal during the developing process. This technic, as well as the pose, has helped to show the figure as an abstract art form.
The regular lighting of the church provided the illumination for this photograph. As a result, the picture has religious feeling and a bit of mysticism. A regular flash shot of the same scene would have drawn attention from the altar, would have introduced an inappropriate harsh element. Taken in a Catholic Church at Bridgeport, Conn. and used full page in *Life Magazine*
GOOD NIGHT

This is a studio shot, carefully planned. Its main fascination, of course, is the lighting, with the strong silhouette of the sailor and plenty of darkness for atmosphere. DATA: Rolleicord, fast pan film, f/5.6, 1/10 second.
F-R spot in light over arch; T-20 near the camera as a fill; T-20 in the hall for backlighting.
An overcast day has its advantages from a photographic point of view. With this scene of an Easter procession in a Brazilian town, for instance, it was possible to get fine detail everywhere. Extreme depth of field helps to give added all-over interest. Taken with a Rollei®flex
MEXICAN GIRL

The excitement, joy, and beauty of a child's participation in communion and confirmation have been captured by the photographer's sensitive and understanding approach to her subject. A flashbulb to the left of the camera provided the soft lighting and the important catchlights in the eyes.
WHEN ONE WISHES to make a night photograph of a building and the existing lighting of it is not sufficient to obtain a realistic effect, it is necessary to resort to additional light from portable equipment. Perhaps the best piece of advice on the situation is to boost the existing weak lighting where possible, and otherwise add illumination from sources which will appear as natural as possible. Because of the diversity of conditions to be met with in practice, no standard procedure can be given. One may learn, however, by observing what someone else has done to achieve satisfying results.

An example of natural looking night lighting obtained by artificial means is shown in the photograph of the Market Square Tavern on Duke of Gloucester Street in Williamsburg, Virginia. The light from the lamp on the post near the front end of the building was too weak to have any appreciable effect for a workable exposure, and another lamp just like it across the street had no practical photographic utility at all. Moreover, to get a general view of the building, the camera had to be placed diagonally across the street.

While there was still daylight, the camera was set up at the desired point of view and the composition determined. Then, to create a realistic lighting effect as if from the street lamp, a reflector containing a 1000-watt projection bulb was tied to the back face of the street lamp. To supply current for this portable flood light, an extension cord was strung out of the building from a base plug inside. The reflector directed the new source of light against the building and onto the

ANALYSIS OF... SOLSTICE

Photography is growing out of an archaic phase of a technical (tool) era into a new period of classical maturity. This new level depends more on the awakening of the mind than on additional improvements of our instruments and methods. It should be recognized by a widening of the mental horizon. It should show an ability to combine and integrate technical knowledge and skill with aesthetic, dimensional, visual as well as emotional and intuitive elements. It should employ conscious and subconscious powers, the rational mind stimulated by imagination, facts saturated with meaning, themes or ideas shown through a congenial vocabulary of form, tone, composition, in other words a body with a soul, dreams materialized, abstract conceptions humanized, craft and skill becoming creative.

All these words can do so little compared with the appearance of a real deed in this direction. Solstice by Barbara Morgan seems to me such a deed. There is a print that shows wonderful control of the photographic equipment to a point where it seems idle to ask about camera, exposure, aperture, etc. It is so sensitive in tone values, forms, rhythm, spacing, etc. that it virtually sings. No reproduction can give the full subtlety of the original.

Through a window the first appearance of the ageless miracle of nature's struggling to life during a long winter's sleep was camera-ambushed. This picture does not attempt to describe, define, or explain. It simply experiences the fact, the mystery, the joy, and the hurt of birth of life. The soft snowy effect of the frost turns into maternal forms, nature lyrically humanized, a physical event turned into a symbol of hope and resurrection, life struggling out of breaking wounds.

The flat, sharp oval with the twig motif inside provides a fine conscious contrast to the breathing, feminine rhythms of the rest.

Yes, this is a picture full of music, emotional poetry, and mystic thought all expressed by photographic means without sound, without the need of a text and without definitions of a philosophical school. To me it belongs to the solstice of photography.

Leo Katz
ground beneath the street lamp, while acting at the same time as a shield against light shining into the lens.

After darkness came on, this photograph was made with a series of individual exposures, using only the one portable flood light. The first exposure was 30 seconds at F/16 on supersensitive pan film with the flood light placed as described. This first exposure, however, had no effect on the gable end of the Tavern at the left nor on the extreme right end of the Tavern. To light these portions, the portable flood light was taken down from the lamppost and directed toward the building, first from the left, out of range of the lens, and then from the right, also out of range, thus simulating light from other street lamps. The left exposure was five seconds and the right one a minute, the latter timing necessitated by the greater distance of the flood light from the building.

The next procedure was to take the flood light into the rooms of the Tavern and illuminate the far wall and ceiling of each for about two minutes per room—this space of time in order to make sure that the inside lighting would appear brighter than that given outside the building. Much time was consumed between the individual exposures because the shutter had to be closed frequently to prevent streaks on the negative from the head-lights of passing automobiles.

What about the 150-watt bulb in the street lamp? There was no way to turn it off, and if left on during the total time of all the separate exposures, it was feared the halation would block up the metal frame of the street lamp too much. The solution was to stick a piece of black paper about four inches square onto the street lamp glass facing the camera, thus shielding the direct light during all the exposures except the first one of 30 seconds. The time required for this photo was from 8:30 P. M. until 10:30 P. M.
INTERIOR LIGHTING FOR MOVIES

Russell C. Holslag

Motion Picture Apparatus Designer, J. A. Maurer Inc.; Co-author, Making Better Movies

Amateur motion picture photographers will welcome this direct and sensible article on interior lighting methods. The techniques advised are simple and inexpensive and show how Hollywood effects can be simulated. The author covers straight lighting, rim and back-lighting, and lighting for color in an article illustrated by a unique series of diagrams. This is valuable reading material for movie and still photographers alike.

Tremendous improvements in convenience and compactness in lighting equipment have been made for the 8mm and 16mm movie user. Perusal of early catalogs of amateur movie equipment reveals flood arcs and reflectors to hold 1000-watt projection bulbs with mogul bases. Although these things seem violent anachronisms in the light of present practice, it wasn't long ago that they were sold and actually used. Indeed, this fact serves to emphasize the remarkable development of the recent photographic epoch, in which has sprung up the handy flood bulb, the color film balanced for tungsten light, the simplified lighting units, the high speed panchromatic reversal films, and the fast, well-corrected taking lenses. These have so facilitated the making of interior movie shots that the amateur can be quite independent of daylight, so long as he has house current at his disposal.

We shall not discuss here the various makes and special types of lighting units that are available. They are the tools of lighting and will be referred to as such. Here we shall aim to describe the methods of handling the tools to get results rather than to concentrate on the tools themselves.

BASIC UNITS

In most of the units we consider, the light source will be a bulb of the flood type. These are convenient and effective for all general purposes. Occasionally, a light source will be noted which is of the concentrated filament type, with clear glass bulb. This is the case with certain types of spotlights, which are useful as auxiliaries to the general lighting scheme. Among the flood lamps the No. 1 is about the size and appearance of an ordinary 40-watt house lighting bulb and is rated at 250 watts at 110 volts. Its life is about two hours of continuous burning. No. 2 is a larger bulb, rated at 500 watts, with a six-hour life. These bulbs have a standard screw base which will fit the regular lamp socket. A large bulb, No. 4, with a power consumption of 1000 watts, is available with the mogul base. This bulb, of course, will fit only in units having this special base. Its rated life is ten hours.

HANDLING LIGHTS

At the outset, we must assume also that the reader will have a fundamental knowledge that will inform him on certain essential points of good photographic practice before taking up the subject of lighting setups. First, there is the relation between lens diaphragm opening and depth of field. In most interior lighting subjects, the amateur tends to rely on a fast lens to give him adequate exposure on the film. A fast lens, at a large stop opening, limits the depth of field, i.e., the distance through which the subject can move toward or away from the camera when the lens is focused at a given distance. As the diaphragm becomes smaller, the subject may move through a greater distance under these conditions and background and foreground objects will be in sharper focus. This is why well-illuminated, well-exposed subjects seem generally sharper on the screen than do the darker pictures where the lens has to be opened to its widest stop to make the most of all the available light.

Next, we should know that lighting units have to be placed with some care to prevent "spill light" (or direct light from the bulb) from reaching the lens. We should again consider the familiar principle that the amount of light which falls on a given area is inversely proportional to the square of the distance from light to subject area. We must
FIG. 1. The imaginary circle of 360° upon which all lighting schemes for this article are based. The subject and the camera are shown, represented in a conventionalized manner.

also remember that it is the distance from light to subject that controls the illumination, not the distance from camera to subject. We must learn to watch out for unsuspected glares in the picture caused by stray reflections from our lighting units, from the surfaces of glass covered pictures, glass cabinets, or other polished surfaces. We should have a knowledge of handling the exposure meter and remember to approach the subject closely when taking a reading so that the effect of unwanted areas will be eliminated. For interior lighting set-ups, we should keep our camera on a tripod so that, once we have established a viewpoint and set our lights up with relation to this viewpoint, everything will stay put.

THE CLOSE-UP

With these and other fundamentals well in mind, we are ready to consider our lighting set-ups themselves. The borders of the motion picture screen form a proscenium, or stage, which the picture fills, whether it records close-up or long shot. A good, sharp close-up, or semi-close-up, will fill this proscenium quite as satisfactorily and as fully as will a long shot. In fact, since most casual workers in 16mm and 8mm film do not tell enough of their story with close-ups, it might be salutary to make a film with deliberately limited lighting equipment and so to compel one's self to stay within a restricted area. In an article on lighting, there is no logical point at which to emphasize the desirability of close-ups, yet this one device, which adds so much to the intelligibility and interest of any film, should be mentioned somewhere in any article having to do with any creative aspect of the motion picture.

For our experimental close-ups, then, let us assume that we are to illuminate a range of areas from about two feet square to around four feet square. For this, one or two No. 1 flood lamps are adequate, if used in efficient reflectors. Since the principles involved in lighting a small area with few light sources are the same as would be used in lighting a larger area with more powerful sources (or with a larger number of sources, in groups), we can use our small area as a most convenient proving ground for all sorts of lighting experimentation. Then, what we learn in a limited space we can apply later to larger areas.

PLANNING LIGHT FOR MOVEMENT

In beginning our studies in lighting for movies, we must not be led astray by some aspects of our experience in lighting for still pictures. In the latter, the subject stays put and, indeed, sometimes must hold a critical position very carefully after we have once arranged our lights to hairbreadth accuracy to get a certain effect. But, since the essence of the motion picture is movement, we can hardly plan for such set-ups in the movie shot because we want our subject to move and we plan to have it in motion. Thus, we cannot keep the subject frozen in order to preserve some pet Rembrandt lighting angle. In fact, a bestowal of freedom of movement on the subject is the first key to movie
lighting principles; it is a condition which we must meet at the outset. Thus, what applies to the limited freedom of movement within the smaller frame of our close-up will also apply to the longer shots, with their proportionately greater freedom of movement and multiple or stronger light sources.

With this as a groundwork, we are ready to come down to definite cases where lighting set-ups are put in actual use. Casting about for an adequate means of illustrating the spatial relationships of the units in a lighting set-up, we are confronted with the usual difficulty which results from trying to illustrate a three-dimensional situation in a two-dimensional, flat picture. In the hope of simplifying this problem, the author has devised a plan, based on what might be called the “sundial” method of locating objects in space with relation to a central point. This point, in our diagrams, will be assumed to occur in the vertical center line of the subject, which seems, after all, to be the most important location in the photographic scheme of things.

A reference to Figure 1 will make this system quite clear. Here we see a large circle, which we may imagine as a diagram, laid out in chalk lines on the floor. This circle is divided into eight segments, of which four form a complete semicircle, facing the front. The dividing lines between the segments are labelled from “0” to “180” and, of course, the line “0-180” is a straight line cutting the entire circle in half. Only the front half is numbered; the rear segments are simply considered as equal and opposite to the front ones.

At the center of this cabalistic diagram rises what appears to be a square pedestal, surmounted by a ball—a conventionalized representation of a typical subject. For the purposes of our exposition, we will assume that this subject is standing directly over the center of the circle, where all radial lines meet. Now if, in this kind of diagram, we wish to show the camera in relation to the subject, we have merely to illustrate a conventionalized box on a tripod in line with the angle marked “90”, and pointing in a line parallel to the line marked “90” below it. Thus, the lens axis of the camera, if extended, would pass through the center of the subject. In all our illustrations in this series, it is plain that all objects placed over the circumference of this circle will be equally distant from the subject and that the relationship of objects to this circumference will indicate distances nearer to, or farther away, from the subject.

**ONE AND TWO BULBS**

To start, let us take the simplest of all lighting set-ups, that in which the light is stationed at or near the camera and is directed full upon the subject from the front. A verbal description suffices to outline this simple condition but, in order to illustrate the working of our “sundial” indicator, we shall set it up in Figure 2. When the light is placed as at Figure 2, a sphere, from the camera point of view, would be photographed as a flat round circle (Fig. 2A). A further difficulty encountered in this type of lighting is that any polished, varnished, or glass flat surface facing the camera is likely to reflect the light directly back into the lens and cause an annoying flare.

Therefore, the next improvement we can make is to multiply our lighting unit by two
and spread the two lights so that they stand on lines "45" and "135" respectively, as in Figure 3. Notice that they are now placed slightly above the level of the subject. This arrangement still gives flat, front lighting, but has the advantage of avoiding the heavy shadows cast by any protruding features of the subject as it is in motion.

Both of our set-ups so far would result in the photographing of our sphere atop its pedestal as a flat, disc-like object. We can begin to picture it more like what it really is by moving a single light around in the sector from "0" to "45" (but closer to "45") and by raising this light high enough so that it will also point downward toward the subject at an angle of 45 degrees (Fig. 4). This results in a picture of the sphere which will look something like Figure 4A, and which, at least, gives an idea of the roundness or modeling of the subject. This is the basis of the well-known "45-degree front lighting," a standard formula in portrait studios. Its use for movie close-ups is generally good, but the lighting unit must be placed far enough away from the subject so that the latter may have freedom of movement without disturbing the effectiveness of the set-up.

**A REFLECTOR**

The blocked-up effect on the shadow side of the subject, caused by the use of one light, can be dissipated partially by the use of a flat white-surfaced reflector. This is opposed to the subject just outside the camera range and is so placed that it will turn the light back on the subject toward the side that would normally be in deep shadow (Fig. 5). This will result in a definite lightening up of the shadow side, so that our sphere will now look like Figure 5A. Notice that this procedure tends to soften the sharp line of demarcation where light and shadow meet and that the shadow itself tends to grade off from light to dark.

The reflector should consist of a large white surface, such as cardboard, wallboard painted white, or some similar surface, which can be propped up in the right place or held in the hands of an assistant. Naturally, the larger the area that is photographed, the larger such a reflector should be. For large areas in which several figures are to move about, a reflector of adequate size would be impractical because of the difficulty in bringing into the room and manipulating such a large flat surface. Many room interiors, however, have flat white walls and ceilings which, in themselves, make efficient reflecting surfaces and aid exposure considerably, though usually not in any controlled fashion.

**FILL-IN**

Better than a reflector, because more readily controlled as to direction, is an auxiliary light placed between "135" and...
"180" on our sundial diagram, so that its light is directed at the object from the shadow side. To get the proper effect, this secondary light should not be of the same brightness as the primary light at "45" and this condition can be achieved by using a secondary unit of lesser value or by placing the secondary unit farther away from the subject than the main one. As an example, in two units of equal light power, the "45" could be six feet from the subject, while the "shadow lightener" is placed at seven and one half feet. Bearing in mind the laws regarding the power of light in relation to the distance from the source to the subject, the relative illumination of the two lights would then be about 56:36. This ratio would fall well within the exposure latitude of the average panchromatic movie film and would give the effect of modeling while providing enough exposure for details in the shadow side to register. The set-up is shown in Figure 6. The line of demarcation between the brighter and the darker side may not be so apparent to the eye when both lights are on, but the variations between the two exposures will be quite evident when the picture is projected on the screen.

These are the basic lightings which, if intelligently used, will photograph the subject (1) in adequate detail and (2) with adequate modeling effect. These principles can be applied to large areas or small but it should be emphasized again that, in the larger areas, freedom of movement is necessary and the light sources must be placed at a sufficient distance to give directional or "modeling" effects without greatly changing either the angle or the exposure as the subject moves about. Therefore, to get the same effect on a large area as on a small one, the lights must be set at a proportionately greater distance and also increased in power. Sometimes this will become a difficult thing to do in the normal home, when photographing subjects in a room with the regular home movie lighting units. Even in a large room, where there is plenty of space left outside the picture area in which to place the lights, often the disposition of furniture and the position chosen for camera placement will make the matter difficult.

**POWER CONSUMPTION**

In applying the principles we have already used in getting directional effects in small areas, we shall need to increase our illumination by geometric proportions to get corresponding exposures in small areas. Thus, if we need two No. 1 flood lamps to successfully illuminate an area 4 by 5 feet (20 square feet) at a distance of ten feet from the lamps, we have a power consumption of about 500 watts or 5 amperes. But, if the
area is increased to a space of 10 by 15 feet (150 square feet), the illumination must be increased in the proportion of 20:150, or about 7 1/2 times. The latter, to give the same exposure, would involve a power consumption of 37 1/4 amperes, which would be unsafe to draw from the ordinary house wiring. Generally, home circuits are fused for 15 amperes or, at most, for 25 or 30. With a 15 amperc fuse, it is not safe to employ more than six No. 1 or three No. 2 flood bulbs on ordinary home lighting circuits. For the successful lighting of large areas, therefore, an electrician should be consulted regarding the installation of special leads and units of higher light output should be considered.

RIM LIGHTING

Taking the basic principles of the directional modeling lights as a foundation, we can add a number of special lighting arrangements which can prove highly effective in giving to our pictures the elusive qualities of “snap” and “life.” We have specified with deliberate intent the fact that these aids are to be added. Only under special circumstances can they function properly alone and, in using them, we are to remember that we shall first set up the standard, basic lighting, then apply these special devices if we wish.

In studio parlance, the first principle invoked in these aids is that known as the “rim light” or the “kicker,” or some other equally expressive term. This is simply another way of indicating that we are to make use of a special means to outline the subject with a bright line of light—a line so much brighter than the subject’s normally illuminated surface that it will emphasize the contour.

Since this “rim” or “edge” light must be so much brighter, it follows that the lighting unit which supplies it must be either very close to the subject or of much greater brilliance than the other lights. Here is another good reason why close-ups should be used. For, in such cases, a single light can be placed very near the subject without cutting into the camera field. Figure 7 shows how a simple rim light can be set up in conjunction with the standard lighting arrangement already described. Such a light (reverting to our illustrative sphere) would produce an effect as is shown in Figure 7A. In this set-up, it is apparent that the rim light occurs only on one side of the subject. Therefore, in arranging for a rim light of this kind, it is best to direct it on the darker side of the subject so that its effect will be more pronounced.

It happens frequently that, in arranging a rim light source, there is danger that direct light from the bulb will shine into the camera lens. This may be prevented by the judicious placing of a flat, opaque surface between the light and the camera in such a way that it shields the light from the lens but not from the subject. One such typical placing is shown in Figure 7. In studio parlance, such a shield is called a “gobo” and is exceedingly useful for many set-ups. By a suitable clamp, it can be arranged for clamping to a spare tripod stand or, in an emergency, can be held in the right place by an assistant.

BACK LIGHTING

If a rim light proves so effective on one side only, it would seem logical to try to extend its effect all around the subject, if possible. This is precisely what is done (generally as a matter of course) in motion picture studios, for there are few better methods for making the subject “stand away” from the background, especially in a monochrome rendition. Visitors to motion
picture studios often notice with surprise that there is more light on the side of the subject away from the camera than toward it. This procedure is followed to produce a rim light all around the subject from powerful light sources above and at the back of the set. As a matter of fact, this is nothing more or less than a studio adaptation of the familiar “backlighting,” known to all moderately advanced still camera workers. In the studios, this light is generally directed from above at such an angle that it outlines the forms of the actors but does not shine into the camera lens. This thin rim of light is usually unnoticed as such, yet is most effective in making the actors stand out from their surroundings.

Such an installation of a powerful battery of lights pointing downward from the rear upper portion of the scene could hardly be contemplated by the average movie maker and, in any case, special units would be necessary to accomplish this purpose without danger of flare. However, the benefit conferred by limiting one’s movie photography to a small area is again apparent in this case, because backlighting from above and behind can be done quite effectively on a small scale with only one or two lighting units. Such units should involve the deeper type of reflecting bowl in order to avoid too much spilling of light and the camera lens should be carefully shielded from top light by a deep lens hood or by a gobo arranged at an appropriate angle. The typical professional movie camera carries a deep mask box over the lens as a matter of course. The back lighting should be powerful and as close to the subject as the picture limit will permit. Of course, before the back lighting is brought into play, the exposure is carefully metered on the subject when illuminated by the standard front lighting, to which the back lighting is auxiliary.

A favorite variation of the back rim lighting idea is found in the selection of a subject with light, fluffy hair. A good, strong back light on such a subject will surround the head with a very showy halo, an effect which is often much admired. If the subject is not to move about, it may be possible to bring up directly behind it a bare, unshielded bulb to supply the backlighting, in which case the subject acts as its own gobo for concealing the source of light from the camera. Here again, one must always supply adequate light to illuminate the front of the subject at the same time, else there may result an effect similar to the total eclipse of the sun, where the light shoots out only at the edges and the object that conceals the source appears dark.

In the matter of guarding against spill light from an open unit in sidelong lighting, a spotlight is often most valuable. Because this type of unit is equipped with an optical system that sends the light rays in one direction, the spot may be used for back or side-lighting with much greater freedom than an open reflector. The adjustable spotlight allows one to vary the size of the spot within certain limits, governed by the distance from the unit to the subject. With a fairly powerful spotlight, a good backlighting effect can be achieved, even in an ordinary room of fair dimensions. If the spot cannot be placed directly at the rear of the subject, sometimes it can be placed in one of the rear corners of the room, high up, where its rays can be directed diagonally across the subject from the back. Most studios have mobile spots which are suspended on derrick-like arrangements and these are often used for such purposes as shooting glamour into the blonde head of the star from above, rear. Smaller versions of such spots can be had for amateur use. A typical backlighting set up is shown in Figure 8.

The effect of this as produced on our typical subject, the sphere, would be like that shown in Figure 8A.

BACKGROUND LIGHT

The whole object sought by backlighting in movies is to make the subject stand out or separate itself from the background. This brings us to the matter of illuminating the background itself, a point to which not much attention is given by the casual indoor movie maker. If the background happens to be a light room, with large expanses of white wall and ceiling, there is usually enough stray light reflected about to make the background quite visible. But, with dark rugs and walls and with darker furnishings, it is remarkable how such a background will soak up light.
FIG. 8. A typical backlighting set-up. Extreme care must be taken to see that the back light does not shine into the lens.

In such a case, if the background atmosphere is to count, special attention must be applied to giving it its own illumination. This can generally be done effectively by plain, flat lighting with one or two units. Sometimes a natural effect can be gained by the use of a table or floor lamp in the scene, in which flood bulbs are used. Direct light from these bulbs should, of course, be concealed by the shade of the lamp itself. But, beware of burning flood lamps too long in an ordinary lamp, or too close to a paper or cloth shade. These bulbs generate a lot of heat and it is awkward when the shade starts to smoke.

It is possible, with a fast lens and with fast film, to illuminate a small or medium-sized room adequately for picture taking in all portions. To do this, direct the light from a couple of No. 2 bulbs in reflectors toward a white ceiling. Reflection of light from the ceiling surface will then illuminate the room evenly. Such lighting has no special directional character but may be useful for photographing subjects such as children, who are apt to move about unpredictably. A good exposure meter will quickly show whether there is enough light present for the film and lens opening you have available.

Diffusion should receive some attention here. Some reflectors, with polished surfaces, will turn back the light on the subject in a more hard, direct way than will reflectors with matte surfaces. A softer effect, for close-ups and medium close-ups, may be had by directing the main light source through a piece of cheesecloth stretched in a frame. Tracing paper or cloth and similar materials can be used to vary an effect of this kind. Such diffusers soften the “hard edges” of the light but will also reduce the light output of the unit used. The exposure meter will indicate by how much the light is cut down when using a diffuser.

COLOR

In black and white movie photography, the light is made directional for two main purposes: (a) for modeling and (b) for making the subject stand out from the background. The introduction of color into the picture does much to accomplish these two objects automatically. If the subject is red and the background blue (let us say), no special expedients are necessary to prevent the subject from blending with the background in a color picture. Modeling with shadows is possible in color just as in black and white, but with color more care must be exercised because the latitude of color film (ability to register details in shadows as well as in highlights) is not as great as in black and white shooting. In addition, an average increase of exposure is needed for color so that, under general circumstances, all the lights available must be used at their greatest efficiency. All things considered, therefore, the amateur would be well advised to adopt the type of lighting shown in Figure 3. Because of the fascinating possibilities it offers, however, there is always the temptation to try for special light effects when using color. Sometimes the setup can be arranged to make use of sunlight pouring through a window in combination with the tungsten illumination used for Type A Kodachrome. Here, the sunlight is used only as an auxiliary, to create “atmosphere,” as in a shadow pattern on wall or floor, or for backlighting. Normal daylight is distinctly blue in color to Type A but sunlight, when used as an auxiliary, has not shown this effect objectionably. Such shots are experimental, of course, but often show unusual results.
THE ESTHETIC LAWS OF LIGHT
Edward Kaminski
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A well-known teacher of photography gives here his interpretative and creative attitude toward light—the photographer's essential tool. He tells how, in everyday scenes, the photographer can learn to see light effects, how he can relate light to objects. Here is an inspiring article for photographers who have trouble "seeing" pictures.

All photographs by students at The Art Center School, Los Angeles.

WHEN WE WANT to speak or convey a message, we require a language. If we have nothing to say, language becomes just talk. A language is a vehicle; just as a man wanting to carry fertilizer to his land needs a truck, we need a language to convey our message or thoughts or ideas. The artist who paints needs paint and canvas—the musician needs an instrument—the actor, a play and a stage—the photographer needs a camera, film, and light.

All this is a top view, a surface glimpse, but necessary. However, we should take a more profound look at this language or medium. Each artisan studies his medium quite reverently, because he wants to be sure he gets his ideas across. Here, we shall look at photography and, what in my estimation is the essential medium: light.

To begin with, let me repeat that light is your chief and all-important factor. Without it you could not even stammer. No matter what type of equipment you have, expensive or humble, you must have light and, above all, must understand it. Thousands of photographers use cameras but few take the trouble to study the laws of light, their important factor of expression.

At the start let me also say that you, as a photographer, are a new species—
Sunlight was here strong enough to make possible a real "action" photograph of salt water foam. More important, though, is the angle of the light—picking up each bubble and ridge in the sand and giving them form—making an artistic photograph from an extremely simple subject. DATA: 5 x 7 Agfa View, 81/4-inch Goerz Dagor lens, fast pan film, f/22, 1/200 second

Photo, Jerry Markarian

their greatness. Today, like the ancients who discovered paint, we are not able to see the possibilities which will unfold in the next few hundred years. I am saying all this to make you more conscious of this new power—"light"—and perhaps make you more curious about its laws. Almost 90 per cent of the students who come to my classes think that the camera, lens, film, and developers are their chief tools, usually considering light incidental, not knowing what it does.

Let us ask and answer a few questions:

First, how do we see an object? By light, any light; the brighter the light the better we see the object. In a gray light things are flat; in bright sunlight they have form, shape, and contour.

Second, does light always act the same? Always. Once we know its laws, light has no secrets. We can anticipate, plan ahead, and depend upon it.

Third, how does man relate to light? Through his eyes.

Fourth, how does man recognize form? Now we come to the big issue. As a child, man sees a form and becomes curious. He wants to feel it, taste it, smell it; so he uses all his senses to get acquainted with it. It takes him years of experiments until he knows all shapes and forms. Therefore, he needs only a hint from nature to recognize a shape. The light can be dim or flat but he knows its form instantly because he has stored up all this information in his subconscious mind.

SEEING WITH LIGHT

Now let me come back to ourselves as photographers. Again, who are we and why the great interest in light?

You see, our job is to visualize and transmit our thoughts and ideas to others through our medium. We see a chair. We cannot put the actual chair, wood, cloth, and sunlight onto a piece of paper—all we can do is to put black, white, and grays upon it to give the impression of a chair. We know it
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is a chair—we saw it. We also got an image of a chair, but here's where we must see that the true laws are in operation. We must give the onlooker a true visual image so that his subconscious mind will not be fooled. He may feel right or wrong about it, but he won't know why. It is our business to make this clear to him. Now a shape can have many aspects. It can be flat, gray, dull, brilliant, full of form, dramatic, lifeless, gloomy, or gay, depending on how we want to present it or others to see it. With the proper use of light, a form can be enriched, dramatized.

Van Gogh painted a chair and it became a portrait of a chair. Many people saw chairs, but he saw it and gave it character by giving it light. The painting now hangs in a museum as a work of art. Steichen saw a wheelbarrow full of clay pots. He saw the light and pattern of the shapes made by light; he photographed it and it is considered one of his best works. It's not the chair nor the pots—it is the light which revealed them to him.

We may see all sorts of things all day long under all sorts of light conditions and if we took pictures of them we could say, "That's how I saw them, nature was like that!" Would we be wrong? No, not at all. But who wants the ordinary sight of things? The writer may see incidents all day long and if he wrote them as he saw them would he be wrong? No, but people would not read him; his stories would be boring.

SEARCHING FOR SUBJECTS

So we must search and know when a thing is best or better, and since light is our deciding factor, let's look at it.

How about a walk through the park where we can take a look? We see a lake with ducks, gulls, swans, and boats bobbing on the water. Paths wander amid trees of all description. Children are playing on the lawns, and the grown-ups are content to sit on the benches and bask in the sunlight, or read in the shade of the trees.

See that tall pine tree? It looks flat from here. Why? Because it is silhouetted against the lake and the bright sky. Let's move over to the right a bit. Now the tree is against a group of dark pines. Notice the sun on the side and see how the shape is beginning to unfold. See the top, how round it is. What made this change? The light hasn't changed, but the background has. See how different objects look with different backgrounds or settings? Hold your finger against the sky and look at it—now hold it against the dark mass. Notice how the sunlight reveals the form when your finger is against the proper background.

Let's walk over and examine that mass of tall pampas grass. Notice how flat it looks from here. Come closer and see the beautiful pattern it makes when the light hits it from one side. Now we see the whole form rounded. See how a design is created when we move over here. We see this grass as a mass of darks, grays, and lights. Look at one leaf and see how round it looks in the sunlight, and how flat this shaded one looks.

Let's go down this path. Look at that old man sitting on the bench reading. He is in the shade and we see him as a series of grays; there are no brilliant highlights.

Look at those mallard ducks. See how they fit into the rushes! Nature gave them camouflage to blend with the background. That ripple created by the ducks caught a light. How? Why? That broken surface caught the light and made an arrow right to the duck! A ray of light at right angles to a surface or plane gives a reflection.

There on the water sits a sea gull. He is white with gray-blue wings. What can we

A striking light scheme can give many outdoor scenes—like this one of pipe sections—an unusual beauty. Modern industry provides many such outdoor pattern compositions

Photo, Jack Richards
learn from him? First, the shape of the bird: we know it as being a gull. If we photograph him, our print will reveal a gull. Can we make it a better gull? Let’s look at him. How do we see him? He is moving and so are we as we walk, thus we get a moving picture view of him. We see many angles and in a second we know his shape, therefore, because our mind is receiving all these impacts, our concept is clear to us. If we just click the shutter, we can get this bird looking a flat white, or we can wait and shoot when we notice the nice soft shadow over its side and head. Again see the outline of white against that dark mass of water. Then photographs will get ten separate ideas. It’s up to us to choose.

Look at that drinking fountain. See the rounded top, the square sides. From this angle it’s one shape; from over there it is another. We see planes—we see solids, just by moving around. Why does this happen? Here is the man on the bench. Notice how the sun has changed the set from the drab thing we saw earlier to a charming play of light and shade. Even the old hat has form. That’s mood!

We can walk over to the children playing on the swings. See how that child swings through a series of backgrounds. There is light against dark, dark against light. Your eye loses the rope and picks it up again. The hair is lost against the trees, then comes out against the sky.

CONCLUSION

You say, “Does one always have to examine things this way?” Well, ordinary people do not; people that just stroll in the park let things be. They have other thoughts. Nature just is to them. That is as it should be, but you are photographers. It is your business to make pictures—it’s your language. You are going to talk with it. It’s your business to know light.

At first it is confusing, so let’s just take one form at a time and study it; just one tree, one lamppost, one stone. Examine one each day; this will show you how many ways it can be seen under many light conditions. Your imagination, concepts, and you will grow.

“What books shall we read to get more information?” Your own mind is the book. Nature is there within you, and there is the sun, the great source and book of light. Let them come together. All the information exists within yourself; only curiosity will
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reveal these truths. We must realize people get very little from outside themselves. It’s a process of unfolding and searching.

One’s own ideas are to be developed. Many men wish to copy and reproduce nature as it is. They are the ones who delight in seeing things outside themselves—getting pleasure—taking it. The job of the creative photographer is to produce; to see and add or translate; to choose, select which would come from within; to give out instead of take.

Thus a greater freedom is unfolded. The world around us is ever unfolding. So are we within our own nature, which is one with all nature.

This location shot proves that studio lighting is not at all a necessity when making interpretative photographs like this. With complete control over the position of the model and her props, the photographer achieved his results with a soft low sunlight and reflectors. DATA: 2⅛ x 2⅛ Rolleiflex, fast pan film, G filter, 1/50 second, f/11

Photo, Tom Binford
THE NATURE AND MEASUREMENT OF LIGHT

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Here is the answer to the question: “What is light?” Light is explained as radiant energy and the measurement of that energy is described. Terms such as lumen, candlepower, and lux are defined; reflection and polarization are covered. And, finally, light is seen in relation to the photographic effect. The information in this article is important and should be absorbed by all serious photographers.

When a photographer points his camera at any object, he generally wants to get a picture that will look as nearly as possible like what he sees. To be certain of this he must use the same agent to take the picture that he uses in seeing it. This is because some objects reflect the radiation in the ultraviolet and the infrared quite differently from the way they reflect the radiation in the visible spectrum, that is from the way they reflect light. Thus, light is the all-important agent in photography, the same as in seeing, and this is because photography is actually a successful attempt to produce a picture that looks as nearly as possible like the original. Of course, at times a photograph is taken to show things not visible to the eye.

EVOLUTION OF THEORY

The question “What is light?” is one that philosophers have been interested in and have studied since the very beginning of scientific inquiry. Progress was slow both in collecting definite experimental results and in setting up theories to explain these results. Nearly 300 years ago Newton showed, by means of a prism, that sunlight could be drawn out into a spectrum of many components differing in color and refrangibility, or as we would now say, into components of different wavelengths. About 150 years after this, it was found by Herschel that the spectrum extended beyond the red end by showing that marked heating effects were produced on a thermometer held just beyond the visible portion. About a year later Ritter found that the spectrum extended beyond the violet by studying the blackening of a silver salt at this end of the spectrum. These two components were called respectively, infrared and ultraviolet. About 1800, Young demonstrated the interference of light which was to be one of the serious stumbling blocks to the corpuscular theory. Young also showed how the rectilinear propagation of light could be explained on the wave theory.

While these extensions of the spectrum remained narrow fringes, the word “light” was extended to include the entire known spectrum, but now since both the infrared and ultraviolet have been extended many octaves, as compared to the single octave of the visible spectrum, some such term as the one used, “radiant energy,” is necessary, and the term “light” is best reserved for its original meaning—visible radiation.

Many theories were advanced to explain the phenomena observed, among them Newton’s corpuscular theory* which held that light was made up of some sort of corpuscles that were given off from light sources. Many and varied properties were given to these corpuscles to explain the experimental results. Newton knew of the wave theory of light, but he could see no explanation for the linear propagation of light, nor of polarization on this theory, so he advocated the corpuscular theory with so much zeal and added so much to it that it has been said that he held back the wave theory about 100 years.

The corpuscular theory was abandoned some time between 1800-1850 because it was thought to be incompatible with a number of experimental results that were obtained in the latter half of the 18th and the first part

* The corpuscular theory of light was brought forth many years before Newton’s time (i.e., about 500 B. C.) but was elaborated by Newton to such an extent that it is spoken of as Newton’s corpuscular theory of light.
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of the 19th century—the most important of these were probably interference and the fact that light traveled more slowly in the more dense medium. This corpuscular theory was replaced by a wave theory with waves in some sort of elastic solid. This elastic medium—the ether—was given many and varied properties to enable it to explain all the experimental results.

About 70 years ago the theory that is the basis of the modern theory of light and radiation was first suggested. In 1873 Maxwell brought out his electromagnetic theory of light. This theory did not replace the wave theory, but rather supplemented it by substituting for the wave in the elastic medium an electromagnetic wave with an electric vector and a magnetic vector at right angles to each other in a plane perpendicular to the direction of propagation (Fig. 1). There are many results—such as the photoelectric effect, the change of the character of emitted radiation when the source is in a strong magnetic or electric field (the Zeeman effect and the Stark effect), the change in the transmitted light when the transmitting substance is in a strong magnetic or electric field (the Faraday effect and the Kerr effect), and the fact that good conductors of electricity are good reflectors of radiation—that show that light or radiant energy is an electromagnetic phenomenon.

Although Newton's theory that light consisted of corpuscles was abandoned by most physicists as incompatible with the electromagnetic nature of light, later experiments have shown that radiant energy like matter is composed of discrete particles. Therefore a reconciliation had to be made between these two theories of radiation, that is, that somehow radiant energy is composed of electromagnetic waves and of "quanta." The term "quantum" or "photon" is now ordinarily used for these particles rather than Newton's name "corpuscle," and instead of being thought of as material particles, these present-day photons are considered to be small bundles of very definite energy content. It should be pointed out, however, that some of the properties attributed by Newton to his corpuscles were much nearer to those now attributed to the quantum of radiation than is generally realized.

MATTER VS. RADIATION

There is another analogy between the atomic theory of matter and the atomic theory of radiation that is worth mentioning. In a consideration of most of the mechanical properties of matter, it is treated as a continuum, but in most of the chemical considerations of matter, the atomic characteristics are predominant. Likewise, in the consideration of radiant energy as it passes through space or matter, it is treated as a continuum of electromagnetic waves, but when it interacts with matter both in its origin and absorption, the quantum nature prevails. It follows that the optical aspect of photography will treat radiant energy as a continuous phenomenon and the photochemical aspect will treat it as made up of some sort of particles. Thus all consideration and treatment of light as it passes through space from the source to a receiver, all reflection phenomena, and all passages through and refraction by prisms or lenses are on the basis of electromagnetic waves. When, however, radiant energy reacts intimately with material objects, its quantum nature is made evident. Examples of the latter are the line emission and absorption spectra of chemical atoms, the band spectra of molecules, fluorescence, phosphorescence, and photochemical reactions such as take place in the photographic plate.

MEASURING INTENSITY

The question of continuity in time similarly creates a difference in attitude and methods of consideration and treatment between

FIG. 1. Relation of electric and magnetic vectors to direction of the propagation of light (in general, of radiant energy), according to Maxwell's electromagnetic theory
the illuminating engineer and the photographer. The illuminating engineer is interested in light sources differing both in intensity and in color for use in producing lighting effects or illumination. The photographer is likewise interested in producing various lighting effects to bring out certain characteristics of the final photograph, but he is also interested in the timing element as it affects his exposure for making the final picture record.

Thus both the illuminating engineer and the photographer are interested in the intensity expressed in candles and the color of various light sources. For incandescent sources, the color can be expressed by giving their color temperature, which is the temperature at which it is necessary to operate the standard radiator so that it will give light of the same integral color as that given by the source considered. This standard radiator is defined as one that will absorb all the radiation that falls upon it, neither reflecting nor transmitting any of the incident radiation. It can be shown that such a source will give out more radiation than any other source at the same temperature and of the same size. Such a body at room temperature must appear black, since it can neither reflect nor transmit any light. For this reason this standard radiator has been called a blackbody. At any temperature at which it is useful as a source of light, it would not appear black.

To secure agreement among the many workers in this field, it has been necessary to set up by international agreement a standard candle equal in light-giving power to about the average tallow candle of our great-grandparents. Figure 2 shows the distribution in the visible spectrum of the radiation from a number of sources at certain color temperatures. These curves have been plotted so that each source has such an area or is at such a distance that they all give the same illumination on a definite surface.

The intensity of a light source is in general different in different directions. This is true to some degree for ordinary incandescent lamps, but is very evident for the modern fluorescent lamps since they give almost no light when observed end on. For some uses, the intensity in a particular direction is all that matters. In other cases, the average intensity in all directions is important. For sources giving radiation too far out of the visible spectrum, the candlepower may not be satisfactory, so it may be necessary to give the intensity of the radiation in the particular part of the spectrum used. Likewise, for sources too far removed in color from incandescent sources—e.g., mercury or sodium arcs, or some of the fluorescent lamps—it may be necessary to specify their color on the standard chromaticity diagram of the International Commission on Illumination.

The lumen

The rate at which light is emitted by a source, passes through an aperture or falls upon an object, is called the luminous flux by the illuminating engineer, and the unit is the lumen. The lumen is the flux that falls upon a surface or aperture that is everywhere
perpendicular to the direction of the light and equal in area to the square of its distance from a source of one candle. From geometry it can be shown that a source of one candle-power radiates $4\pi (=12.57)$ lumens provided, of course, that the source radiates with the same intensity in all directions. The lumen, of course, does not depend upon the distance to the object illuminated, but the incident flux density or illumination depends upon the area covered by this unit flux. Various units of illumination are used, depending upon the various units of distance used. Thus a source of one candle at a distance of one foot gives an illumination of one footcandle. If the unit source is at a distance of one centimeter, the illumination is called the phot, and if the distance is one meter, one meter-candle or one lux.

For many applications in photochemistry and photography, the total quantity of light, which is the product of the light flux (in lumens) and the time, is important. According to the application, various units of time may be used such as lumen seconds, lumen hours, etc. If the area over which the quantity of light is distributed is significant, the ratio of the quantity of light to area may be considered, and this is called exposure. This, of course, is also given by the product of the illumination and the time. Thus an exposure of one lumen second per square foot is the same as an exposure of one footcandle second. This is probably made more evident by recalling that an illumination of one footcandle is by definition one lumen per square foot.

**THE INVERSE SQUARE LAW**

The light, or the radiant energy, falling upon any surface from a source depends upon the intensity of the source, the distance between the source and the receiver, and the inclination of the receiver with respect to the line joining them. Geometrical consideration will show that the amount of flux falling upon any receiver is proportional to the cosine of the angle between the normal to its surface and the line joining the receiver to the source. Geometrical consideration likewise shows, Figure 3, that the illuminations falling upon surfaces, equally inclined to the direction of the rays, vary inversely with the square of their distance, since an equal amount of flux is spread over areas that increase as the square of the distance. This is one of the fundamental laws of optics. This assumes that there is a point of symmetry of the source from which to measure, or that the dimensions of the source are small with respect to the distance. For ordinary photographic sources, if the largest dimension of the source is less than about 10 per cent of the distance, the inverse square law holds to a fraction of a per cent. It is, of course, also assumed that there is no absorption or scattering between the source and the receiver. Since no medium—except a perfect vacuum—is perfectly transparent over the entire range of the electromagnetic spectrum, the propriety of applying the inverse square law depends upon the knowledge that the medium is sufficiently transparent in the case at hand.

**REFLECTION, ABSORPTION, TRANSMISSION**

In general, when luminous flux falls upon any surface, it is partly reflected, partly absorbed, and partly transmitted. If the surface consists of a good mirror, practically 100 per cent of the incident light is reflected. For materials consisting of properly treated glass, practically 100 per cent is transmitted, and for an object covered with finely divided carbon black, practically 100 per cent is absorbed. Almost any combination of these three types can be found in different real bodies. But in any case, the sum of the amount reflected, absorbed, and transmitted is 100 per cent. The fraction reflected, absorbed, or transmitted is generally given as a percentage of incident radiant flux. The geometric configuration of the reflection, absorption, or transmission must be con-
FIG. 4. Regular reflection of light from a smooth, polished surface

FIG. 5. Diffuse reflection of light from an optically rough surface

Considered as well as the quantitative aspect. Thus we have regular reflection, diffuse reflection, regular transmission, and diffuse transmission. Diffuse reflection and diffuse transmission are classed as scattering. It is generally by this type of reflection and transmission that objects are made visible. The diagrams in Figures 4, 5, and 6 show these various types of reflection, absorption, and transmission.

What one sees when viewing any object depends upon the type of illumination and upon the surface characteristics, both of the object studied and of its surroundings. Thus a body of low reflectance is more visible as an object against a light background, but the visibility of details of such an object is enhanced by using a dark background. The various types of ideal surfaces or bodies—comprising those having total regular (specular) reflection, such as a good mirror; total diffuse reflection, such as a magnesium carbonate block; total regular transmission, such as a piece of clear glass with treated surface; totally diffused transmission, which is approximated by the inside frosted lamp bulbs; and totally absorbing surfaces which are closely approximated by black velvet or a surface covered with finely divided carbon black—are alike in having no details of their own. Thus, any one of the above taken alone makes a very poor object for photography since its visibility depends almost completely upon the surroundings. Most real objects present a combination of two or more of the above ideal characteristics and have a surface structure which can be brought out or depressed by proper control of the quality, quantity, and direction of the illumination.

ILLUMINATION AND BRIGHTNESS

By the consideration of an ideal surface having 100 per cent diffuse reflection, the relation between the illumination and the surface brightness can be worked out. For such an ideal surface, Lambert’s cosine law says that the brightness is independent of the direction of illumination or of observation. If one lumen falls upon a square centimeter of such a surface, it is said to have a brightness of one lambert. If the one lumen falls upon a square foot of this surface, it has a brightness of one foot-lambert. For the corresponding unit of brightness with the square meter, as the unit of area, the name “apostilb” has been suggested but has not been generally accepted. A unit of brightness equal to one candle per square centimeter (π lamberts) called the “stilb” is sometimes used in Europe. Sometimes American writers give brightness in candles per square inch.

POLARIZATION

One of the difficulties that confronted Newton in explaining light was the phenomenon of polarization. Light is said to be polarized when the electric (respectively
magnetic) vector is not random in direction and time. The simplest type of polarization is one in which the electric (respectively magnetic) vector is restricted to a single plane through the direction of propagation of the ray. This condition can be brought about by reflecting the light, at an appropriate angle, from a plane surface of a transparent material, by passage of light through certain material substances, such as tourmaline, or by some manufactured substitute for this, such as a Nicol prism or a piece of polaroid. If such a beam is passed through a second such polarizing device, the intensity of the beam will depend upon the relative angle of the axes of the two polarizers and become practically zero when the axes are at right angles to each other. In circularly polarized light the electric (respectively magnetic) vector changes in direction but not in magnitude, while in elliptically polarized light the electric (respectively magnetic) vector changes in a regular manner, both in direction and in magnitude. Light which may be regarded as a combination of unpolarized and polarized light is said to be partially polarized.

Since the light of the sky and that reflected from water or wet pavement is significantly polarized, the use of a properly oriented polarizing screen in front of the camera lens may materially reduce the glare.

PHOTOGRAPHIC EXPOSURE

The photographer is interested in obtaining an image of the objects or persons photographed and making a permanent record of this. The impression that he obtains upon his plate or film will depend upon the plate or film quality and the "exposure," which has already been defined as the product of the illumination on the plate and the time. The unit of exposure may be expressed as any combination of illumination and time units, such as footcandle seconds, metercandle seconds, or even metercandle hours. To obtain the illumination on the plate, the photographer has control of the illumination on the scene, the lens and the stop used, and the time of exposure. Allowance must, of course, be made for the light absorbed by any filter used whether at the light source or the camera or even by the lens itself.

In the above the dependence of the photographic exposure on the illumination of the scene or at the plate has been considered, without indicating how these illuminations were to be determined.

By definition the illumination is an evaluation of irradiation with respect to the human eye. For measurement of total radiation, physicists are accustomed to measure the resulting electric effects produced when the radiation is allowed to fall upon, and heat, thermometric devices—strips of metal whose resistance changes when they are heated, or thermocouples which consist of a circuit with two wires of dissimilar metals in electrical contact at two points; one at the receiver of the radiation, and the other kept at room temperature. When radiation falls upon one of these junctions, it is heated, producing an emf (electromotive force) proportional to the amount of heat it receives. This emf is measured with a suitable measuring device. These thermometric devices are blackened to make the absorption of radiation as complete as possible. Since such a blackened receiver is sensitive to radiant energy of all wavelengths, it will respond in regions of the spectrum where the eye is not sensitive. Any such receiver of radiation, as the eye, the photocell, the phototube, or the photographic plate, that do not respond equally to radiation of all wavelengths, is said to be a selective receiver. When one of these receivers is substituted for the eye, its selectivity should not differ from that of the eye too greatly for the purpose at hand.

MEASURING ILLUMINATION AND PHOTO EFFECTS

In the laboratory very elaborate provisions are made for measuring the light flux of various sources or the illumination produced by them. As is well known, the eye is a very poor instrument for judging the absolute value of light intensity or illumination. If such judgments are attempted, errors as great as a factor of 10 may be made, which is more than any form of photography can tolerate. The eye is, however, a good judge of the equality in brightness of two surfaces that are adjacent. When the two surfaces have the same color, matches may be made.
FIG. 6. Regular and diffuse reflection, refraction, absorption, scattering, and regular transmission of light

time to use for the illumination that has been measured for any particular type of film or plate. This saving of time is of particular importance when the illumination is changing rapidly.

Since the various types of photographic plates or films differ from one another and from the eye in their sensitivity for radiation of different wavelengths (that is they differ in selectivity), it is necessary to consider the integral color of the light used to produce the illumination. As for example, if the same illumination is produced by sunlight and light from a tungsten lamp, the output from the tungsten lamp will be much richer in radiation in the red end of the spectrum and less intense in the blue end of the spectrum than that from the sun. Since the photographic film weighs this radiation differently from the photometer, the relative photographic effectiveness of the two sources is not proportional to the relative illumination produced by them. This is taken care of by giving different figures for the speed of the same photographic material when it is used with the different sources of light.

REFERENCES:


2 Standards of light intensity and terms used in illumination as discussed in the report of the Nomenclature and Standards Committee of the Illuminating Engineering Society, Illum. Eng. 36, 815 (1941); also American Standards Association, Z7.1-1942.


DIRECT PAPER NEGATIVE TECHNIC
Don D. Nibbelink, A. R. P. S., A. P. S. A.

Following is an interesting and timely article on a method of making pictures directly on paper. Direct paper-negative photography is not new, but the author sets forth some helpful pointers on the subject. Other practical applications of this method will be useful, such as for photograms and copying text.

With less film available than they normally use, photographers are now forced to choose between two alternatives: making fewer pictures, or finding satisfactory substitute methods of taking pictures that will enable them to continue their hobby or profession. Obviously, this latter expedient is the more desirable of the two.

In this connection, more and more photographers have turned to making their camera exposures directly on single-weight paper, rather than utilizing exclusively the customary film negatives. Although paper-negative photography is fundamentally the same as film photography, there are, of course, small differences with which the photographer should be familiar so that results of the best possible quality can be obtained through a thorough understanding of its advantages and limitations.

For instance, it is impossible, regardless of how much work is done on the paper negative, to achieve exactly the same results as those obtainable by the use of photographic film as the negative material. But this need not be a drawback. Rather, the differences which will be apparent can easily become something desirable and artistic in quality.

The limitations of speed and color sensitivity, as well as a textured appearance, are not so serious as one might imagine, and, in addition, the paper-negative process has many advantages of its own. The amount of control over both tone and detail is almost unlimited through retouching, the cost of a paper negative is much less than that of a corresponding size film negative, and the time saved in processing is literally halved when compared with that usually necessary for film negatives. Finally, loading the paper in the camera presents no great special problem. For sheet-film holders, the paper is usually trimmed, inserted into the holder in the usual manner, while short lengths may be cut to the desired width for loading roll-film cameras. Direct paper negatives are not, however, recommended for the extremely small cameras.

THE TYPE OF PAPER TO CHOOSE

For shooting paper negatives directly in the camera, the only recommended paper is the fastest single-weight enlarging paper that it is possible to obtain. Agfa Anse Brovira is a typical example of a suitable material. In addition, the paper surface should be either glossy or a very smooth matte similar to "Velvet" or "Commercial" surfaces. It is also a good idea to select the softest grade of paper, such as number one, for two reasons: first, the softer grades of paper are usually

An excellent example of early paper-negative photography made by Langenheim of Philadelphia. These 19th Century Talbotypes were usually made on a fine grade of writing paper that was photographically sensitized with silver nitrate.

Courtesy, American Museum of Photography
faster than those possessing more contrast; and second, a soft paper negative will result in approximately normal negative tone gradations. If a more contrasty result is desired, it would be preferable to use a harder grade or paper for making the final positive print. Processing of the paper should concur with the manufacturer's directions.

There are several technics with which photographers should become acquainted in order to produce quality paper negatives and good subsequent positives—either contact prints or enlargements—from these negatives. For example, no one procedure used alone will necessarily be the answer to solving the texture problem. Instead, it may be

![Sketch showing the effect of pre-fogging the negative through the back to help reduce the printing effect of the paper texture. Notice that the procedure is based on the fact that the more dense cellulose areas in the paper stock plus a small masking density tend to give an equivalent printing effect to that of the clearer paper base areas plus a larger masking density.](image)

**PAPER NEGATIVE EXPOSURE**

The speed of the fastest bromide enlarging paper, as mentioned above, is far less than that of the more commonly used "amateur" types of films, but even so, this does not present too much of an exposure problem. It is easily possible to take portraits with exposures which may be found to be about \(\frac{1}{6}\) to \(\frac{1}{2}\) second at \(f/4.5\) with average portrait lighting equipment. However, in using the paper negatives for outdoor exposures, the speed will be found to be considerably increased so that "instantaneous" exposures can be given. This is due to the fact that bromide enlarging paper is most sensitive to the blue radiation in white light, and daylight is generally bluish compared to the light from incandescent electric lamps. Such illumination appears yellowish and contains relatively less blue radiation.

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**THE TYPE OF SUBJECT**

Generally, "paper grain" resulting from the non-uniform distribution and density of the cellulose fibers in the base of the paper negative will be found to be most prominent in the middle gray tones of the print, gradually disappearing as the tones approach either white or a maximum black. This fact can be taken into consideration in choosing the type of subject and the method of handling that subject when making a picture on a paper negative. Because the texture is less pronounced in either the high or low density areas, it is advisable to make either low or high key paper-negative pictures. Another thing to keep in mind is to avoid both very contrasty lighting and very flat...
DIRECT PAPER NEGATIVE TECHNIC

lighting. The choice of subject and lighting should be made with the thought of avoiding any smooth, even areas of gray tones in the final photograph. The paper-negative texture can often be minimized by including patterned backgrounds as a portion of the original picture. For instance, a patterned dress or backdrop would be much more adaptable to this technic than would objects of solid color. Generally speaking, the pictorial type of picture is more sympathetic to the use of paper negatives than is the straightforward portrait. Also, it can be used to better advantage in the portraiture of men than of women, the latter expecting a "peaches and cream" complexion ninety-nine per cent of the time.

It is best to produce fairly heavy paper negatives for two reasons: first, to assure that the negative is properly exposed. Viewing the paper negative by reflected light to judge its density is a mistake if it is to be printed by transmitted light. However, if the positive print is to be made by means of reflected, rather than by transmitted light—as when the positive paper is exposed in the camera, with the paper negative as the subject—it is then correct to judge the negative by reflected light. For judging the approximate density by transmitted light, the picture should be placed on a retouching stand, or, preferably, on an illuminated contact printer, emulsion side down. If the paper negative appears to be perfectly normal by reflected light, it actually will be seen to be lightly exposed or underexposed when viewed as it should be (similar to an ordinary film negative) by light coming through the paper negative.

The second, and equally important, reason for generously exposing paper negatives is that the high image density of the negative will tend to minimize the appearance of paper grain in the finished print. In this connection, it is possible to increase the density in certain areas by means of a pencil or crayon sauce on the reverse side of the print.

TRANSPARENTIZING PAPER NEGATIVES

Ever since the days of Talbotypes or Calotypes, photographers have experimented with various media in attempting to increase the translucency of the paper stock, and at the same time decrease the graininess in the final print, resulting from printing the paper negative by transmitted light. Many solutions have been recommended for this purpose, some of the better ones being vaseline oil, mineral oil, or a solution of Canada Balsam in turpentine. Although these various transparentizing treatments do help to reduce the printing time of a paper negative (which usually is not excessive in the first place), they do not successfully accomplish the second purpose for which they were intended.

Paper, for the most part, is composed of cellulose fibers closely "knit" together by small areas somewhat more permeable to light. The oils increase the translucency of these so-called interstitial areas proportionately more than they do that of the more dense fibers. Therefore, although increasing the translucency of the paper base as a whole, the total effect was actually to increase the granularity. This means that any paper negative thus treated is more grainy...
in appearance than it was before the treatment. The effect of decreasing the granularity through the use of transparentizing media is dependent upon the actual nature of the paper stock which varies considerably from one type of paper to another and also from one manufacturer's products to another.

Therefore, it is difficult to predict beforehand the action that mineral oil, for instance, will have on the granularity of a particular paper negative.

If, in your own work, you find that such treatment is expedient, perhaps the most satisfactory method is to use either the Canada Balsam in turpentine or the mineral oil. In both instances, a good precautionary measure is to ascertain that the paper negative is "bone dry" before the surfacing medium is applied. The paper negative may be heated over a radiator or placed in a drying oven in order to drive out all the moisture which may be retained by the cellulose fibers. This will make the paper more readily accept the oil or balsam, neither of which substances is miscible with water. The transparentizing treatment should not be hastened but is accomplished best by long (overnight immersion periods in order that the absorption of the substance into the fibers is as even and as complete as possible.

One of the outstanding advantages in using a transparentizing medium with paper negatives is that it may be applied locally and as such is an excellent means of dodging the print, at the expense of some increase in graininess in the treated portions. This method of dodging is particularly advantageous where the printing of fine details is desirable. The balsam-in-turpentine solution is recommended if this is to be done, as there is slightly less diffusion of this substance than with mineral oil to neighboring negative areas. Naturally, the negative is less dense in the areas to which the solution has been applied, and because of this you may find it useful to put the oil on over-exposed highlights in the negative which otherwise would have a tendency to be somewhat "chalky" or devoid of detail in the final picture if printed "straight" without use of the oil.

PRE-FOGGING THE PAPER NEGATIVE

One of the most important procedures to help eliminate the printing effect of the paper fibers, is to pre-expose the paper to be used for the negative through the back with controlled imageless light. Strangely, it is a technic which has been largely overlooked in the many attempts to produce as grain-free paper-negative prints as possible.

The mottle caused by the fibers in the paper stock results from outlines of more dense cellulose fibers being recorded in the print as tiny lighter areas. Fogging helps to relieve this situation by automatically masking for the paper fibers since the fibers tend to act as an impediment to the light and thus cause a differential exposure to reach the sensitive emulsion.

The way in which the fogging exposure helps to reduce the printing effect of the paper base may perhaps be better understood if it is regarded in the following manner. It is as though a piece of the photographic paper stock were used as a negative and a print were made from this negative by contact with a light-sensitive emulsion. The parts of the paper itself which were the most dense (the heavy cellulose fibers) would be represented in the emulsion by areas which had received little exposure and were a light shade of gray. Conversely, the parts of the stock which were less dense (the spaces between the heavy cellulose fibers) would be represented in the emulsion by areas which had received comparatively more exposure and were a darker shade of gray. Thus, if the fogging exposure is approximately correct, before the actual camera exposure has been made, the emulsion has an equivalent printing density to that of the paper stock and one which automatically compensates for the heterogeneous make-up of the paper base.

This can easily be proven by developing a piece of paper to be used to make a paper negative which has been pre-fogged through the reverse side. By reflected light, the light-gray fogging exposure will appear to be quite mottled, but if this paper is examined by transmitted light, the mottling disappears almost as if by magic. The actual negative image interferes with this masking exposure
to some extent, but nevertheless the grainy appearance is considerably lessened.

The proper amount of light fog which should be allowed to reach the emulsion is fairly critical, as either too little or too much fog will not be effective in the elimination of granularity. This will depend, of course, on the thickness of the single-weight paper base and other factors, such as the contrast of the emulsion, characteristics of the developer, etc. The extent of fogging that results in the greatest reduction of graininess should be determined by experiment. For a starting point, the over-all density of the fogged paper, if developed without the superimposition of the negative image, should be from light to medium gray. If you find the pre-fogging exposure to be comparatively heavy, it probably may be a good idea to use Brovira Number 2 instead of the usually recommended Number 1 in order to retain the proper amount of paper-negative contrast, as an excessively heavy fogging exposure tends to reduce negative contrast.

The fogging is perhaps best produced and controlled by placing the paper emulsion down in the enlarging easel, masked so the fogging exposure will cover the entire area that will be exposed in the camera at some later time. Without placing a negative in the enlarging negative carrier, the enlarger diaphragm is stopped down to a small aperture and the paper exposed with this “free” enlarger light for the proper length of time, as determined by preliminary trials with the enlarger setting, lens diaphragm, and other factors carefully recorded.

It is a good idea to pre-fog a sufficient quantity of paper negatives in the fashion outlined above so that the necessity of performing this operation before making each camera exposure can be eliminated. The best exposure for pre-fogging can be determined by a few trial exposures on several sheets of paper, each exposure being twice that given the preceding sheet in the series. Then the pre-fogged sheets of paper are all exposed in the camera, with the same subject and the same lens and shutter setting, and they are given identical development. After these paper negatives have been printed, it is easy to judge which pre-fogging exposure gives the greatest reduction in paper grain apparent in the final print.
The fogging exposure can also be made after the negative exposure has been given instead of previously, since there does not seem to be a great difference in practical results as to when the operation takes place, it being only a matter of convenience.

GRAINLESS PAPER-NEGATIVE PRINTS

BY COPYING

Of course, the obvious way to avoid grainy or mottled prints from paper negatives is to copy them by reflected rather than by transmitted light. Since the light is merely reflected from the smooth surface of the negative rather than passing through the paper base, no objectionable graininess from the cellulose paper fibers will be apparent is the final result. Whether or not reflection printing is the better method of producing the positives is open to conjecture, as the disadvantage of a loss of scale—particularly in the maximum and minimum densities—may be objectionable in some types of subject matter, such as a negative which has important details both in the heavy shadows and in brilliant highlights. However, in a majority of instances, reflection copying of paper negatives will be found to give satisfactory prints.

One important aspect is that for optimum results the exposure of paper negatives to be copied by reflected light should be fairly accurate, and the negative densities should appear to be normal when viewed as a print. But this is a definite advantage, as only about half of the exposure required to produce a “transparency” paper negative will result in a satisfactory “reflection” paper negative. In practice this corresponds to an approximate doubling of the speed of the paper-negative material.

If a copying camera is available, the photographer should have no trouble producing excellent prints by this method, their size being limited only by the maximum dimensions of the print paper that can be accommodated. If one does not have access to such equipment, many enlargers can be easily converted into a convenient and practical copying camera to produce approximately contact-size prints. The procedure is merely to illuminate the enlarger easel by photoflood lamps in reflectors, arranged at either side of the easel to give an even distribution of light. Then lower the enlarger as close to the print easel as possible (this usually will give about a 1 to 1 ratio between the negative and the size of the resultant print), turn off the photoflood lights, and focus the enlarger with the usual enlarger lamp and a test negative on film in the negative carrier, as usual. Then remove the test negative, switch off the enlarger lamp, place the paper negative emulsion up in the enlarging easel, and center the easel directly beneath the lens. Then the unexposed paper on which you wish to make the final print is put in the enlarger negative carrier, emulsion side down. Next, turn on the photoflood lights which illuminate the easel and the surface of the paper negative, to effect exposure of the printing paper in the negative carrier. After sufficient exposure, the paper is removed from the enlarger and processed in the usual manner.

The proper exposure depends on the actual working conditions and will, of course, have to be determined by a few test-strip trials. If only a few prints are to be made by this method, photoflood lamps in reflectors to illuminate the paper negative are satisfactory, but a more suitable lighting arrangement can be secured through the use of a set of copying lights which should preferably be removable when the equipment is to be used for the customary enlarging procedure.

THE CHOICE OF FINAL PRINTING PAPER

Proper selection of the paper surface and the emulsion type has a great influence on the acceptability of paper-negative prints. If possible, the choice of the final printing paper should be governed by two things: the emulsion should be of the warm-tone type, such as Indiatone; and the paper surface should be rough, such as Fabric. When projected upon a rough matte paper, the grainy texture created by the printing effect of the paper stock tends to be broken up or masked by the small surface irregularities of the paper surfaces. In connection with this matter of the general appearance of the final picture, although individual tastes will vary, it is suggested that the prints be toned in some formula that will produce reddish, purplish, or sepia tones.
PHOTOGRAPHING SHELL STILL LIFES
Ruth Bernhard
Professional Photographer, New York City

There is, of course, a great deal more to the photography of still lifes than lighting technique—but lighting is extremely important. And a master of interpretative lighting here tells some of the basis of her work, in connection with one of the most fascinating of all still life subjects—the seashell.

Of the many manifestations of nature among which we live, I am particularly preoccupied with seashells, both from the point of view of a collector and photographer. Apparently few people have "discovered" seashells. That these intricate structures are the simple creation of the animals within them, gives their form and beauty more significance. The animals, or mollusks, as they are called, born complete with the shell, are constantly building on and enlarging it to accommodate their growth. Thus this complicated structure is continuously being worked upon by the living organism within.

Most people who casually pick up shells on the seashore give little thought to the animal itself, as the shells washed up on the beach are mostly uninhabited. The brilliance of color, and sharpness of contour and texture disappear when the animal dies, leaving the shell shiftless, to be tossed by the waves and ground against rock and sand. These shells are beach-worn. While the animal lives, it keeps its shell in perfect repair. Any injury it receives is skillfully mended and the shell structure retains its perfect form and original beauty. Many casual beachcombers have become passionate collectors of these exquisitely beautiful things. The earnest collector will find it a thrilling experience to dredge in deep water, sift and dig in the sands at low tide, and search out the almost imperceptible mounds under which they conceal themselves.

In my own case I have happily found a two-fold expression in collecting and photographing seashells. I find in them delicacy and strength, the extravagant and the frugal, the functional and decorative in unlimited scope. To me they embody time and space, immeasurable and fathomless.

PHOTOGRAPHING SHELLS

The problem of photographing shells is no different from that of photographing leaves, flowers, or any small still life. However, I am not ready to take the picture until I have made myself thoroughly familiar with every aspect of the subject. I study the form, color, and structure, and become engrossed in it to the exclusion of everything else until I practically identify myself with it. Only then am I ready for the setting.

In each specimen I emphasize by lighting, and background the most interesting characteristic as I see it. For backgrounds and necessary props I use very menial scraps.
THE COMPLETE PHOTOGRAPHER

The characteristic of this shell is its luminous white inside and its shiny exterior. Both of these qualities have been brought out by careful lighting of this and that which I make to suit the purpose, but my favorites are silks, sand, driftwood, cork, silver paper, and “Chinese potato noodles.” I use small lights and reflecting mirrors. I might mention, however, that I have no general rules or set technic. The most necessary asset, I strongly believe, is a depth of feeling and understanding for whatever is to be photographed. Learning as much about the subject as possible brings greater power of expression through it. To lose oneself in the beauty of it can make it a most important experience.

LIGHTING

Before photographing I devote much thought and time to lighting. I like to use small and not too powerful spotlights in combination with shaving mirrors—the five and ten cent store variety. I seldom direct the light directly on any surface but prefer to use the edge of the light. If hard shadows interfere with the delicacy of design, I use diffusing screens even on the mirrors. With little and soft light, and careful planning, the beautiful plastic form of the shell can be recreated.

Those who have not had experience or do not have technical knowledge of photography might become discouraged when attempting their first photographs of shells. It is easy to be carried away by their unbelievable color when working in black and white, and lose the effect of the plastic structure. Color photographers, however, really should find photographing shells a paradise. Fine composition is extremely important when using color films. A general rule to follow is to keep the subject set-up as simple and clean cut as possible. Avoid using vari-colored shells when the close-up single shell will give the most effective results. Any result, of course, depends upon practice, and no amount of theoretical knowledge can take the place of hard work. Doing a thing over and over again until the visualized result is attained is not tiresome to those to whom the ultimate goal is a fine picture.

Perfect shells make fine still life specimens—but so do some which are beach-worn. The skeletons of these shells are given artistic form through an interesting interpretation—greatly aided by lighting. The soft edge of the spotlight has been used to pick up the outlines of the shells.
Before considering the uses of colored lights in color photography, it is advantageous to study white light. When Sir Isaac Newton first discovered that a single beam of white light directed at a prism evoked the complete spectrum, he laid down a principle which acted as a foundation for all color work—that white light is composed of a mixture of distinct colors which cannot possibly be converted into one another. From this statement it is a simple step to the realization that all light has color. Before a photographer attempts to use colored screens to achieve special effects in color photography, he must have a fairly complete understanding of the color values in natural and artificial light.

COLOR VALUES

Sunlight, the source which most artificial light apes, has a high yellow intensity. Because it is the single natural light powerful enough to use in color photography, it becomes the easiest light to use and produces the best results in unskilled hands. When shooting color pictures in sunlight there is no urgent need to weigh color balance. The highlights in a sunlit picture are always on the warm side, the shadows are conversely cool, in direct obedience to the law governing complementary colors. It is in trying to achieve a sunlit effect without sun that the color properties of artificial light become important.

It is not always necessary to use a yellow screen over a lamp to simulate sunlight. Ordinary Mazda lamps, not especially balanced for color, are high in yellow intensity. If the sunny feeling needs exaggeration, a yellow cellophane or cheesecloth screen in front of the Mazdas will turn the trick.

Why then don’t all pictures made indoors with this colored lighting give a true sunlit effect? There is a simple explanation. The photographer wasn’t as wary as he should have been. He studied the highlight side of the picture and let the shadows come as they may. The result was that the shadow side of the picture picked up some of the warmth that belonged to the highlight. Most photographers recognize instantly that something is wrong with a picture in which this phenomenon has occurred. It is vaguely disturbing, but the cause is not easy to detect. A study of the shadow area in a picture that displays this flaw will bring to light colors on the warm side of the spectrum, not complementary to those in the highlight area. Flouting the laws of color balance in this way produces color photographs that are displeasing solely because of a distracting element that not one person in a thousand can name, but anyone can feel.

REFLECTIVE VALUES

Even when a photographer is aware of the importance of cool shadow areas as opposed to warm highlights, his pictures may reveal this fault. He has plenty of things to blame in preference to his own carelessness. Therefore you will hear that the fault lay in the lights; perhaps they were too old or too new, or just defective. Or he might insist that the films were defective, a favorite scapegoat, or the processing of the films was negligent. Because a photographer cannot process his own Kodachrome films, the Eastman Kodak Co. has been taking a lot of unjustified blame for color inaccuracies. Actually studio walls cause more color trouble than any weakness in material or processing, or because of defective bulbs.
Because a wall may not be in the picture area, don't underrate its reflecting value. A wall several feet away from the subject matter can kick plenty of color into the shadow side of a picture. If the wall is a warm color, this light bounce in color can ruin your picture. Unawareness of familiar objects such as studio walls can play havoc when working in color. I make it a practice to look all around my studio every time I am preparing to take a color photograph. I note the color and reflecting power of every wall and object. If this seems unduly cautious, let me tell you that before I began the practice, I found warm colors sneaking into the shadow areas of several pictures. Everyone had a different theory to account for it. We painted two walls and were on the point of building a tent around the subject matter out of pure desperation. Someone pulled up a shade and I detected a pinprick of light on a corner. There was the culprit—just a pile of mirror reflectors used on outdoor location jobs. They had been lying around for months. No one paid them any attention because they were familiar. Yet the top mirror had been reflecting the wrong colors into the shadow areas of my pictures.

A correct estimate of the color values of the walls of your studio before you shoot can make them an asset instead of a liability. If it is a warm-colored wall that is the offender, by training a blue light on it you can cool it off as effectively as a cold shower. The reflected color may then make the shadow area cooler than intended, without harming the picture.

**PSYCHOLOGICAL EFFECT**

The psychological effect of color can be intensified through a knowledge of the color values of natural and artificial light, with or without colored screens. In highly special cases, a warm shadow area is not only permissible, but desirable. Heart throb pictures, Valentines, and fire photographs are instances. Here you must watch and doctor your walls with colored lights for the opposite purpose—to prevent cooling off the shadows.

Although few photographers today use Cooper Hewitt lamps, I keep some around for color shots. They have a blue intensity that is precisely right for a certain psychological effect—when not used too close to the subject. To achieve this effect without detection, I blend the cool blue light through the other color-balanced light as part of the general illumination. It produces an ethereal other-worldly effect obtainable to such a degree by no other means of lighting. To play up traits of personality such as selfishness, superficiality, or calm reason, to emphasize the cooling properties of a drink or a cold platter, this all-over Cooper Hewitt tinge is invaluable.

To create the opposite psychological effect in color, you can use a comparatively small Mazda floodlight in place of the Cooper Hewitt. Veil the lamp with an orange-yellow cover of cellophane or cheesecloth to intensify it. It warms up the entire picture area, and almost defies detection. In no case should the color you use to create a reaction constitute more than 10 to 15 per cent of the general illumination. By using these lights with special color values as all-over illumination, you avoid the problem of incorrectly balanced shadows.

**COLOR TEMPERATURE**

Artificial light today is balanced for Kodachrome, separation negatives and separation cameras. The 3200 Kelvin bulbs, used almost exclusively for color work indoors, have an almost perfect balance. They are high in blue intensity, but because of accurate balance to the mediums most in use, this blue becomes normal light.

The contrast between Kelvin 3200 and ordinary Mazdas used in home lighting or for black and white photography, can produce color without an added color screen. If there is a table or floor lamp in the picture, it is a simple matter to substitute a regular Mazda bulb for a 3200 Kelvin bulb in the lamp socket. This gives the warm glow of lamplight without artificial screening. If you should want the yellow glow intensified, you can wrap the bulb loosely in yellow cellophane and cover it up with the shade. This so intensifies the yellow that it becomes an important accessory. If it is not watched carefully, however, its aggressive color will assume an importance you did not intend, and may throw the picture out of balance.

(Continued on page following insert)
Two lights were used for making this colorful picture. The lights were placed on each side of the girl’s head inside the room.
SLEEPING BEAUTY (above)  
DUDLEY LEE

Here is a typical indoor color photograph which can be made by anyone. Look for the casual and familiar scenes within your own home for some of the most interesting pictures.

OUTDOOR PORTRAIT (right)  
EARL THEISEN

The relative intensity and position of the outdoor light was very carefully controlled to get this beautiful model's portrait. Taken for Look Magazine.
This illustrates the use of colored lights in color photography, as described in the accompanying article by Victor Keppler. The red illumination in the firelight was obtained by using red and orange cellophane over a flashbulb.
A cool character study was deliberately planned by flooding the subject with an old fashioned long tube Cooper Hewitt light.
Various colored light sources projected these colors upon a screen between the camera and the model. All the lights were balanced to give the same exposure except the blue which was doubled to give the white lighting effect outlining the figure.
The cut-out of an old fashion print was enlarged and placed in the foreground to contrast with the feminine side. This color illustration was made to feature beauty products for men. From Harper's Bazaar
The yearly riot of autumn color can be portrayed only with color film... as in this simple outdoor photograph.
COLORED LIGHTS IN COLOR PHOTOGRAPHY

EQUIPMENT

To add color to photographic lights the best materials are cheesecloth and cellophane. The large range of color in cellophane as well as the possibility of mixing the colors through the use of two sheets of cellophane make it a handy instrument. But if the color you are seeking is subtle, it is preferable to go to the extra trouble of dyeing cheesecloth to the shade you desire. Any colored screen worthy of use must be either big enough so none of the original uncolored light can escape onto the picture content, or it must be close enough to preclude this possibility. Small screens can be fitted into the slot in front of a spotlight.

Another method of using colored lights is through reflection. Cardboard or wall paper in solid colors can be pasted on small flats and used as color reflectors. By throwing ordinary lights on them you can reflect the desired shade wherever you want. The color obtained in this way is softer and more subtle.

The system of reflecting color through the use of backgrounds works just as well in reverse. When I have a large single color background I use an ordinary white flat. By using colored screens in front of the lights trained on the background, the effect becomes luminous and transparent. It has the added advantage of reflecting the colored light back on the subject and providing a color edge along the figure or still life.

If you are doing a portrait of a person at home, colored screens are imperative to change or provide the desired color background. Suppose the sitter has a favorite gown which clashes with the color of the living room walls. None of the other rooms is large enough to work in. If the wall is blue, you can make it green by throwing a yellow screened light on it. A heavy red screen would turn that cool blue wall into a warm purple. A white or cream wall can be changed to any color you prefer by means of colored screens. By a little experimenting, you can discover the best possible background color. But don’t forget to watch your shadow areas for a possible intrusion of warm tones.

Colored screens are also used to provide an auxiliary highlight. If you want the highlight on the warm side of the picture, use a red or orange screen. For the cool side, blue or green screens are advisable. A better, if less simple, system of achieving the same effect is to throw the colored light on the side walls or back rather than on the subject. A colored screen trained on the subject is a simple matter to detect. It calls attention to your technic instead of your subject matter.

SPECIAL EFFECTS

The most fertile field for using colored screens is in the special effects realm. To simulate the warm glow of a fireplace or an outdoor fire, colored screens are essential. The ordinary flashbulb should be used for general illumination, just as usual. In the fireplace, you can conceal anywhere from one to three flashbulbs covered with red cellophane. The number to use depends on whether the fireplace lighting is auxiliary or basic light. The reason I prefer flash lighting for the entire picture is because of the manual difficulty of synchronizing the flashbulbs and closing the shutter. It can be done with flashbulbs only in the fireplace and mazdas for other lighting. In this case you expose for the normal reading of the amount of mazda light you are using. Just before you are ready to close the shutter with one hand, explode the battery leading to the flash arrangement with the other hand. But unless the operations are performed in rapid succession, the subject will move and a double image will result.

CONCLUSION

If these hints lead you to believe that I advocate mixing lights, you are entirely correct. The popular taboo against mixed light arises from the average photographer’s ignorance of the color properties inherent in all photographic light. If only you remember that everything has color except black, you will never mix lights at random.

Let me warn you finally that, legitimate though they may be for special effects, colored screens are as tricky and dangerous to use as dynamite. In inexperienced hands they may well backfire and blow your photographic reputation to shreds.
SPECIAL LIGHT SOURCES
Don D. Nibbelink, A.R.P.S., A.P.S.A.

Sunlight and the regular tungsten illumination are photography's most common light sources, of course. Yet there are many other fascinating sources of illumination open to the photographer if he will try them. Moonlight, for instance, and candlelight or fireworks. Street lamps, auto headlights, street signs, and searchlights are a few more of the unusual light sources covered in this article.

All photographs from Agfa Ansco unless otherwise credited.

ANY LIGHT WHICH is capable of illuminating an object for visual examination may be used to take a photograph. Photographers customarily think the only usable sources of illumination for picture taking are either daylight or artificial illumination by means of flash or flood light. However, there are a relatively large number of excellent light sources which are often overlooked for capturing unusual pictures or for supplementing customary illuminants. A few examples of these "unusual" lighting sources include fluorescent light, candlelight, fireworks, moonlight, and even the light from an automobile's headlamps. These are discussed later in the article.

EQUIPMENT

The work can be accomplished satisfactorily in a majority of instances by either a miniature or folding type of hand camera, together with a tripod, a cable release, and a sunshade.

Although most of these pictures will be taken at night and the use of a sunshade may seem paradoxical, it is nevertheless necessary. A sunshade will often help to keep extraneous light from nearby street lights, for example, from striking the lens directly and resulting in the condition known as lens flare, which is caused by light reflections from one air-glass surface to another in a multi-element lens. This condition may detrimentally affect the picture by causing fog, or, in extreme cases, geometrical patterns of light on the film.

STREET LAMPS

Strange as it may seem, the most common illuminants found outdoors at night—the street lamps—are capable of yielding photographs of great pictorial beauty, as well as furnishing ample illumination for even the straight type of record picture.

Although satisfactory pictures may be taken by means of street lights at any time throughout the year, such pictures are particularly effective after rain or during the winter when the ground is covered with snow. In the former instance, reflections are often added to the picture which enhance its interest; and in the latter, snow frequently helps to illuminate by reflection what would otherwise be black and empty shadows.

It is a common error to include the street lights themselves in the photograph. While this occasionally can result in the desired type of picture, it is the exception. If the lights must be included in the camera's field...
of view, it is advisable to minimize the number of actual light sources. If this is not done, the finished print will present a very disconcerting appearance because of the many distracting brilliant highlights. Should it become desirable to remove or to minimize the effect of an objectionable street light, this may be accomplished with comparative ease when the print is being made.

A technic which is very helpful in using street lights at night is to place the camera in such a manner that the rays from the street light do not shine directly in the lens. This may be easily accomplished by "hiding" the light behind a telephone pole or an overhanging branch of a tree, etc. Because the illumination from a street light is of an extremely directional nature, it is necessary to reduce, if possible, the tremendous contrast range between the extremely brilliant light and the inky black shadows of the night. By selecting a camera angle in the manner described above so that the brightest object in the scene will not be the light source itself, but rather the subject illuminated by the

TWILIGHT PICTURE. Notice the balance between the evening sky and the artificial lights in the building. Exposure control reduced the flare possibilities of the nearby street lamp.

STREET LIGHT. An example of "hiding" the light source. Because of the long exposure, an unshielded street lamp would have fogged the film hopelessly.
light emanating from the street lamp, this technic can often provide interesting halo effects, particularly in a foggy or misty atmosphere.

There is a psychological, as well as a photographic, reason for preventing the direct rays of a street light from striking the camera lens. Should this contingency occur, the street light in the finished print would give the observer a psychological impression of looking at an extremely bright light source, even though the light is represented in the photograph only by a piece of white paper. Since the eye has a natural tendency to avoid looking at brilliant light sources for any prolonged length of time, the street light in the photograph will actually cause the observer to squint at the picture or wish that he might view the scene from a different vantage point.

STORE WINDOWS, SIGNS AT NIGHT, AND LIGHTED BUILDINGS

One of the secrets of successful pictures of store windows and other general street scene subjects, which to a large extent furnish their own illumination, is the careful selection of the time of evening when the photograph is to be made. In pictures of this type, as is true of many night-time photographs, the outstanding problem is an excessive contrast range, particularly if lights are to be included in the picture, as in the case of a theater marquee or a street scene which is brilliantly lighted by many windows and signs.

If the exposure can be made in the evening before the twilight has diminished completely, the combination of the artificial illumination and the very weak daylight will be exceptionally pleasing. This is true not only in black-and-white photography, but also in color photography. If, for example, a color film were exposed to a neon sign, a comparatively short exposure will be given, but one which would inadvertently result in correct exposure only for the sign while all other objects in the picture would be tremendously underexposed. By using the evening-daylight combination, suitable shadow detail can often be obtained. The “proper” balance for a particular subject may exist for as short a time as ten to twenty minutes, but by scheduling the evening’s pictures according to the decreasing amounts of daylight, many photographs can be taken in this manner.

AUTOMOBILE HEADLIGHTS AND SEARCHLIGHTS

On one of the trips of a large dirigible to Lakehurst, N.J., a group of news photographers tried unsuccessfully to photograph the giant airship at its mooring at night by shooting all the flashbulbs in their possession while their cameras were set for a time exposure. The attempt was not satisfactory, but the problem was solved by having one of the airport attendants play a powerful searchlight back and forth on the airship while the newsmen’s cameras were again set for a time exposure, and the picture was taken in this manner.

This same principle may be applied to automobile headlights, small searchlights, and even flashlights if no other photographic illuminant is available, when a night photograph is to be taken. It may not always be necessary to “paint” the object with the light as was done in the above instance—although this has the advantage of directing the light exactly where it is most needed. Care must be taken, however, that the “painting” is accomplished in a smooth manner so that no “hot spots” of uneven lighting will result at any time.
SPECIAL LIGHT SOURCES

In using automobile headlights, interesting pictures may be taken either of a moving stream of traffic, by means of a prolonged time exposure, or of a specific subject. In the latter instance, it is usually advisable to elevate the rays of the headlights to “high beam.” This will help to prevent the foreground from being excessively overexposed since a directional light source of this nature falls off in intensity as the distance from the light increases.

FIREWORKS AND LIGHTNING

Fireworks and lightning can be discussed together because both require approximately the same photographic technic. To take a picture of lightning at night, for example, the camera is placed on a tripod and is pointed in the general direction of the lightning. The shutter is opened by means of either a time or bulb exposure setting, and is closed only after a continuous chain of lightning has flashed across the sky and in so doing has exposed the film. It is entirely feasible to leave the shutter open so that a series of lightning flashes may be recorded on one film. This often results in a photograph of more artistic merit than would a picture of a single flash. It should be kept in mind, however, that there is a limit to crowding a number of either lightning flashes or fireworks displays onto one film beyond which a confused mass of light paths will result.

As might be expected, the form and intensity of aerial displays, as well as the selection of suitable foreground objects which may appear as silhouettes against the night sky, have much to do with the success of the picture. Since these factors are often so unpredictable, it is recommended that a series of exposures be made, selecting the most fortunate grouping for the print which is to be the final one.

FIRES

Fires—regardless of whether they are small bonfires, fireplace fires, or actual conflagrations—can furnish excellent photographic subject material. Particularly with the larger fires, it is possible to make instantaneous exposures or even motion pictures if a sufficiently fast lens-film combination can be employed.

There is one general recommendation in connection with firelight photography. It is a good idea to include some form of reference object in the scene so that the observer will have no difficulty in knowing the correct magnitude of the fire. This may be accomplished by silhouetting people around the fire or including in the foreground a fire truck or some other piece of fire-fighting equipment if the fire is of the serious variety.

MOONLIGHT

The effect of moonlight pictures can often be more readily achieved under actual daylight conditions than is generally realized. Professional motion picture studios use infrared film as one technic of producing moonlight photographs. Another method is purposely to underexpose a scene, such as one containing specular sunlight reflections on the water, and overexpose the picture when the final print is being made. However, pseudo-moonlight notwithstanding, it is possible with little difficulty to take beautiful pictures by actual moonlight either of the moon itself or of objects which are illuminated by moonlight.

This latter type of picture is best suited for snow-covered subjects and is perhaps most easily taken during a full moon, with, of course, a long (from ten minutes to a few hours) time exposure. The results are only slightly different from pictures secured under
daylight conditions, with the exception of more diffused shadow outlines due to the change of the relative position of the moon to the earth during the exposure. However, it is difficult to produce realistic pictures in which the moon is included in the scene other than by actually photographing the moon. If this is done, it is advisable to make exposures of less than ten or fifteen seconds in duration or the moving moon will appear to be elongated.

This movement may be avoided by two methods. The first involves a double-exposure technic in which an exposure of approximately five seconds is given to the entire scene, including the moon. The shutter is then closed until the moon has traveled completely outside the field of view, and the second exposure of several minutes is given to record more completely the remaining details of the picture.

The second method is similar to the one previously described except that the final moonlight picture is a composite from two negatives, one of which contained a short-exposure image of the moon and the second a long-exposure image of the remainder of the scene. Often the moon will appear to be disappointingly small in the photograph, but this second method can remedy the difficulty through the use of a telephoto lens for the moon exposure in order to enlarge the image to the desired proportions.

FLUORESCENT LIGHTING

Fluorescent light is coming into greater prominence in photography as an illuminant closely comparable to the desirable daylight, yet capable of being better controlled. The light is produced by a substance known as a "phosphor," coated on the inside of the long glass tube, which will emit light when subjected to the action of ultraviolet rays. The ultraviolet radiation to excite the phosphor is generated by electricity passing through mercury vapor inside the glass tube.

In addition to the advantage of approximating the color quality of daylight, fluorescent lighting units emit very little heat—a fact which portrait subjects appreciate. Also the efficiency of these lamps is high and they require comparatively small amounts of electricity to operate.

As might be expected, there is a slightly different technic of taking pictures—lighting, exposure, development—by fluorescent, as opposed to tungsten illumination. Generally there are also small differences in color rendition between the two types of lighting units, such as the slightly lighter rendition of blue eyes with fluorescent light, but these differences are so small as to be practically disregarded by any but the most critical photographer.

OTHER GASEOUS DISCHARGE LAMPS

In addition to neon signs, one of the most common types of gaseous discharge lamps in use as a light source in photography is the mercury vapor lamp. This lamp has many practical applications as a studio lighting unit.

Due to the fact that the light given off by gaseous discharge lamps in general is not evenly distributed over the entire visible spectrum, they are not suitable illuminants for color photography. However, they do find numerous applications in the photo-mechanical reproduction processes, in projection printing, blueprinting, exposing pigment papers, etc.

CANDLELIGHT, LANTERNS, AND MATCHES

Although satisfactory pictures can be made by illumination furnished by candlelight, kerosene lanterns, or matches, by far the most successful photographs utilizing this lighting include the light source in the picture.

A portrait of a person lighting a cigarette with a match can be made with no supplementary illumination, provided that a fast lens and a fast film are used. Kerosene lanterns or other types ofwick burners often make desirable "props" in either exterior or interior scenes.

Candles, as a photographic light source, abound in pictorial possibilities. Candles can be used to illuminate entire interiors if necessary. They are attractive adornments for birthday cakes and other celebrations such as inside of a jack-o'-lantern for Hallow-e'en pictures.

The technic of photographing candles allows several different methods to be used to
SPECIAL LIGHT SOURCES

good advantage. For example, it is a comparatively simple matter to control the size of the candle flame by varying the amount of exposure. The flame may be only outlined by a short exposure, or the same candle flame is capable of producing a decided halo effect by prolonging the exposure. Of course, any intermediate effect can be obtained.

It is difficult to recommend any specific exposure to produce a certain type of candle flame since this will naturally depend on the size of the candle, and many other factors. A good thing to keep in mind, however, in all pictures of this sort is that any deviation from normal exposure should tend toward overexposure rather than on the side of underexposure.

If a picture is taken in which both candle-light and supplementary artificial illumination is used, the two types must be balanced in intensity. If this is not done it may be found desirable to double-expose the picture without moving the camera between exposures, so that the general over-all illumination comes from a few well-placed floodlights. The candles present would then be lighted for only a small portion of the total exposure so that they will be suitably outlined, rather than appear as objectionably bright areas of light.

INCANDESCENT METALS

Industrial pictures offer many opportunities to the alert photographer to take unusual pictures.

Usually incandescent metals furnish enough light so that supplementary illumination is not necessary, but of course, this depends on the actual conditions under which the picture is taken. An exception is sometimes found in photographing a welder where the intense brilliance of the oxyacetylene flame represents a great photographic contrast to the black face shield worn by the operator. A more satisfactory picture can be secured if the figure is given sufficient separation from the tones of the background. Incidentally, it is advisable to shield the direct rays of the flame from the camera lens, not only to avoid the possibility of lens flare but also because the light “halo” is actually more pictorial than is the flame itself.

CANDLELIGHT. Here is a fine contemplative portrait made entirely by candlelight. Notice the soft modulations of the face, the result of this unusual light source. A whole series of interesting photographs could be made by the use of candlelight only. The photographer who constantly strives for new effects is the photographer who will succeed.

INCANDESCENT METAL. Light from this molten metal was enough to illuminate the entire scene—taken with a bulb exposure. Supplementary light would, in this case, have spoiled the dramatic effect by illuminating many surfaces which would have detracted from the dominant focal point of the hot flowing metal.
LIGHTING WITH HOUSEHOLD LAMPS

When special photographic flashlamps and floodlight bulbs are not available, the amateur photographer will find that ordinary bulbs, such as are used in every home, can be a fine source of photographic light. Pictures in both black and white and in color may be taken indoors by the light of tungsten bulbs of from \( \frac{1}{60} \) to 300 watts; and with the use of extra fast panchromatic film, it is possible to take short time exposures with the box camera and hand-held snapshots with lenses of f/4.5 or faster.

The following table was computed with an extra fast pan film such as Kodak Super-XX and paper reflectors like the Kodak Handy Reflector. There are many variables in indoor lighting and this table is given only as a guide. The color of the walls and reflective quality of the ceiling, for instance, will make a difference in the exposure. Variation from the type of film and reflector given above must also be taken into account. Also remember that because of the inverse law of light, a lamp which is twice the distance from the subject will have \( \frac{1}{4} \) the effectiveness.

The lighting units can be arranged in the same way as is usual for photofloods. For instance, it is a good idea to have a main light and a fill-in light in about the ratio of 2 to 1. The strong one may be a 200-watt lamp to balance a weaker 100-watt lamp at an equal distance. This is the arrangement as shown in the diagram below, where the camera light is at camera level and the side light is about 2 to 4 feet higher than the camera. If the two lamps are of equal strength, then the 2 to 1 ratio of main light to fill-in light can be maintained by varying the lamp-to-subject distance.

### Other Uses of Ordinary Lights

With Metal Reflectors. Metal reflectors can, of course, improve the effectiveness of home lighting units and their use is recommended.
In the above arrangement, the lamps in reflectors are at one side of the subject and somewhat higher than the subject level. The shadows are filled in with reflections from a projection screen or white sheet which is placed as shown. For such a set-up, using extra fast panchromatic film, the exposure would be approximately:

<table>
<thead>
<tr>
<th>Lamp-to-subject</th>
<th>Lens opening</th>
<th>Exposure in seconds for 2 lamps of:</th>
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<tr>
<td></td>
<td></td>
<td>100-watts</td>
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<td>f/4.5</td>
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<td>5 feet</td>
<td>f/3.6</td>
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</tbody>
</table>

* Intermediate speeds, not usually found on cameras, are not given. To find the speed to use, calculate the speed halfway between the two given. Two 150-watt bulbs at f/4.5, for instance, would call for a speed of about 1/40 second.

With Movie Cameras. With extra fast panchromatic film, it is possible to make close-ups with home lighting lamps and a table of Cine-Kodak (16 frames per second) exposures is given below. This table is based on use of Super-XX with Kodaflectors and a sheet reflector.

Use With Color Film. Modern color film is extremely slow in comparison to black and white film and its use with regular household lamps is not recommended because of the necessarily extended exposure. Where speed is not a factor—as in still life, for instance—Kodachrome pictures can be made indoors. A Wratten 78B filter is necessary to correct the color quality and the following exposure may be taken as a guide: When two 200-watt lamps are used in paper reflectors with the top light 2½ feet from the subject and the front light 4 feet from the subject, the exposure time on Kodachrome with a Wratten 78B filter is 1 second at f/2.

Use of Regular Home Lighting. For ultra-realism in home photography, pictures may be taken with regular home lighting units—table lamps and bridge lamps, for instance. The exposure for this type of lighting varies with each type of lamp and shade and no set rules can be laid down, of course. It is suggested that lamps totaling at least 350 watts be directed on the subject and the following is a guide, where home lamps are used without reflectors and where the exposure is made on Super-XX film.

<table>
<thead>
<tr>
<th>Average lamps-to-subject distance</th>
<th>Lens opening</th>
<th>Exposure in seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 feet</td>
<td>f/4 or f/4.5</td>
<td>1/10</td>
</tr>
<tr>
<td>6 feet</td>
<td>f/3.6 or f/6.3</td>
<td>1/5</td>
</tr>
<tr>
<td>6 feet</td>
<td>f/11</td>
<td>1</td>
</tr>
<tr>
<td>8 feet</td>
<td>f/4 or f/4.5</td>
<td>1/5</td>
</tr>
<tr>
<td>8 feet</td>
<td>f/3.6 or f/6.3</td>
<td>3/4</td>
</tr>
<tr>
<td>8 feet</td>
<td>f/8</td>
<td>1</td>
</tr>
<tr>
<td>8 feet</td>
<td>f/16</td>
<td>4</td>
</tr>
</tbody>
</table>

This table is for portraits and light-colored interiors. For dark interiors, double the exposure.
DIFFUSED SUNLIGHT. Because the sun was directly overhead and diffused by overcast, the effect of quiet and rest was given in this picture. Lighting sets the mood and pace of picture ideas. Where the lighting is sharp and contrasty the subject is usually more active.

The sunlight in this picture was very low, but by backing away from the two persons, filling in with speed flash, and then developing for higher contrast, this effect was obtained.

A LIGHTING PICTORIAL
Earl Theisen
Staff Photographer, Look Magazine
All photographs by the author unless otherwise credited.

Lighting sets the pace and the mood of a picture, and by its control the story values of the picture are controlled. The eye naturally goes first to the more brightly lighted portion of the picture. Therefore, by raising the lighting intensity of any particular portion, we direct the eye there first. Likewise, cross-lighting has the effect of increasing the tempo of the photo, making it seem more active and giving texture and roundness to the subject matter to be photographed.

Due to the demands of photography for action and snapshot effect, speed flash has come into its own. With speed flash it is possible to duplicate practically anything done with studio lights, and do it faster with greater ease.
The photographs on these pages illustrate the results obtained from various lighting setups, including a few trick ones.

Campfire effects for instance may be obtained late in the day even though there is some sunlight, by running the extension cord with an open globe behind the campfire and placing the subject close to this globe. The highlights are then more intense and thus permit the photograph to be printed down darker for night effects. It is also possible in photographing pools of water at night to immerse the extension cord with globe under water where it may be fired without destroying synchronization. The light from this globe emphasizes the water pattern.

Aside from trick effects and the use of speed flash, however, it must not be forgotten that the sun is our greatest source of light, and that a wide variety of effects can be obtained through the use of natural lighting only. Included in these pages are a number of excellent photographs attesting to this fact.

The speed flash will overshadow that of the sun, thus darkening the background in relation to the foreground and giving the subject the effect of being posterish.

Backlighting with sunlight to play up the flying snow, also to give texture and pattern to the snow on the ground. Speed flash was used for shadow filler.
LAUGHING GIRL. This photo of the vivacious miss is an outstanding example of the type portrait which can be taken in sunlight. The exuberance, gaiety, and mood of the pose are carried out in the brightness of the outdoor lighting.

Photo, R. I. Nesmith Associates
Action photographs can easily be found at the beach. The above picture by Robert I. Nesmith was made with a 2¼ x 2¼ roll film camera and one flash bulb to illuminate the shadows. The strong sunlight was directed from the right and the flash was thrown in from just left of the camera position.

The two photographs at the right show a good use of full backlighting at the top and three quarter backlighting below. Charles P. Cushing has made many thousands of photographs for publications and he knows the importance of lighting his scenes correctly. A magazine or newspaper likes to get pictures which have a plastic quality, figures separated from backgrounds, and sufficient detail in foreground shadows to prevent dark ink blotches when reproduced. Also note that he has filled the frame of the pictures with the subjects.
OUTDOOR SHOTS. Left: Fine skin texture obtained through maintenance of proper balance of speed flash illumination to sunlight intensity. Center: The lift in this picture is the result of cross illumination with sunlighting. Right: Low sunlight with speed flash filler. The basic laws of lighting which have been presented in such articles by Ansel Adams, Edward Kaminski, Fred Archer, and Russell Holdag in this issue, all hold good for the photographer who is using a combination of flash and sunlight. Don't try to overemphasize the flash lighting and rival the sunlight. You may get an artificial result with conflicting cross shadows, making the observer too conscious of the lighting instead of the actual subject photographed.

SYNCHRO SUNLIGHT. (below): To give skin texture, the contrast from the highlights of the sun is held to a close balance by the distance of the speed flash to the subject in relation to the intensity of the sun.
YOUNG FARMER. A well-known news photographer and photographer of children has caught this young farm boy with a synchro-sun camera set-up. Notice how the one flash has filled in shadows, but has not upset the dominant role of the sun. Notice, too, how the big hat has kept the boy's figure from becoming lost in the corn stalks.

Photo, Bill Stahl
THROUGH TRAIN. There is dynamic action in this picture of a train speeding by a suburban station. With the center of the picture in the lower left corner, the lines of action seem to speed toward the upper left and lower right corners of the space. A fine framed shot in semi-silhouette.

Photo, Ewing Galloway
MEXICAN PEASANT. The large straw sombrero formed a perfect frame for this sunlight portrait of the Mexican. But it also would have cast the face in shadow if a flash had not been used to fill in. Photo, Andre de Dienes

MEXICAN MUSICIANS. Here again the large, light-colored sombreros worn by the subjects act as frames to separate them from the detailed background. Taken in sunlight with speed flash for filler. Photo, Andre de Dienes

KIWANDA POINT IN A STORM. More than anything else, it is the contrasty lighting of this photograph which implies the mood of the storm. The blackness of the crags in the foreground, contrasting sharply with the white turbulence of the waves, make this a classic outdoor shot. In taking the picture the photographer used a G filter over his lens. Photo, Irving B. Lincoln.

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These photographs show a good use of full backlighting. The photo at the left, by Bob Leavitt, uses a combination silhouette and fully lighted figure seen through the doorway. No front lighting is used in this case. The illustration at the right, by Jerry Cooke, was made by pointing the camera directly into the sunlight, with the tree trunks serving to shield the lens of the camera from the direct sunlight. The whole secret in making effective photographs is to use the lighting creatively and avoid a standard formula for every subject. This technic will insure the production of some unexpected photographs, packed with interest value.

Photos, Pix

In this picture of the Hopi Indian making bread, a remote speed flash was laid in the pit to give the effect of charcoal embers. This is synchronized with that of the photographer.

The hand in the right hand corner demonstrates the approximate position of the remote speed flash in this type of picture. Never point the speed flash at the camera.
(Right) PUSSY. This unusual photograph of a pussycat was taken with a single flash coming from the left at the precise moment the cat was released from his cage. Notice the single catch-lights in the cat's eyes.

Photo, Nina Leen-Pix

(Below left) To get this effect, the reading lamp was unplugged and a globe screwed into the socket. The reading lamp was then plugged into the camera. Right: Combination of speed flash and time exposure. The camera was set on a tripod and 30 second time exposure was made after which open speed flash was set off.
RITA HAYWORTH. High key speed flash lighting. To maintain a proper mood in keeping with the subject matter, the speed flash in this picture was made without reflectors so as to fill the room with illumination and raise the whole key of the lighting.
This effect was obtained by synchronizing the camera in the girl’s hand to the photographing camera. In this way, the camera that made the picture actually set off the globe in the camera held by the girl.

In mirror shots, like this of Loretta Young, the best effects are obtained by backlighting the subject’s face on the mirror’s side to give the picture in the mirror illumination.

Ann Sheridan. To get texture with speed flash, two sources of lights were used: one at the camera, another at right angles to the camera viewpoint. Both lights were synchronized to the camera.

Here again is another poster effect which was obtained by backlighting with remote speed flash. Notice how the subject stands away from the background. Notice too, the shadow on the wall.
STATUE OF LIBERTY. This striking photograph of the famous lady was taken at night with flood lighting coming from below.

Photo, Charles Phelps Cushing
VERTICAL CENTERLINES FOR ARCHITECTURAL SUBJECTS
F. S. Lincoln
Architectural Photographer, New York City

A well-known photographer explains in detail how to photograph architectural subjects successfully. This is one phase of photography which can often present a problem to both professional and amateur.

All photographs by the author.

In modern photography, particularly since the advent of the "shutterbugs" with their miniature cameras, angle shots up or down have become much in vogue. "The crazier the angle, the more fascinating the picture" seems to be the motto for some people, but when it comes to architectural subjects, we dislike to be given a conscious feeling that the building shown in a photograph is falling over.

Importance of Stability

It is fundamental that a building should rest on a firm foundation and if you want to make a good architectural upshot or downshot, it is important that you impart a perception of stability. This can always be obtained by making a vertical line of the building coincide with the vertical center line of the picture. If it is impossible to select an actual vertical line of the building for this purpose, then imagine a vertical line that could be drawn where desired, and use that.

An easy example to consider first is the exterior upshot of the office building shown in Figure 1. In this photograph, there is absolute symmetry of the right and left halves divided by the definite line between the two vertical rows of windows in the center of the picture. This line coincides with the vertical center line of the photograph. If it is impossible to select an actual vertical line of the building for this purpose, then imagine a vertical line that could be drawn where desired, and use that.

Try turning the picture to the right or left and observe how the structure seems to be falling over. Turn it back to the vertical position and the movement stops. The vertical position looks best because we feel more at ease with a solid foundation below, and here we have a distinct perception of it.

Indoor Subjects

For our next example, let's take an unsymmetrical upshot, the interior illustrated in Figure 2. At first glance, because the dark marble column at the right tilts so strongly to the left, one might not suspect that a line through the vertical center of the photo would coincide with a vertical line of the building, but it does. Check it with the edge of a sheet of paper and you will observe that the building line passes midway between two vertical sash lines. To be sure, this line is imaginary, but it could be drawn on the wall or on the glass so as to be visible. It is important to notice that the vertical line which might be drawn need not be continuous along one surface. Here, it starts from the ceiling and goes down the wall of the building, then along the window pane. Next, it jumps to the partition that covers part of the window, and continues vertically downward along it,
FIG. 2. An unsymmetrical interior, but note the vertical line down the center. Though the lines flow in various directions, the centerline maintains the balance of the picture.

and jumps back to the building wall again at the bottom of the photo.

The photograph of Figure 2 was taken with an 8 x 10 camera, on the groundglass of which a pencil line had been drawn through the exact center. In judging the composition, which ever way the camera was turned, this pencil line was made to coincide with or be very close to and parallel with some vertical line of the building. Then it was a case of balancing the light and dark areas of the photo to make an interesting composition. The result is a photograph that is easy on the eyes and the subject appears to rest on a secure underpinning.

The curved staircase shot of Figure 3 shows a difficult picture to compose on the groundglass. By relying upon previous experience with verticality of the center line, the task of photo composition was made much easier than otherwise. In looking at the image on the groundglass, there is often great difficulty in making a decision as to what looks best, but if you start off with the system explained here, there will be less wear and tear on the nerves. Notice in this

FIG. 3. Here again the vertical centerline gives symmetry to a fine and difficult shot which otherwise might have lacked stability.

FIG. 4. What might otherwise have been a photo of disconnected objects on a desk, becomes a picture of interest because of composition.
VERTICAL CENTERLINES FOR ARCHITECTURAL SUBJECTS

case that a vertical line through the center of the photograph coincides with one of the upright supports of the baluster rail near the top of the stair, and notice the coinciding again with another upright a little over half way down the stairs. Continue down further to the bottom of the photo and see that the vertical line goes right between two supports there in the deep shadow, one slanting slightly to the left and the other slightly to the right. Had there been another support in the middle between these two, it would have coincided with the photo’s center line.

Now let’s take a close-up, the desk corner depicted in Figure 4. Without our system in mind, we might wonder in making this shot just how to tilt the camera to make the most pleasing picture. Some people don’t even attempt to make their compositions on the groundglass, but they wait till the darkroom process comes along and worry about the composition there. That is not the best way because it is a makeshift process. If one does not have a precise and definite vision of his finished picture before it is taken, no amount of juggling in the darkroom can compensate for what might have been created at the time of studying the image on the groundglass.

There is no rule, of course, for choosing what real or imaginary vertical line of a building or room should coincide with the center line of the groundglass. By twisting and turning the camera, any vertical line in the field of view of the camera may be selected at will. Whether the chosen line is a suitable one or not for a good photograph depends entirely on the good judgment of the photographer. This desk corner shot holds together well because the various areas of light and dark are in good balance for eye appeal. An important adjunct of the feeling of this composition, however, is the coincidence of a vertical line of the subject with the center line of the picture. Here, this line is somewhat imaginary, but it could be drawn down through the center of the binding of the second book from the left on the top shelf, thence down through the left part of the radio, and along the wall very close to the right edge of the clock. If the desk were not in the way, this line would continue on down to the floor. Observe, however, that a vertical line on the front of the desk would also coincide with the photo center line if a line on the desk existed.

Next comes a harder subject to compose. Figure 5 is a decorator’s idea of a young girl’s room. This set-up was arranged in the hallway of the decorator’s establishment and in order to tell the story properly in a photograph, a downshot was decided upon. Other-
What to do when making a downshot with no obvious vertical lines to be seen on the objects photographed? Figure 6 is an example of such a case. The only obvious vertical line of the objects in the picture is the center of the lamp standard at the upper right corner of the photograph. Since this was not chosen to coincide with the center line of the groundglass during the composing, it had to be on a slant. Another line was the one decided on for coincidence with the center line of the groundglass, thus to make this picture have stability and not give the feeling that the dishes were about to slip off onto the floor. Before reading further, look carefully to discern what imaginary vertical line in the group of objects coincided with the centerline of the groundglass. All the dishes are round, but they all have vertical centerlines that are imaginary. Check for yourself and you will see that the centerline of the cream pitcher coincides with the center of the photograph. This is no afterthought or chance finding, but a matter of definite decision at the time the photo was made.

CONCLUSION

Here are six examples from a great many upsots and downshots in the author's files. It was only after years of experience and constant study that the system described in this article was established. Surely it is simple enough, but have you been practicing it consciously? If not, get out some of your own tricky angle shots and analyze them in the light of the theme of this article. Unless you deliberately wish to impart an irksome feeling in making any particular picture, do a little remasking to make it stand more on its own feet. Perhaps you'll wish you had more on the negative in order to add corner space in the re-tilting correction, but next time you can do better from the start.

Even if your photos are not strictly in the class of being architectural, it would be hard to make an upshot or downshot anywhere at all without including some objects which normally have vertical elements. For instance, most tree trunks are perpendicular to the ground; so are fence pickets, lamp posts, and growing stalks of corn. Compose your pictures while keeping their vertical centerlines in mind.
BIRD PHOTOGRAPHY
Sabra and Heathcote Kimball

The authors have made a special study of bird photography, and in this article they tell how to picture an unusual variety—in your own backyard. As in all phases of photography, the use of proper lighting is important.

All photographs by the authors.

Bird photography and field trips to distant sanctuaries seem to be synonymous. To get a high percentage of good pictures, it is better to go to some nesting ground or rookerie where particular species of birds abound; and it always is more exciting to have conquered almost unsurmountable difficulties in picturing a rare species of bird nesting on the top of a nearly inaccessible crag, or to wade waist deep through a muddy mosquito-infested swamp to find the nest of some marsh dweller. Of course this type of work means careful planning, considerable expense, much traveling and plenty of vacation time in which to take trips. But it is quite surprising what can be accomplished in bird photography almost in our own backyard.

For the past six years we have spent all our leisure time at bird photography and never have traveled further than fifty miles from our home to secure the hundreds of bird pictures in our files. It might seem that such a limited sphere of action would not provide enough situations to call upon one’s initiative or inventiveness, but such is not the case. No matter where the bird photographer may be, he can make use of all the “tricks of the trade.”

Basically, the subject divides itself into two classifications: first, that of rapid action or flight pictures, and secondly that of birds at rest—on the nest, perching, roosting, or feeding birds. Each needs a different camera. We own a Leica with 135mm telephoto lens, 4 x 5 Autograflex with 17-inch telephoto lens, and a 4 x 5 Speed Graphic with 6-inch lens. The miniature camera is the fastest to operate for flight pictures. If you are strong, a larger reflex mirror camera such as the Autograflex is excellent, but is quite awkward in

BLACK SKIMMERS. This unusual shot of skimmers in flight was taken in the mid-July sunlight with a Leica camera, 135mm lens, f/6.3, 1/500. The focus was just guessed. The authors have photographed over a hundred varieties of birds in the New York area and now have over 3000 negatives.
some conditions. For the resting pictures a larger camera with groundglass focusing should be used, and generally accompanied by flash equipment.

THE SET-UP

The easiest way to take bird pictures is to attract the birds to a spot of your own choosing. Instead of you hunting the birds, they seek you. This is accomplished by the use of feeding stations and bird baths, which should be near one another. We have three feeding stations fifteen feet outside the dining room windows. One is on the ground for the ground feeding birds; another is a narrow wooden tray fastened to an upright stick four feet high; and the third is a squirrel free-hanging feeding house suspended by a piano wire from the branch of a tree. Adjoining these is a bird bath which attracts some birds that won’t come to the feeders. Bird menus can be very elaborate, but we use mostly beef suet, sunflower seeds, mixed wild bird food, and doughnuts.

All the stations are filled daily except when we want to photograph. Then we use only one—generally the one on the upright stick—making sure that no tempting tid-bit is left on any of the other stations. A suitable set-up is built on the tray, as in tabletop photography—in spring, perhaps a piece of lawn sod with a pansy plant newly transplanted in it, or anything that seems appropriate to the season. A little food is scattered on the top. Five feet behind this is a background consisting of a piece of beaver-board four feet square that slides into an upright frame, the support of which is another upright stick planted in the ground. The board which is reversible is white on one side, and painted blue on the other, shaded from a darker blue at the top to a lighter blue below. This background is most important as it cuts out unwanted details of neighbors’ houses, bushes, garbage cans, etc.

The Speed Graphic on a tripod is placed four feet from the upright tray and as nearly on a level with it as possible. The tray must be narrow in order to have both the bird and scenic effects in sharp focus at this close distance. A twenty-foot cable release is run from the flash synchronizer through the dining-room window. A standing reflector is placed high at the side of the background and four feet in front of it to kill any shadows cast by the set-up or adjoining branches on the background, and another flash reflector is mounted on the camera higher than the tray.

The camera is prefocused wide open on the middle of the set-up, then stopped down to f/32. Two Wabash No. 0 bulbs or Press 25 are put in the reflectors which are fired in synchronization, and the shutter cocked at 1/200 second. No matter what the light conditions may be, or how tame or quiet the bird may seem, we always use the two flashbulbs and the speed of 1/200 for all black and white pictures. One fiftieth or 1/100 second is just too slow to stop the bird’s take-off when it is scared by the flash of the bulbs or click of the camera.

COLOR

We make only one exception to this, and that is when Kodachrome is used. To get correct color values with outdoor Kodachrome and a blue flashbulb, you must be content with 1/100 or even 1/50 of a second, and must open the lens a lot more. Here, as expense is quite a factor, we vary technic a little. We try to take pictures only when...
the subject and blue background are well lit by direct sunlight, and use only one blue bulb in a standard reflector slightly to the side and above the subject. In this position the bulb will throw any shadows down away from the bird and off the background. Then we try to wait until the bird is absolutely still before shooting. Otherwise, there is apt to be a head blur if the bird is feeding, or wing or tail blur from motions imperceptible to the human eye but duly recorded by the camera lens.

In this way we take many of our pictures right from the dining-room table while we are eating breakfast or lunch, and it certainly is most comfortable when winter brings its snows and biting winds to sit indoors and watch the bird activity outdoors at the feeders without having to be a cold part of it ourselves.

BIRD BATH

Some birds cannot be attracted by food but will come to a bird bath either to drink, dunk, or bathe. The same principles are employed here as for the feeding station pictures, except that the set-up cannot be varied and the pictures look more artificial. All will fall in the same category of “bird in bird bath.” But it is often a welcome adjunct to the feeding station, and if a few perching places are provided near the bath, you may get a sitting or preening picture of some species you could approach in no other way.

IN THE FIELD

For field work an easily portable place of concealment is an absolute must. It is even quite useful in your own yard when dealing with birds that are camera shy. After much perusal of bird books which suggested numerous types varying from an eighty foot steel tower erected at the site of an eagle’s nest to a wooden packing crate on wheels, we built our own blind. For land work, we used one of the camera tripods, a wire barrel hoop, a screw-in socket, two strips of wood, and a large piece of burlap. The two pieces of wood were nailed together at right angles in the middle and here the screw socket was fastened. These cross pieces were fastened to the wire hoop with staples and the burlap then sewed to the hoop in gathers. This made a circular tent open at the top and, when fastened by the screw socket to our tripod head, it is five feet high, six feet in diameter at the ground, and two feet at the top. The burlap was then sprayed with green paint shading it from darker green at the top to a lighter color further down and leaving the bottom half natural burlap. The bottom is held out with tent pegs and the fly front is fastened from inside with safety pins leaving an observation slit and one for

A rare action shot of a blue jay about to light on home feeding station, showing clearly the wing leather pattern of a bird in flight. The author pre-focused on the feeding station four feet away. Taken with Leica camera, 50mm lens, f/3.2, 1/1000 second, early afternoon sunlight then the camera lens. Other holes can be cut in the burlap as needed and the loose flap pinned open or shut as occasion demands. This is nearly invisible in the woods and is very easily carried as the camera tripod can be collapsed into a small unit, and the burlap is easily rolled up into a small bundle.

Unless dealing with very tame birds, the blind must be used for nest photography, in sanctuaries and rookeries, but always pitch it with the sun behind you. It can be further concealed by draping over it whatever native growth may be around. If the nest is on the ground or at tripod height, there are two methods of attack—using the camera in the
Blue jay perched on a feeding station in front of artificial backdrop. This was a synchro-flash daylight picture, taken at 5 ft. with Speed Graphic at 1/22, 1/200 sec. A Press 25 bulb was used. Similar setups can be devised for attracting the birds to convenient photographing position.

Snipe, or sanderlings, alighting on a narrow sand bar. This fine photo was taken with Speed Graphic in bright morning sunlight, f/8, 1/350 sec. Bird authorities consider this picture one of the best ever taken of its type, as it clearly shows the wing spread of a bird in almost every position of flight.
BIRD PHOTOGRAPHY

blind usually with a telephoto lens, or having the camera outside the blind with a long cable release or pull string going to the operator in the blind. We always use flash when the camera is outside, as often the nest is cleverly concealed in a deep tangle where no sunlight ever penetrates. If the nest is high in a tree, the camera on the tripod can be tied to the branches, and a long shutter release led to the blind at its base.

When entering rookeries always try to find a favorite perching place. Most of the birds will at first take alarm but will soon choose some perch from which to better observe the actions of the human below. Often this will be a tall dead tree silhouetted against the sky and the branches will be filled with a group of scary but curious peering eyes and craning necks. Set up the blind near this and conceal yourself and camera in it with only the telephoto lens sticking out. In all blind work better results will be obtained, if after everything is set up, one person hides himself in the blind, and another very openly walks away. The birds think all intruders have left and will soon ignore the inanimate tent. If activity is slow, the assistant can thrash around through the underbrush for a few minutes to again scare up the birds, and beautiful flight, lighting, and taking-off pictures from the branches can be made.

For birds of the beaches, marshes, and sandflats the most versatile blind is a watertight scow or sink-box remade from an old rowboat. Ours is six feet long, four feet wide, and ten inches high with a frame above the wooden part supporting a burlap cover just high enough so that we can sit upright. This we can paddle, row or tow anywhere and we use it either afloat, pulled up in a swampy marsh or right on the dry beach, and if the tide rises we rise with it and avoid a wetting. This happened once when we sat in the tent on a piece of drift wood and were so absorbed in our photography that we never noticed the tide rising until too late. This blind is painted olive brown with the burlap streaked green and with loops along the sides in which are inserted stalks of weeds, phragmites, and marsh grass for further camouflage. When photographing ducks, geese, or snipe we also use wooden decoys which are anchored in the water or placed on the sand near the box. As well as attracting birds to them, the decoys make excellent distance markers. By pre-focusing on different ones, you know exactly how many feet away each one is and when a bird in flight passes over one of these, you

Black-crowned night herons photographed in the top of a dead tree 40 ft. above photographer’s concealment in ground bushes. A 17-in. telephoto lens was used. Taken with Speed Graphic, mid-morning sunlight, f/16, 1/350 sec.
can more quickly make necessary camera adjustments for sharp focus. When using a telephoto lens, stop it down even further than you think advisable, because a bird in flight can cover distance very rapidly and very quickly flies out of focus. Then give the underexposed negative overdevelopment.

One other method of bird photography which is sometimes rather productive, is that of stalking. In the height of migrations in the spring and fall there will be certain days when every tree and bush will be alive with migrants. A flowering fruit bush often will have several varieties of birds feeding on the insects attracted by the blooms, and the birds seem to be so engrossed they do not mind a close approach. In May we have stood by a beach-plum bush taking pictures of several kinds of warblers only six feet away without their showing any signs of fear or alarm. We have also climbed fruit trees to photograph other larger species feeding in the blossoms right in front of us. One fall, we sat by a grape arbor watching more warblers eating overripe grapes not more than three feet away. However, occurrences of this kind have to be on good bird days, and unfortunately these are not very frequent.

Another stalking method is to use a boat or canoe. If it is allowed to drift with the tide or wind, and the person with the camera raised and ready sits perfectly quiet, an otherwise shy shore bird often will permit a close approach. We had one experience last summer with a green heron fishing along the banks of a creek. We took twelve pictures of him from a rowboat drifting along not more than ten feet away and finally almost touched him with the bow before we startled him into flight.

These general methods will be found applicable to bird photography no matter where one may go. Some localities may require minor improvements, but we have tried to give basic fundamentals which will produce satisfactory results with your neighborhood birds.
THE SCOPE OF ACTION PHOTOGRAPHY
Barbara Morgan

As the essence of photography is interpreting action, it is axiomatic that the photographer must know how to produce the illusion of action in a still photograph. Barbara Morgan, well known for action work, briefs the reader the history of action photography and gives a clear and concise description of its present day use.

The word and everything in it moves. Photography has outgrown the head clamps and is in stride and swing with this pulse of life.

Electrons whirl about their nuclei; a bomb hurtles a city block into rubble; grief redraws faces; a man and woman embrace; sun, moon, stars move predictably in their orbits; lightning strikes unpredictably; a boy runs with his dog; people go about their chores on all the curves of the planet.

Action equipment is at the service of action photographers to capture this and much more. Picture history from every war theater comes off the photo wires and rolls off the newspresses. The folks at home in farms and factories follow their men at war vicariously through pictures. Military strategy depends heavily upon photographic reconnaissance and aerial mapping. Seeing by camera through fog, under water, through a periscope, during aerial combat, in all vital areas simultaneously, more quickly, more accurately than the human eye, is part of the war job of action photography. Retaining the image unaffected by confusion, fear,

SWEET BETSY FROM PIKE WITH SOPHIE MASLOW AND P.L L BALES. Two climactic shots from a folk dance made with two speedlites at 1/10,000 second. Leg lift. (left). To emphasize the rather remarkable sculptural shape of their two bodies in this action the face has been silhouetted. A broad lighting used with the camera at about hip level. Her dark head increases the tipping balance of the figures. The lift (right). A great exhilaration comes during the peak of lifting and spring action. Photo, Barbara Morgan.
amnesia and all the subjective elements which make eye witness accounts unreliable, is the value of our medium in this most photographed war.

If photography is useful in war for death it can be still more useful for life. It can honestly show war ravages and be a tool in healing hates.

COMEDY ACTION FROM "STAR AND GARTER." In the perennial battle of the sexes a desire is not suppressed. Perfect timing and right shutter speed. Note the man's facial contortions are sharp while the girl registers shock with slight facial blur. Dingles on the hat vibrate and blur, yet hat and body are caught sharp.

Siphon squirt is not too frozen

Photo, Karger, Pix
The Scope of Action Photography

While the medium of action photography makes possible this undreamed participation in personal experience and world events, we must quickly remember that a photograph does not take itself. The photographer is no automaton. He is sympathetically alive to the least tremor of his subject in terms of cameras, lenses, lights, film speed, development and printing. His rapid reflexes couple the changing subject before him with a vision of the final picture. He does not passively shoot what is accidentally before him but anticipates, galvanizes, and rearranges to get the essence.

The best ones know how to inject psychological interpretation, how to get maximum power and beauty into their pictures by design, and how to build a shooting script for a complex subject and express it through a unified series. The action photographer brings to his work himself and his equipment in a fifty-fifty partnership.

The news photographers with their 4 x 5 Speed Graphics fitted with f/3.5 lenses and focal plane flash yielding 1/1000 second exposures indoors; the 2¼ x 2¼ medium miniature users aided by reflex viewing at 1/500 second top speed, with or without flash; and the 35mm miniature users with their 1/1.5 apertures and 1/1000 second or 1/1250 second exposures, with or without flash, are standard equipped practitioners today. Millions of amateurs have cameras capable of stopping usual action, while a few specialists have the speedlite's action freezing speed of 1/10,000 second. Action photographers in fields of research have especially designed cameras as tools of investigation, in astronomy, medicine, psychology and wherever human need and curiosity lead. This array of equipment has cost thought and patient labor. We are the fortunate inheritors of an interlocking progression of inventions, discoveries, and experimental practice brought to fruition by the efforts of many people in many countries.

The following chronology is a resume of developmental stages leading to the photography of action at its present level. For every name listed as inventor or discoverer there are actually many others who have done first rank or parallel work, who are omitted for lack of space. The intention in this list is to show how one invention furthers another. Muybridge, for example, was not able to do his work in animal motion begun on the slow wet plates until the faster dry plates gave him sufficient speed. Research goes on now as never before, accelerated by exacting demands. The ideal action equipment has yet to be developed.

Chronology of Highlights in Technical Developments Leading to Status of Action Photography As of Today

1832—Joseph Plateau, Belgian (studying "persistence of vision"), constructed the Phenakistoscope, a hand-rotated disk on which drawings showing a simple action cycle were spaced, with a slot between each drawing. When the disk was revolved close to a mirror the observer looking through the slots had the illusion of continuous action. This series of images blurred together and appeared to move. This phenomenon is due to the inability of our eyes to make speedy discrimination of rapidly changing images, and is called "persistence of vision." Understanding this law is important to high-speed photography and cinema and to anyone in a quandary over "blur" vs. "freeze." (See discussion under Shutter Speeds.)
Photo, Rejlander, From the Museum of Modern Art

REJLANDER, (left) one of the pioneers in photographing indoor unposed action made a series for Darwin's scientific investigations.

CARTIER, (opposite page) with artistic sensibilities, expressed the complete abandonment and fantasy of children playing in the ruins of homes...and has made haunting designs in both versions with a Leica

WEEGEE (below) has made a journalistic sequence of the fluctuations in a female hepcat's conversion from mere interest to ecstasy. The male hepcat remains fairly unmoved. Taken in a theater during performance of a swing band.

SERIES OF HEPCATS LISTENING TO SWING MUSIC, 1943
Photo, Weegee
CHILDREN IN SPANISH RUINS ABOUT 1934

Top photo taken before children sighted photographer. Bottom photo was taken after seeing the camera.

From the Museum of Modern Art

Photo, Henri Cartier-Bresson
THE COMPLETE PHOTOGRAPHER

1837—Louis-Jacques-Mandé-Daguerre—principle inventor of photography. Problems of action photography are indicated in the comparison of two photographs Daguerre made of the same street view at different hours of the day. Movement of light and shadow due to the time interval between the two shots completely alters the character of the place. A boot-black shining another man’s shoes is blurred in his action zone during the slow exposure.

1840—Exposure Time, Daguerreotypes, Computed for October to February. Eastern U. S. Summer months would be from 10 to 40 per cent less than shown in the table.

<table>
<thead>
<tr>
<th>Year</th>
<th>Weather</th>
<th>Sunlight</th>
<th>Exposure Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1840</td>
<td>Very brilliant, clear, deep blue sky</td>
<td>8:00 A.M.</td>
<td>15 minutes</td>
</tr>
<tr>
<td></td>
<td>Absence of red rays at sunrise and sunset</td>
<td>Noon</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Quite cloudy, but lower atmosphere free from vapors</td>
<td>8:00 A.M.</td>
<td>30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Noon</td>
<td>20 minutes</td>
</tr>
</tbody>
</table>

1851—William Henry Fox Talbot—parallel discoverer of photography. Made high-speed photograph by electric spark exposure (one of the forerunners of Edgerton speedlite). Talbot rotated a news clipping on a wheel. The high-speed spark exposure “stopped” the action sufficiently to permit the headlines to be clearly read.

1857—Small cameras fitted with large aperture lenses were capable of defining ordinary action without blur in outdoor sunlight.

1857-72—O. G. Rejlander (Swedish) working with Charles Darwin made indoor action photographs of spontaneous emotion. These photographs, which Darwin considered more revealing and reliable than paintings, were used to illustrate “The Expression of the Emotion in Man and Animals,” London, 1872.

The Two Ways of Life, 1857, a photomontage showing many figures in one of his most famous illustrations.

1872—Eadweard Muybridge was hired by Leland Stanford to photograph a horse in motion to discover whether at one phase of the gallop all four legs of the horse are off the ground. His poor silhouettes made on the slow wet collodion plates proved the theory, but were unsatisfactory as photographs.

1873—Dry Plates—Prepared dry plates were put on the market. They were so much more light sensitive than previous wet plates that lens shutters had to be devised to prevent over-exposure. Workers using the slow wet plates had merely replaced the lens cap after exposing. The more rapid speed of the dry plate, with shutter control, permitted the camera to be hand held without the tripod. As a result the “Detective Camera” and many small hand cameras using dry plates came into general use.

1877—Muybridge, assisted by the availability of dry plates, once more undertook his now successful analyses of the gaits of the horse and other animals, including man. To photograph the consecutive phases of the trot, the amble, the run, etc., he arranged a battery of 24 cameras in front of a measured background, with an electric tripping system by which the moving animal set off each shutter consecutively as its body passed before each lens at the possible speed of 1/5000 second exposure, according to Muybridge’s calculations. This resulted in a strip of pictures of the continuing action, exposed at controllable intervals. He continued these investigations of human and animal locomotion for years and published his monumental findings. This faster-than-eye analysis revolutionized previous conceptions of animal motion, and attracted to him Thomas Eakins, the painter, and other artists and scientists who either collaborated or who continued independent experiment. Muybridge devised the “Zoopraxiscope,” a revolving drum of stereoscopic images of his action strips which he projected upon a screen.
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with the approximate illusion of natural action (inspired by zoetrope).

1881—Etienne Jules Marey—a great French scientist already exploring action, honored Muybridge with a party in Paris at which Muybridge put the Zoopraxiscope through its paces to the amazement of European scientists and artists. The Zoopraxiscope contributed to Edison’s Kinetoscope, a forerunner of present day motion pictures.

MAN SWINGING GOLF CLUB. Stroboscopic Analysis. One of the simplest and best of Edgerton’s golf club series is worth careful study as an action photograph and as a design. The continuous swing has been photographed at successive intervals on one negative by means of the intermittent flashing of the variable stroboscopic light. The body of the stroke is nearly circular to the picture plane but the beginning and end of the stroke are more elliptical, as can be seen in the foreshortening of the clubs. This can also be followed in the hand pattern. The hands are moving most rapidly just before striking the ball, after which the speed diminishes so that the hands do not separate. This telescoping of successive images of the hand makes a pattern somewhat between an accordion and the spine of an embryo. Varied spacing between clubs also shows the relative speed. As the hand grip on the club is too dark to register in this exposure, there is a dark zone between the circle of light clubs and the gray hands. This gives a curious detachment and design interest. The swing zone of the man’s head and body add up to a very satisfactory abstract fluid shape. For sheer design, however, the white shoes and light gray legs are distracting, although they make good guide positions for scientific study. In this swung orbit the stroboscopic exposure interval did not happen to coincide with the impact of the club on ball, but we see the result of the blow in the bowing of the club in the following phase. The overlapping of the club images where the beginning and end of the stroke meet, have a beauty characteristic of this space-form built up in consecutive time light flashes. Extreme speed isolates moving form which would otherwise remain invisible to us in blur.

Photo, Harold E. Edgerton

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1882—Marey, attempting improvement on Muybridge’s work, developed a photographic gun producing 12 exposures on a revolving plate driven by clockwork with which he photographed birds at the speed of 1/720 second exposure. This gun camera was unwieldy, the images unsharp. Later Marey obtained images of the movement of a luminous object by prolonged exposure on a single plate. By interrupting this light at short inter-

1885—Ernst Mach of Vienna used an electric spark to photograph the silhouette of a speeding bullet upon a sensitized plate.

1888—George Eastman introduced the Kodak camera, using a roll of sensitized paper good for 100 exposures loaded and processed at the factory. He replaced the paper with roll film the following year.

1888—Marey, striving for a more flowing record of motion images, photographed action at intervals on a continuous roll of sensitized paper advanced past the focal plane in synchronization with his shutter. When the Eastman roll film became available he used that to demonstrate his strip of action images in a zoetrope to Thomas Edison, who in turn developed a method basic to present cinema.

1898—First model of Graflex-Reflex type camera with focal plane shutter was developed by Folmer, allowing fast action to 1/1000 second, together with groundglass focusing to follow action up to the moment of releasing the shutter.

1900—Carl Zeiss, Jena, manufactured anastigmatic lenses commercially, based on previous work by many lens designers.

1914—Oscar Barnak made first model of still camera, using 35mm cinema film for motion-picture testing. Marketed in 1924 as the Leica, its features were: short focal length lens, great depth of field, speed of 1/1000 second, interchangeable lenses, rapid film advance, lens-coupled range finder, 36 frames to a roll, small handling size. Fine-grain film and development permitted great enlargement.

1920’s-30’s—Lens apertures for miniature cameras increased. The f/1.5 lens was introduced in 1935.

1929—Dr. Erick Salomon used the Leica for his “candid camera” revelation of public personages, accelerating the craze.
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1930's—Reportage—Small fast cameras were used to photograph facets and phases of character or action. Rising use by picture magazines in Europe and America.

1930—General Electric developed the first flashbulb commercially in the United States, although the Phillips bulb was already manufactured in Holland. At first this was used only for open flash in held poses, merely replacing the dangerous flash powder. Soon newsmen, notably Ernie Sisto, were devising homemade synchronizers for their compur shutters, yielding speeds up to 1/200 second. Higher speed synchronization required dependable peak of flash illumination which required more precision in manufacture.

1930—Harold Edgerton brought previous work in high-speed exposure to a useful culmination by developing a stroboscopic lamp. An electronic circuit discharges light pulses through the gas-filled tube at variable intervals in sufficient intensity to expose quite large objects. He also produced a gaseous discharge "speedlite" lamp which delivers one flash of abundant light at a speed of 1/10,000 second and recharges for successive flashes in a couple of seconds. A separately housed condenser unit supplies the necessary high voltage. It yields characteristically wire sharp, intensely illuminated, frozen motion pictures in the ordinary action range and brings many types of hitherto unseen actions into visibility. The No. 2 Speedlite bulb has been adjusted in color temperature for use with Kodachrome in action work. He also developed equipment for fast spark exposure beyond 1/1,000,000 second.

1937—Introduction of the panchromatic high-speed films of relatively fine grain.

1938—Wabash introduced the focal plane flash bulb with a sufficiently sustained peak of illumination to evenly expose the full wipe of the focal plane shutter at the speeds of 1/1,000 and 1/1,250 seconds. Coupling fast film with focal plane flash or speedlite meant the possibility of uninhibited action photography in most fields of human activity and in many fields of scientific research.

MICROPHOTOGRAPH ACTION OF HYDRA (dark-field illumination). The hydra is swallowing a worm, part of which can be seen through the thin body wall. Photo, P. S. Tice

During this development in the mainstream of action photography there were many highly specialized applications. Cameras and lights were devised for action work in fluoroscopy, astronomy, metallurgy, psychology, and all of the fields where photography has become an indispensable tool. Explosives in testing laboratories are photographed at 1/10,000,000 second by means of a motor-driven drum revolving past a slit of film which is synchronized with the explosion. All kinds of continuous growth and change, such as the life cycle of bacteria, is recorded by time lapse photography. A high-
speed motion-picture camera passing 3,000 frames per second is used to study rapid mechanical actions unseen by the eye. Great photographic telescopes compensated to the rotation of the earth are mounted precisely to follow stars in their orbits. There is no end to this digging into the unseen.

PRESENT STATUS

After this brief glance at the ancestry of action photography I want to turn the lights on the present, ourselves, our photographic desires, subject matter, equipment, what to do with our inheritance.

It is true that present action equipment is still very primitive. We want grainless film permitting small cameras for big work, such fast film that cumbersome flash will not be necessary for interior action. We want to get rid of cluttering range finders and such gadgets sticking out all over the camera like barnacles. We would like a smooth built-in job, mobile and inconspicuous with which we could follow every fluctuation of the subject without breaking rapport while we resemble the camera. But patience! In the light of the foregoing history it is wonderful to have what we have. With it we can make pictures that move and have the spark of life in them as never before in the world.

Furthermore, don’t let big talk of speed and more speed intimidate you if your camera’s limit is 1/200 second or even 1/100 second. The important thing in action photography is learning to feel and understand action in picture terms, to swing into the rhythm of the subject, to watch a grin spread over a freckled face and get it with the merriest glint in the eye. The medium miniatures with speeds of 1/500 are ample for most action work. After all, the synchro-flash at 1/1000 and speedlite at 1, 10,000 are
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on the outer fringes of the great body of the action pictures which interests people. Whatever the action and equipment may be, the first consideration is to understand their character and limits and work completely within them.

INTERPRETATION OF ACTION

People used to say that if an action picture were good it was a lucky accident. That was before the laws of action were analyzed and coped with. It is true that an action photographer may have to shoot several negatives before he gets the sensation, "I got it," because he deals entirely in variables. But the negative-after-image of the composition that stands for a moment in the mind after the shutter click, is almost as reliable for the action photographer as the ground-glass checkup for the tripod photographer providing the action photographer has trained himself for such concentration of instant perception.

The first requisite of action photography is to study the spirit and periodicity of the action. Does it have an accented rhythm or is it a continuous repetition, or is it random or unpredictable? Almost all human and animal action is strongly rhythmical because of the heart beat and breathing. Regular patterns of walking, running, hammering, climbing a stair, would appear fairly

FIRST COMBAT ACTION PHOTOGRAPH taken through the periscope of an American submarine is now a classic. Through the etched lines of the periscope glass we see the sinking Japanese destroyer with two Japanese sailors clinging to the conning tower. The death pitch of the destroyer is countered by the periscope curve and by eerie accident the sight line cleaves the Rising Sun insignia asunder. The geometric lines overplaying the naturalistic forms of the watery wreck are a sharp reminder that this defeat is the work of science. Out of focus middle field of moving water gives fluid separation between the close-up and distance planes of the picture

Official U. S. Navy Photograph
unaccented in a cinema sequence. But if the phases of the walk or the stair-climbing is watched, you quickly see that the continuous pattern is made up of units in which there is a preparation, propulsion and recovery. We find then in an apparently monotonous action there are accented and unaccented phases. Hurdling has a very marked accent—first the running pattern, the take-off, peak over the hurdle, and the recovery into running again. Some climactic rhythms do not come out of a symmetrical preparation. The stiff-legged buck of a bronco shooting the rider into the air may have been the climax.

**CHANGING CLASSES** at the Christiansted High School, Puerto Rico, December, 1941. Take this picture in slowly and you find yourself moving casually with the boys and girls up and down the stairs and familiar courts and crannies and then briskly with the girl of the flying skirt. It remarkably gives the "feel" of people and place. Such unpretentious photographs of routine daily life are most important in our increasing need to get acquainted with people we haven't known. Abundant tropic light has allowed great depth of field with action.

Photo, Jack Delano, F.S.A.

**WORK-A-DAY NATURAL ACTION.** Longshoremen at cotton docks, Port Houston, Texas, 1939. The natural majesty of gesture in work emphasized in the unposed action of the superb central figure.

Photo, Russell Lee, F.S.A.

**FEEDING COWS.** Friendly trust between the farmer and his cows shows in this easy rhythmical action of feeding routine. Cow eats without jumpiness as the feed flows over her hungry nose.

Photo, J. C. Allen and Son.
of many tail switchings, humpings and side-jerkings. Generally the accented phase makes the best picture, in a regular patterned action. Then the body is full of breath and the will and energy are highest. In the hurdle the highest height off the ground or the forward leg already reaching over the rail give the keenest sensation. In the un-symmetrical bucking there may be many pictorial action effects of thrashing tail and mane which occur before the rider is actually bucked off. You watch on the hair trigger.

Decentralized action, like a traffic picture, is quite another problem. Now the scene includes many regular patterned walkers, regular patterned slowly moving cars with unpredictable jay walkers and taxis speeding up and obliquing through the tangle. First of all, an object coming toward the camera needs less shutter speed than the same action passing horizontally before the lens, while the oblique of the same movement splits the speed difference. Therefore watch the horizontal movement of the main traffic flow for the top regular speed, then watch for the unpredictables. They have a top speed, too. A 1/250 second should generously stop any traffic on Fifth Avenue and 42nd Street in New York City. Even 1/100 second would cover most slow traffic movement. Speed is only part of it. Depth of field is the real squeeze if a large scene is wanted. This means cutting down on the speed to the minimum to achieve a smaller aperture and therefore greater depth of field. Needing a small aperture, you debate at this point whether to cut down the speed still farther and have “blur” on some of the faster mov-

IN THE PARK the photographer caught these squirrels dancing around the innocent napper. Low camera angle adds to the drollery

Photo, Weegee

COW CHEWING. Said Ylla, “I was with that cow all afternoon but it wasn’t until the sun was level, 6:30 in summer, that the light went right into her mouth.” Filter darkened sky gives more value to the light tones of nose, ears, eyes. Low camera angle from left aids the side to side chewing suggestion. 1/100 second exposure at f 5.6

Photo, Ylla
ing cars. Having decided on depth of field and shutter speed the real problem of action design commences. If you see faces and headlights breasting into you there is more sense of a traffic tide than if you see only people's backs and tails of cars moving out of the picture. The sensation of traffic is crush and chaos—but pictorial chaos is not in action reportage. This might include dominant traffic flow at the rush hours seen from a bus top, from a building, from the air; idiosyncrasies of cops, taxi drivers, colorful people; different types of crowds at different hours and different sections of the city, the kids in play streets, vendors, and street life in all its varieties of tempo.

DUST STORM, TEXAS PANHANDLE, MAY 1936. The car might be standing still or moving. However, the landscape implies movement by scale, placement, perspective, tone value. The tiny car caught at the convergence center of the picture is pushed forward by the great tide of black dust. It is also sucked forward by the two-toned fan of the convex roadway, to a marimba accompaniment of fence posts.

Photo, Arthur Rothstein, F.S.A.

interesting. So the idea is to find a viewpoint from which to work out a design of this moving mass. Very high or very low camera angles give a sense of the extremes which are part of such experience. A large foreground bus contrasted by a small distant jaywalker, reflections on a foreground windshield, and close-up windblown faces could offer counterpoint against the regular crisscross tides. A natural way to express facets of so complex a subject as traffic would be

MOVEMENT AND FORM CHANGED BY EMOTION

In the man quietly seated for an ordinary portrait we see the calm eyes, the unstrained mouth, the unwrinkled forehead, the relaxed hands. Let him be torpedoed and struggling to a rubber raft in shark-infested waters and we see another form and being—the bulging eyes, the gasping or clenched mouth, the straining neck cords; the claw-like hands.
The Scope of Action Photography

Sudden fear, love, anger, joy actually throw adrenalin into the bloodstream. When the psychic state steps up the physical state in this way, the heart-beat, breathing, nervous and muscular responses are transformed into action of increased voltage. Actors can induce such changes. Cinema footage show such transformations. The still photographer so far we have thought chiefly of action which is movement of a body through space. Actually the *prime motion* is the impulse in the brain, the nervous system, the spirit—call it what you will—which energizes the bodily motion. Perhaps the most fascinating and difficult action photography is motion of the will or of the unconscious. Dead pan

![SING SING JAILBREAK CAPTURE. Desperate eye of this trapped man is the center of the vortex of the opposed forces. Close-up in the white heat before resistance wilts to the law. The cop on the right attempts to quiet him while the cop on the left is the muscle action. His body and clothes are pulled and manhandled but his will to be free shoots out from the sick sweat. Photo, Ossining Police Headquarters.]

must slice with appropriate shutter speed into these physical effects of emotional causes.

A person chronically angry or cheerful retains as character lines the muscular accompaniments of such emotions. The photographer of people in action must not only be in nervous sympathy with his subjects, but must know how to accelerate or subdue the flow of emotion in the subject to achieve the desired degree of expression.

portraits are dead because the spirit is not in motion. When living things look each other directly in the eye a specific current is set up. Who shall say what this current actually is, which so magnetically interchanges love, hate, fear, indifferences, memories, imaginings. Any action photographer who wants to go deeper than obvious gymnastics will tap into this vast motion source. Action stress of the subject is transcribed to our picture by composition of the selected

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MOTOR BIKE RACERS. Scherschel has panned the camera with the racers in both shots, but the left photo gives the sensation of speed far better than the other. In the first one, faster panning has blurred the spectators into a movement band while in the right photo they still bid for attention though out of focus. The left photo is a real close-up with no distracting grass. The competing racers are so close together that they make one movement form with the helping illusion of blurring foreground dust. The three-quarter side view in the left photo suggests speed better than nearly top view at right.

Photo, Frank Scherschel, Courtesy Milwaukee Journal

PRIZEFIGHT ACTION COMPARISON. (Below) "Slugfest"; (left) Henry Armstrong vs. Petey Sarron, shot with ringlights. (Right) "Target for Tonight" Joe Louis vs. Abe Simon, shot with portable speedlite. Slower shutter speed of "Slugfest" gives the fury of battle as we see and know it, while the exposure speed of the Joe Louis picture gives a less dramatic but mercilessly exact analysis of the bodily displacements and contortions suffered from a crushing knockout.

Photos, Carl Thusgaard, Acme and Morris Gordon, PM
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instant and by choice of shutter speed. Such stress is one index by which we "read" the speed of action and the mental state of our subject. Glamor later or fake intensity is something not to be stooped to by a serious worker. A work operation such as shown in the illustration of hand threshing and feeding cows have normal tempos not to be tampered with if they are to be given naturalistic value.

It is not always easy to create an actual sense of motion in partly mechanical action such as motorcycle racing since the machine does not crouch or strain. Only the rider's tension, the panning blurs of background and track, camera angle and cropping imply the movement. Machinery with moving belts, pistons, rollers and the like can be given animation through sheen on wheels and blur of the moving parts if the shutter speed is slower than the motion speed. Polished surfaces and oily high lights contribute a sense of light and movement. Analysis of machine movement—not to give the emotion of its speed—but to see performance of each part at a given moment can be shown stroboscopically or by freezing action with sufficient shutter speed.

BLUR OR FREEZE

The exposure timing governs the release of dynamic energy of the picture. After thorough absorption of the quality of the motion to be pictured, the much argued question of "to blur or freeze" now opens. It can have no arbitrary solution but by returning to the earlier allusion of "persistence of vision" perhaps new light can be shed on the expressive differences involved.

Our sense of motion as we experience it in changes of balance, in muscular tensions and compensations, in exhilaration, is probably an evolutionary experience earlier than vision. The micro-organism moves but has no eyes. Basic awareness of motion is in its contrast with immobility. From the eons of feeling motion with our own bodies, we have developed habits of interpreting the motion we see from the experience of what we feel. The motion stages we can see are: at rest, motion of distinguishable form, motion of indistinguishable form or blurred form. Like all sense organs, the eye has definite limits in registering stimuli. When the images stimulating the retina reach a certain rapidity, it cannot respond quickly enough to keep each successive stimulus distinct. The retina cannot get rid of one image before the next one is on top of it in a blurred pile. This inability of our sensory mechanism to make swift differentiation is called "persistence of vision." Old habits of seeing have taught us to interpret blur (limit of speed vision) as the badge of speed. "She was gone like a
flash.” Now if we photograph action that is concealed within blur—by means of a stroboscopic or speedlite lamp or any of the other special devices, we make clear and defined further dimensions of speed. In doing so we destroy speed blur and with it the emotional sense of speed, while achieving new analysis of form in movement. However, new characteristics of speed expression say speed in new ways. Violent muscular effort and drapery whipped into sharper patterns than the unaided eye can see, establish speed values of their own. High-speed interruption of movement flow prevents any merging of the transitional instants of motion and makes us say “it’s frozen—it doesn’t move.”

In practical shooting I figure it this way. If the purpose of the picture is to give the naturalistic value of motion then I try to synchronize the action and shutter speed—$1/100$ second for ordinary walking, $1/500$ second for trotting horse, $1/800$ to $1/1000$ second for high dive. Speeding objects in the $1/1000$ second range begin to blur, especially in the faster moving finger tips of a whirling dancer, or the horse’s tail in a wild gallop, and that agrees with the experience of the eye. I believe in using the shutter speed as close as possible to the action to prevent speed distortion of form. However, some action is swift or violent enough to be shot by high speed without any sense of falsification or high pressuring. So much for naturalism.

High speed shooting for the sheer beauty or excitement of such machine-made interpretation is another thing and perfectly valid. Frozen motion, for analysis of coordination at a given phase is still another thing. The photographer should be very clear
about the values he gives to his subjects by his handling of form-altering exposure speeds. When I say "naturalism"—I do not say "reality." What is reality? Certainly the new speed dimensions have extended our old realities, if not our eye-limit naturalisms. Ideally we should have a continuous shutter range starting at time and bulb and going from the 1/1000 of shutters continuously to the 1/10,000 of speedlite. There is too violent a speed gap at present.

Exposure speed determines the voltage of energy in an action picture but there are many other considerations in action composition. The angle at which the camera receives the movement impetus is of first importance.

**CAMERA ANGLE**

When the negative plane is parallel to the vertical plane of the subject, we have a "normal" view which is usually static. But the moment the camera is obliqued, an optical tension in the resulting picture is set up which throws the spectator into a more active state. Motion usually brings about

**LIGHTS OF THE "LOOP-A-PLANE" IN AN AMUSEMENT PARK.** Light pattern traced mechanically by the lights of the ride in a nickel of fun during a continuous exposure of a minute at f.11 on Super Pancho Press film. An idea of what your stomach goes through when riding the "loops" in an amusement center, and a splendid example of the results an imaginative photographer can achieve.

*Photo, Jervis W. Baldwin*

**LIGHT PATTERNS TRACED BY ELECTRIC DISCHARGE.** Compare the free play of the electric movement with the channeled light pattern of the "Loop-a-plane." (Left) Three phase, 60 cycle power arc of 800,000 volt. Exposure, 1½ second at 1/64. (Right) Three phase, 60 cycle power arc of 1 million volts. Exposure, 1/25 second at 1/6

*Photo, Arthur Polme, General Electric Company*
MEXICAN CHILDREN. The spontaneous emotion of Mexican youngsters greeting the arrival of the health medical unit in a rural village. Smith had selected a position on the truck and had his camera ready focused. He did not shoot until he saw this unified surge of joy. No wonder. They were each promised a stick of gum if they took vaccination like men. Fast pan film, 1/250 second at f/11, Rolleiflex
Photo. Bradley Smith
some kind of compression, elongation, or foreshortening in the actual moving object. For pictorial emphasis this natural distortion can be rendered exactly or heightened optically. For example, a low camera angle can make a walking man appear more active and monumental. A rather high camera angle in closeup gives a sense of intimacy, as if looking over someone's shoulder.

LIGHTING AND SPACE

Light and space work together in dynamic composition, to create the frame and atmosphere of motion. Light has five-fold importance.

1. The source of exposure.
2. The direction impact, whether it moves with the action of the subject, plays counter to it, or is pervasive without direction.
3. The soft, or rich, or harsh quality as it renders modeling and texture.
4. Emphasis or suppression of detail.
5. The illusion of space and mood of airiness — of gloom — an expanse.

Lighting to free the forms in space and allow circulation of air is important for most sports, while the partial imbedding of the figure in darkness may be a dramatic necessity for some dramatic moods.

Space may be used as it actually is or may be modified by the illusions of light. The important thing in composing and final cropping is to give movement value through space. A runaway horse has momentum and needs space to run into. A tiny sailboat may need a lofty sky to look free in. Perhaps a closeup sail will look most buoyant if there is very little sky — as if the wind pressure of the sail pressed to the edges of the picture. The energy centers of the picture launch force lines into the space. Where the dominant energy falls off and the supporting mood suffices it, there is the place to crop.

CONCLUSION

A photographer of still objects may lovingly work for nuances of texture but the action photographer in most cases must subordinate texture to dominant moving form.

So it behooves the action photographer to go deeper and deeper into the study of action as it reveals the nature and motives of life and as it provides the springboard for exciting and satisfying photographic design.

ENERGY AND NEUROTIC MAN. An imaginative design made with moving light and a negative of a moving hand. By timing the light movement the various widths of the light line were obtained.

Photo, Barbara Morgan
OF ALL SUBJECTS for the camera, none is so important, so action-filled, and so awesome as war. In a world at war, the news photographer who is lucky enough to be assigned to the armed forces has an exciting and solemn duty to perform—to interpret war, to show what is happening. There is nothing passive about this job—it is action from the word "go." And you will find that kind of action everywhere: in marching men, or a sinking transport, in a sailor at battle station or a tank charge on the desert. It is in this field that the news photographer must be on his toes, not only because his very life is often at stake, but also because there is never a chance to get that action picture again. When a Messerschmidt dives flaming into the sea you have to get it the first time. There is no repeat performance, no "hold it just one moment please." I learned this lesson long before I began, and in 1937, when the Hindenburg crashed. All of us assigned to the landing at Lakehurst expected a routine job, and one of the most spectacular of all spot news events dropped in our laps. I was lucky enough to get a shot—taken under conditions of excitement equal to the heat of battle—which was literally a prize winner.

The newsman is conditioned to surprise action like this. It is this kind of action for which he hopes and for which he constantly prepares himself. War photography is this same thing, only much more accelerated and continuous. It is like sports photography and feature photography and crime photography and the picturing of celebrities, all thrown into one.

THE PURPOSE

The war correspondent and photographer attached to the armed forces is the civilian's representative at the front. He is, so to speak, the eyes by which they see what is going on. By his work, the man in the street will get a lot of knowledge. This is how the Army puts it in its official correspondents' field manual (FM130-26):

The Army recognizes that correspondents perform an undoubted public function in the dissemination of news concerning the Army in time of war. Correspondents accompanying troops in the field occupy a dual and delicate position, being under the necessity of truthfully disclosing to the people the facts concerning the operations of the Army, and at the same time of refraining from disclosing those things which, though true, would be disastrous to us if known to the enemy.

We all know how important the camera is to the waging of war in the field of actual
WARTIME NEWS PHOTOGRAPHY

combat. We know about aerial reconnaissance and map making, about the uses of photography in training, about the camera’s part in research and recording. This is all well taken care of by trained members of the armed forces. But it was the Germans, I think, who first realized that the camera was just as powerful a weapon from the propaganda point of view. They say that the newsreels which made the Sieg Im Osten and Sieg Im Westen films scared at least one nation’s leaders into capitulation.

(Right) Accredited war photographers were on hand when President Roosevelt visited American tank units in Africa.

The camera is a powerful propaganda weapon which can tell more eloquently than words the terror, the vastness, the scope of war. It can show the good or the bad, to build morale on the home front or strike fear into the enemy.

British Official Photo.
THE COMPLETE PHOTOGRAPHER

Propaganda—bad for the enemy, good from our point of view—is the correspondent's sphere. In visual terms you show what is happening on a convoy or at a battlefront. You show what it is like, how our side is doing. National morale is dependent on truth, and photography is a quick way of reaching that truth. The enlisted photographer and the war correspondent overlap in some fields, but in the approach they are quite apart. The signal corps man is after a record of how a town was captured; the navy photographer records the sinking of a Jap battleship by taking a picture through the periscope of his submarine. But the news photographer is still working for his editors back home and he is after something from the news angle. The result may be a picture story feature or a single story-telling shot.

GETTING ON THE JOB

"You've got to be there to get the picture!" That's a news photography adage. And "getting there" is often a tough part of the job. It's what you do after you get there that counts, though. Photographers like Sam Schulman of L.N.P. who were at the Casablanca conference were there when it happened because the armed forces saw to it that the press was represented. Their reporting of the meeting was as important as the meeting itself was historic. They proved
their value as war correspondents in the field.

Correspondents have the status of non-combatants, but are attached to the armed forces and subject to military law. The treatment is pretty much the same, whether under the Navy or Army. These are a few of the Army’s regulations. Correspondents are given the same privileges as commissioned officers in the matter of transportation and messing facilities, but all courtesies must be at no expense to the Government. They wear officers’ uniforms without any insignia or piping. They receive reasonable protection and medical service, but are not, of course, entitled to any benefits.

SPECIAL PROBLEMS AND SERVICES

According to the Army’s manual, “it is the intelligence officer, or his assistant in charge of public relations, who will exercise control of correspondents in the name of the field force commander.” And this means that correspondents will find a special staff member who will tell him where the action is likely to happen next—who gives him assignments, so to speak. This same officer also must censor all written material or photography intended for publication or release.

Visiting correspondents (not the regular accredited war correspondents) do not receive the privileges or freedom of an officer, are limited to a specific itinerary, and cannot get so-called spot news. In other words, they can’t file stories or pictures from the front, but have to wait until they get home. Their work, therefore, is pretty much limited.

Another interesting and important development of this war is the “photo pool” or “rotoing system.” Says the Army manual: “Regardless of the number of accredited correspondents any one agency has in the field, photographs from theaters of operation by newspaper photographers will be rotoed.” Which means that all picture agencies have equal chance to use the pictures taken. This

Wartime photography presents problems not encountered by the civilian photographer—like the concussion of gunfire. This picture was taken in the Guadalcanal jungles during battle. Notice how the litter is shaken off by the big gun’s concussion.

U. S. Marine Corps Photo
READY FOR BATTLE. (above) Grim-faced, American fighting men are pictured on their landing barge as they approach their objective. It is the duty of the war photographer to report all phases of the war, and in order to do so, he must be present where the action is going on.

THE BIG GUNS SPEAK (left). The author was the only news photographer aboard the USS North Carolina on her trial runs.
applies also to weekly magazine photographers and newsreels. The present pool is supplied by photographers from Acme, International News Photos, Associated Press, and Life Magazine. From this pool, pictures are made available to all American newspapers and weekly magazines.

Because of this, the war photographer has a responsibility not only to his editor, but also to his entire profession. It is an inspiring method of work which eliminates all the pettiness involved in the “scoop mania” of regular news work. When the USS North Carolina was taken on its trial run, for instance, only one news photographer was allowed to go along. More would have been in the way of the crew. I was chosen for the job and the picture I got of the salvos of huge 16-inch guns and of the officers and men at work were used by all the syndicates. It’s a great responsibility and with this method of working for a pool, the news photographer is put to it more than ever to “deliver the goods.”

WORKING METHODS AND EQUIPMENT

The first working law is self-preservation. Some photographers do lose their lives or are taken prisoner, of course, but no picture is worth the photographer’s life. The editor sends his correspondent out—often at great expense—to get pictures, not to get killed! So while he must take his risks with the rest of them, of course, there should be no heros. Otherwise, he may end up by being the subject of a picture, not its creator.

For long views of battle scenes, a telephoto lens is used. For work with the U.S. Navy I used a Speed Graphic with a 1934-inch Cooke Teler lens. At the same time, my Contax is always ready for a succession of rapid pictures. On one occasion, for instance, I was taking a long pictorial view of an Atlantic convoy when a PBY suddenly appeared and dropped depth charges in the water nearby, on the trail of a sub. The incident was not recorded due to its extreme distance away from my ship. However, in such fast action, providing it is in camera range, the miniature camera and the telephoto lens is the ideal outfit for successive shots.

On patrol duty in the bombers themselves, I have used a Graphic for aerial views of the ships below and then my Rolleiflex or miniature for close-ups of the crew at work. The Contax is also very good for color work and while color cannot be used by newspapers, it can often be used by weekly magazines such as Life and by the armed forces themselves. And there are many war scenes which are colorful—literally. Col. Zanuck’s film of tank activity in North Africa proved that color film can make war reporting a vivid thing.

I usually take along a tripod, but this is almost never used except for feature work, where there is more time. While working on board ship or in an airplane, the vibration is always a problem and the tripod would be a hindrance rather than a help here. While working on the NORTH CAROLINA, for instance, all my shots were hand-held.

Gunfire is, of course, always a problem to the photographer, because of the concussion.
WAGGIN' HER TAIL BEHIND HER. A staff sergeant examines the shattered rudder of a Mitchell bomber that made a safe return to its North African base despite 500 holes shot in it. The bomber was in a raid on Gerbini, site of two Axis airfields near Catania, Sicily.
A battleship's 16-inch guns have actually shattered the finder and ground-glass of my Speed Graphic. For work with 16-inchers, I stuffed my ears with cotton, braced myself with feet apart, kept my mouth open, and then hoped for the best with a shutter speed of 1/1000 second. Actually what happened was that the gunfire itself made the exposure! My reflex tightening-up reaction to the gunfire acted as a perfect synchronizer. This is pretty much the same with all big guns.

As for the routine, we take along as much equipment as possible, within the weight limit. This includes all cameras and film and a small developing set for on-the-spot processing. According to the Army field manual, however, "all photographic negatives taken by official or accredited civilian photographers may be processed in the Signal Corps field laboratory. . . . Photographs will then be censored by a representative of G-2." Films or prints which can't be processed locally, like color film and movie film, are forwarded by G-2 to the Military Intelligence Division of the War Department, where it is processed and censored.

The home office usually gets supplies to their correspondents by mail or special carrier, but photographic equipment of the armed forces may sometimes be used if you are in a spot. The Signal Corps lab or Navy photo sections help out. And this assistance is, of course, reciprocal. Prints are sent back to the home office through "the pool" and, if the facilities are around, special shots may be sent by radio or wirephoto. The armed
forces recognize the need for speed in these matters and help a lot with quick censoring and transportation.

CONCLUSION

The American public is getting used to good and rapid picture reporting of the war, and it has every reason to expect it. Way back in the Crimean War days, newspapers and magazines used to send artists to the front to draw their impressions and the pictures appeared weeks and months later. During World War I, action pictures were scarce and, again, often weeks late. Now we can get the photographs on the presses almost as soon as the story gets there—and the pictures are real on-the-spot shots. The public was able to follow every phase of the fight for Henderson Field on Guadalcanal, for instance. It saw not only the field itself, but also the action in the jungle and the faces of the soldier who did the fighting and the Jap he caught or killed. In a global war, the civilian’s role is important and pictures from the front give him a greater sense of real participation. Therein lies the importance of our job.

War-time news photography brings the war home to the people who are fighting their battle on the homefront. The on-the-spot newspictures are a powerful incentive to “back the attack,” for here are not empty words of propaganda, but realistic facts which all eyes can see—and comprehend.

It is exciting sometimes and monotonous sometimes; but it is always important. We are assigned to the biggest spot news story of all time and we’re proud of it.
WHEN I STARTED free lancing on spot news stories ten years ago, I was an awful flop. After going to fires, murders, and auto accidents for some time and coming back with pictures which didn't sell—I made a discovery. Editors don't want photographs of burning buildings or wrecked automobiles, they want the human element and reaction. Now, when I go to a fire, I don't bother to take a photo of the burning building. Instead, I set my camera for six feet and watch for relatives or injured people. They scream or laugh or sob—and that's the time I do my photographing. And the same goes for murders, accidents, etc.

GETTING EMOTIONS

The main thing is to figure out what people are going to do and then always have the camera set so that you will get it when they do it. So forget about filters and focusing and concentrate on the human emotions of the people before your lens. Many news photographers are all technic and no emotions. They make the mistake of thinking that they must be callous wise guys. But where emotions count, the news photographer must be sympathetic and human. It is comparatively simple to get well-exposed negatives, particularly if working at night—as I do almost exclusively. All my shots are taken with a Speed Graphic and 1 flashbulb synchronized to the lens. For 6-foot close-ups, I set the shutter at 1/400 second and shoot at f/16 or f/22; for 10-foot shots, the lens is at f/16 for indoors and f/11 for average outdoors.

That's the easy part. The hard part is to
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get the negative image to tell a story in terms of human emotions and get it so that it makes a good picture.

DON'T TAKE MY PICTURE

When a big crime story breaks, the first thing the city editor does is send down a cameraman to police headquarters to photograph the person arrested. And then the fun begins, because it seems that people arrested for crimes don't want their pictures on the front page for the whole world to see. So they "cover up"—put hats or pocketbooks or newspapers in front of their faces. Yet in the ten years that I have been stationed at police headquarters, I have photographed politicians, Wall Street brokers, gangsters, and murderers—and I have never tried to sell a "cover-up" shot.

There are many ways of getting the news picture you want of uncooperative subjects. Often I wait until all the other photographers flash their bulbs on the covered-up subject, and then get the open shot when the prisoner thinks it is all over. Or I hide in the patrol wagon and get the prisoner as he or she steps in. Also I have a prism which I can put in front of my lens and shoot to left or right while the camera is pointed straight ahead, and not at the subject. This gadget—which I made myself from spare parts—is worth its weight in gold. I also have a remote control cable, 20 feet long, which I hook up to the series outlet on the battery case of the synchro. If the subject covers up, I pretend to give up and walk away, leaving the camera on the table (aimed at the prisoner, of course). When he relaxes, I push the button on the cable which I have in my pocket and get the picture.

All these tricks are for one purpose—to get pictures of people who figure in spot news. And whether they are spectators, injured people, prisoners, or winners in a baby contest, the human emotions expressed are important. To get these, you need to anticipate what is going to happen and you need the patience to wait around and get it when it happens.

ANALYSIS of ... VICTIMS OF A TENEMENT FIRE

A mother and daughter have just learned from the firemen that another daughter and a son have lost their lives in their burning home. Weegee has caught that wild spring of grief in the moment of shock which is beyond comfort. The human soul bereft in the universe, unbelieving, struggling to understand the loss is here in all its poignance. If she is a religious woman she is questioning God. The daughter who clings to her scarcely exists, yet the mother and child embrace instinctively for love and protection. The girl turns to her mother, the mother turns to—NOTHING.

Weegee has shot this tragic double portrait against the shining machinery of the fire engine in the black night of violence and sudden death. The glistening eyes, the nerveless hands, the dropped tremulous mouths, dilated nostrils, drawn brows, and the slack bodies delineate this stricken moment of their lives so forcefully and unforgedly, that a photographic composition as such doesn't exist. This is living stuff. You are with them. You could put your arms around them.

At this point it becomes a meaningless impertinence to life and death on the threshold to discuss art. Photography here is the agent of capture of a source experience. Through Weegee's truly remarkable sympathy, he successfully makes a pure and unobstructed transfer.

Barbara Morgan
VICTIMS OF A TENEMENT FIRE

WEEGEE
HAVIN' FUN

The spontaneous expression of a happy baby was caught by a combination of good timing and simple lighting.

DATA: Rolleicord II, fast pan film, f/5.6, 1/100 second, a No. 1 and No. 2 photoflood
Angora

The careful grace of a cat is shown in this photograph, with strong sidelighting giving a feeling of the texture of the fur. A simple dark background completes the picture.
Taken at Rockefeller Center's outdoor skating rink, this shows the possibilities of capturing action in everyday pastimes. Backlighting has helped by adding dramatic shadows. DATA: Rolleiflex, Tessar lens, fast pan film, f/3.5, 1/250 second
STREET SCENE

This shot has humor and it has all the feeling of an unplanned story-telling photograph. The photographer used a single flash on the camera to get this obviously spontaneous picture.
The action and story-telling qualities of this picture make it a really fine and unusual sports photograph. Notice how all eyes are focused on that all-important ball, and also that it seems to form the top of a triangle—both factors in making the ball a center of interest. Notice, too, the lighted scoreboard, which carries the tied score, 39-39.
BLOOM OF DEATH

An official U.S. Navy photograph shows the simultaneous explosion of two depth charges as seen from a speeding PC boat. This type of action shot, sometimes taking on the qualities of an interesting pattern, may often be seen by the photographer of wartime scenes. Notice at the left one of the merchant ships which these charges are protecting.
THE MAKING OF GOOD SPORTS PICTURES

Ed Thorgersen
Sports Commentator, Movietone News

A man who looks at thousands of feet of sports film each week tells what goes into the filming of good action shots. The best sports coverage is done by cameramen who, aside from having a sound knowledge of photography and the game they are covering, are blessed with a "sixth sense."

All photographs from Movietone News.

PHOTOGRAPHY AND SPORTS in the United States are so closely related that those engaged in either of these fields, be they professional or amateur, regard each other as complementary forces. With one exception — war — sports today offers the camera its most exciting subject; and photography is certainly an over-all interpreter of almost every American game or competition.

Action, of course, is the answer to sports' photogenic appeal. The movements in almost any of America's popular pastimes are fast and, at times, furious. Go down the list of our indoor and outdoor games and you can readily see that to the last, every one of them entails plenty of speedy action.

THE SPORTS CAMERAMAN

In the field of action sports, however, a sports cameraman must be constantly on the alert. He cannot have a touchdown played over for him or get a ball player to re-enact a sock over the fence for a home run. This brings us to one of the most important prerequisites of sports coverage. To be a good sports cameraman, it is essential to know intimately the game or competition you are covering. Foreigners to our shores, capable cameramen, have been tried on American sports with sorry results. Yet on international games such as polo, soccer, or tennis, these men have proved worthy lensmen.

ANALYSIS of . . . BOMBARDMENT OF CHUNGKING

To the laymen, the horrors of war are outside even the best imaginations. Pictures, movie and still, cannot make real something which seems inhuman and impossible. Only those who have actually been bombed and have been in first-hand combat can conceivably know war in its fullest. In this picture we have an antithetical picture of a bombardment, which in its complete impotence comes perhaps nearer to telling the gigantic horror than pictures of more explosive force. This pitiful stream of water played against the theatrical backdrop of the blazing city of Chungking, bombed by the Japs, becomes a symbol of feebleness of individuals in a fight of staggering scale. The two silhouetted figures outlined by fire, surrounded by charred spikes that once were trees, wreathed by water and wires — they are not benumbed actors in a fantasy, but real people in the real inferno. Personal detail is obliterated and emphasizes this human struggle in which individuality is practically extinguished in the struggle for mere survival. Miraculously a few leaves unscathed still cling to this sapling, making the naked stakes seem grimmer by contrast.

When a whole city of burning homes become the illumination source for exposing a photograph — then it is time to fight. Such pictures become a weapon.

Barbara Morgan

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The newsreel cameraman, present at almost every conceivable sport, brings the event to the public. Upper left: the horses race down the home stretch; upper right: a bad turn in an ice-skating competition; lower left: sand yachting in Egypt; lower right: college girls in a water ballet.

Next in importance to a cameraman's knowledge of sports for good film reportage, comes personal aptitude and understanding of his machine. He must know his camera and what it is capable of recording. In other words he must know exactly how the scene to be photographed will appear on his positive film, if he is a motion picture man; or on his print, if he is a still photographer. And to know his camera he must know his every lens, from 1-inch wide-angle to 24-inch telescopic; and know his unexposed raw stock or cut-sheet film. With critical modern equipment and raw stock, a single point stop may mean the difference between a good or a bad picture! There are over 100 kinds of film on the market each with its own degree of sensitivity.

Therefore, in news photography, calling as it does for quick decisions and impeccable judgment, this factor is of the utmost importance. A newsman has only one chance. He must be right the first time. A studio photographer or a Hollywood cinematographer may experiment and make retakes. There's no retaking a ninety-yard run through a broken field, or Whirlaway winning a racing classic. For the newsman it comes to this: "You've got it or you haven't." And it is just too bad for him if the latter is the case.

All of which brings us to the question, "How is this harmony of man and machine attained?" The answer is... Given a normal intelligence (in professional circles described as "a strong back and a weak mind") and plenty of practice, any man can become a competent photographer.

However, it isn't quite as simple as that. A camera is a challenge to man's imagination, ingenuity, and creative ability. Like the violin it can be played badly, satisfactorily, or with the genius of a Menuhin. It should be recognized as one of the means through which man attains true artistry. Press a button and you have a picture. That, to
THE MAKING OF GOOD SPORTS PICTURES

many, is all there is to a camera. But it isn’t. The range of the camera is unlimited and it has its ordinaires and its geniuses.

For example, take an autumn Monday on which I’ve got to select three hundred feet of high spots on the national football scene. A newsreel covers, for nationwide release, the six best games of the week. To do this satisfactorily and completely in a journalistic sense, we use from twelve to twenty cameramen. On an average, 6,000 feet of film is exposed on each game. Total that and you’ll find 36,000 feet is the over-all—which must be reduced to 300 feet.

Now here is where you’ll find there are cameramen and again cameramen. All things being equal except the weather, you would say that, selecting 300 feet should be a cinch. Just think again. In the first place it’s impossible strategically to place your staff to the best advantage; and newsreel revenue doesn’t warrant the expenditure. Newsreels were once given away with the feature pictures, and to this day there are exhibitors who resent paying for newsreels.

In New York you have the best cameramen that ever pushed a button—but it costs money to send a crew to Columbus. The local man there is a satisfactory cameraman. He’s on the spot; let him do it. The result is unbelievable. He gets everything but the plays that swayed the game. He gets innocuous kickoffs, huddles, runs—everything but what brought that ball over the line. His assistant got all the celebrities and star players before the game. Between them they got everything but how the game was won or lost. There’s no picture!

Up in Detroit, there was, the same day, a game that attracted the camera aces from New York, led by Bill Storz. His negative comes to the office with every vital play completely covered from every angle.

How do you account for that? Storz knows football and he knows his camera. Besides that, he is a youngster with imagination and he works with precision and intelligence. The man in Columbus is older and has more experience than Storz—but if he lived to a hundred he would never be a good cameraman. There’s something lacking in his makeup, like the backroom fiddler who plays as much as Heifetz but who will never get the same tones out of his instrument though it be a Stradivarius.

HORSE RACING COVERAGE

The mechanics of covering a Kentucky Derby are interesting. After the contacts for admissions and locations are made, a squad of cameramen, soundmen and helpers are assigned by the newsreels; stillmen are assigned by the large newspapers and still syndicates. Most large newspapers assign but one cameraman to the job, depending on the syndicates to supply them with most of their illustrations. The lone man representing a newspaper usually confines himself to getting hometown celebrities and human interest shots so that the layouts will differ to a certain extent.

Newsreels have a greater problem because the standard motion picture camera, rigged for sound, is a cumbersome machine of large
size and weight. In order to cover an event like the Kentucky Derby so that every picture possibility is caught, it is necessary to have a squad of formidable proportions.

Three sound cameras (one equipped with slow motion mechanism), two Akeleys, and from three to five hand outfits are required for an all-inclusive picture of the spectacle. One camera more or less wouldn't make much difference, but the above is a fair average.

A pair of sound cameras, one of which is equipped for slow motion, are set up on the roof of the grandstand at the finish line, with the microphones hanging over the ledge to pick up the sound of the roaring multitude. Both these cameras follow the horses from the starting gate to the finish line, a panorama shot calling for the greatest skill on the part of the lensmen. The starting gate is up a straightway over one quarter of a mile from the roof position. When the gate is opened, the cameraman must keep the horses in his picture frame until they swing past him for the first time. At this point, the most difficult in the entire operation, the cameraman must be on his toes with his camera moving at its greatest speed to keep the leader horse in his frame. After this, until the final pole the leader of the pack must be kept with his nose practically on the edge of the frame.

If you don't think this is a feat we ask you to try following a speeding object with a pair of binoculars and see what luck you have in keeping it in view over any considerable distance. The Derby is run at a mile and a quarter. The cameraman must not only keep his picture smooth and free from jerks but he must keep it in focus and properly exposed. Shooting with the diaphragm of his lens stopped down in clear sunlight he has to be ready to open up if a cloud should pass during the running (which usually takes some seconds more than two minutes), all the time swinging his lens and watching his camera speed. That's just straight shooting.

Bill Storz worked out additional cares for himself on shots like these by asking for a gadget that would enable him to go from normal speed to slow motion in order that the speed of his object, be it a horse in the Derby or a runner at a football game, might be slowed down for what in pidgin English would be called a good "looksee."

Making a shot of this kind requires nerves of steel and the quickest of mental action, because switching from normal to slow motion poses a whole new set of focusing and exposure problems. To make average slow motion requires speeding your negative past your lens at four times greater speed than for normal motion. In other words, when making what is called "four times" slow motion photography, three hundred and sixty feet of film goes through the camera in a minute, as compared with ninety feet a minute for normal motion.

Getting back to the Derby, the third sound camera is assigned to the winner's circle. If it weren't for the vast assemblage attending this racing classic, this camera would not be needed. However, the ceremonies of presenting "The Roses" and the talks by owner, trainer and jockey would be lost forever by the time a sound cameraman could come through the crowds from the roof to the winner's circle! Therefore the third sound camera.

The Akeley cameras and the hand cameras are variously assigned. One Akeley is set up at the starting gate; the high-strung thoroughbreds are at their temperamental worst, and anything is likely to happen. From running away to throwing their jockeys. Then too, most accidents happen while the horses break for positions after the barrier is sprung.

The complete coverage of any sports meet, especially races, should include the start and finish of the event, and the photographer who is napping when the gun goes off is minus a very important shot.
Another Akeley cameraman takes his position where the first turn may be recorded. At this point the jamming is great and accidents are likely to occur. With a long lens the action at this corner fills the screen, and everything for about a quarter of a mile around this curve is exposed on the negative. Many sensational scenes are obtained at this "hot corner," as it is called, and many times this film has been sought by stewards in considering cases against jockeys accused of fouling. During the big race the other curves are covered by the hand cameras. Before and after the race these men make cut-in shots of crowds, parking lots, celebrities, railbirds, pretty girls, fashions, and whatnot. In all, a couple of thousand feet of film is exposed to make the 200- to 300-foot subject which is released in the newsreel.

FOOTBALL

Now what goes for the covering the Kentucky Derby goes for almost any other sport spectacle. Take the Army and Navy football game, for instance. The situation is the same although the action is different. By its very nature, football lends itself to photographic presentation. From kick-off to open field running, its every play is easily followed by a good cameraman with a knowledge of the game. A number of cameramen are assigned to get high all-comprehending shots. Others are assigned to the field to get angles and notables. Still others get the "cut-ins" of human interest such as a "middie" in a funk as the Army threatens the Navy goal or a rapturous cadet at the same moment, the mascots, cheer leaders, etc.

One difference is that the man on high shots is continually changing lenses. For instance, on the kick-off he uses his 2-inch lens. On line plays he uses from his 4-inch to possibly his 24-inch telescopic lens, according to how he wants his frame filled with players. If he wants to take in every man on the two teams, he may use his 4-, 6-, or 8-inch lens, according to the distance from the play. If he wants to concentrate on the center and the snap of the pigskin, he may use his 12-inch or 16-inch, or even a 24-inch; depending also on the footage separating the players from the cameraman. The larger the lens, the bigger the individual players will appear on the screen; but there will be fewer of them. The longer the lens, the more detailed a long run.

OTHER EVENTS

Baseball, soccer, Lacrosse, hockey and like open sports that take up large playing areas are all covered in this manner. Track and field coverage differ but slightly—owing to the varied events. A cameraman must be at every finish to get bold close-ups of the straining contestants, and then be right on top of weight throwers and pole vaulters, seemingly in constant danger of getting in the way of the contestants.

Tennis is a comparatively simple sport to cover, from both a still and motion picture point of view. Two men can do a highly satisfactory job on the most important of matches. One man takes a high position with a turret of various lenses which he changes according to the action on the court. All cameras for tennis must be sound equipped. Duping in sound for a volley would require such exactness that it would take days of painstaking labor to match pictures to a sound track. The other scenes for a tennis story also need sound,
THE COMPLETE PHOTOGRAPHER

Automobile racing is one of the most dangerous of sports, and the cameraman must be always on the alert for accidents. Above, a crashup in which the driver was killed.

being mostly an exchange of feeling between victor and vanquished, the presentation of the cup, and speeches.

At automobile racing, cameramen work almost exactly as they would covering a horse-race, except that they must be even more on the alert for accidents.

Boxing and wrestling, because of the confined space of the action, is what cameramen call "a cinch." There are lens changes, but they are merely switching back and forth between 2- and 4-inch. There is usually a man with a hand camera at the ringside. He looks for action that may take place around one of the posts, for bold close-ups of knockdowns and flurries of toe-to-toe exchanges, and especially for humorous writhings in wrestling.

Crew racing is covered by men at the start and finish lines and from the train which usually runs along the bank parallel to the course. The man on the train changes lenses after the manner of the high shot men at other sports. Another location, here, when it is on the course, is a bridge from which cut-in angles are made. Like other stories the spectators supply the rest of the material for reportage. The list is endless, but from the foregoing outlines an idea may be formed on the coverage of other sports not mentioned here.

MAGIC EYE CAMERAS

There is one very important change now taking place in the field of sports photography, which should be included in any story about the art. The still camera, as we know it, is due for banishment from the scenes where action is the photographer's aim. Editors are finding that the small "movie" hand cameras, with revolving turrets for various lenses, are much better than the standard still cameras for making action pictures.

This is due to the improvement in motion picture raw stock which allows any laboratory to take a frame of 16mm or 35mm and enlarge what is recorded therein to perfectly clear and grainless prints up to almost any size wanted—with 4 x 5 and 8 x 10 prints that only an expert could tell was an enlargement.

In action photography the use of a hand motion picture camera increases a hundredfold the photographer's chances of getting the great moments in sport. For instance, Gordon is tearing down to second base in an attempted steal. As he starts his spurt the photographer with the movie camera
follows him until he flings himself at the base in a swirl of dust and flashing spikes. Every bit of the play, including the instant when he’s tagged or has beaten the ball to the base, is filmed. Back at the office this tiny roll is developed and the frame containing the big moment is enlarged.

What chance has the man operating the standard still camera or even a candid camera that can be clicked for about thirty pictures a minute as compared with a 35mm hand camera which in the same minutes makes 1440 exposures? Still camera manufacturers are aware of this trend and there is now on the market a so-called still camera that is actually a movie camera. This innovation to all purposes is but a motion picture camera forced into the limitations of a still camera appearance; nothing else. It has a motion picture shutter, spring, and even bulbous magazines to hold an extra large quantity of film.

CONCLUSION

Most sports photographers consider ring sports a comparatively easy assignment, mostly because the camera is trained on one stationary area. Wrestling, especially, always offers some colorful ringside shots—like the one above in which an opponent has been sent flying through the ropes.

Wrestling, especially, always offers some colorful ringside shots—like the one above in which an opponent has been sent flying through the ropes.

Completion of Miss Gestring’s dive
RODEO PHOTOGRAPHY
Cal Godshall

In this article, an experienced photographer of rodeo events gives you some important facts to keep in mind when photographing these colorful western shows. And he adds some interesting points in regard to rodeo etiquette—an important factor in this type of photography.

RODEO ACTION PHOTOGRAPHY is slightly different from any other form of photography because one has to take into consideration the constantly changing range, the element of danger to the photographer, and the fact that the contestants are making their living at the rodeo game. The photographer must not interfere with the action of the cattle, brahmas, or bucking horses, as this might turn out to be the difference between winning or losing to the contestant who has paid entry fees and his own expenses for a long trip to the rodeo—whose only recompense is what he may win from the contest.

Flashlight photos of bucking horses are very apt to stampede the horse into a runaway with no bucking. As the rider is judged 50 per cent by his own performance and 50 per cent on the performance of the horse, a horse that stampedes instead of putting all he has into bucking would lose an opportunity to get into the money which is offered as prize to the first four winners.

Standing directly in front of a bucking...
horse is not safe for the photographer unless he knows the action of the horse. Daylight photography of bucking horses will not spoil the action of the animal as would flashlight photos taken during a night performance. The photographer should remember that he can out-turn a bucking horse, but his reactions should be fast enough to enable him to turn inside “the loop” of a bucking horse if he wants to avoid injury. Bucking steers and bulls of the Hereford strain, or other strains of range animals, are not apt to charge or attack a person. They can be avoided pretty well by lying down on the ground—prone—if they do charge towards the photographer. Fighting brahmas are a different matter. Usually they are taught to fight and charge any person afoot. Lying down won’t protect you from this animal. If he can’t pick you up with his horns, he is apt to kneel on you. Therefore, when you are photographing brahmas and they come toward you—run for...
Russia but perfected by the American cowboy and cowgirl. Stock or cowhorse exhibitors use cowgirls for showing the workability of a well-trained cow horse. Many of these girls, called “Queens of the Rodeo,” are selected in competition for horsemanship and appearance. With their beautiful western costumes, they offer the greatest opportunity for beauty around a rodeo and, in action, are the pictures the papers and magazines are after.

Close-up pictures behind the scenes offer many great opportunities for character studies in western life. Little of this sort of photography has been done. Cowboys and cowgirls—the real thing—are a clannish sort of people who stick together, and do not push themselves forward. They possess natural modesty and are definitely not publicity seekers. Most of them are sons and daughters of more than one generation of pioneer cattle growers and people who developed the west. One can secure great candid action shots of this group back of the chutes as they prepare for their contest, helping each other, giving each other advice as to how to ride some bad horse or famous bull, getting a “riggin” (saddles or riding equipment) together, taking care of their ropes for a roping event, or just standing around the corrals in their rodeo work clothes.

Another thing, cowboys and cowgirls are the same type of upstanding American youth one finds in the air corps and other adventurous endeavors. Most of them have plenty of background. The photographer who treats them with respect will find that respect returned and he will be offered the cooperation needed to obtain good pictures. Cowboys have a certain type of western lingo, retained even after a college education, which sometimes is deceiving as to the type of character possessed by the American cowboy.

**TYPES OF SHOTS AVAILABLE**

Audiences see the action in front of the chutes and in the arena, but they never see what goes on behind the chutes—so dozen of opportunities exist back there to get a series of pictures of the livestock getting ready, the saddling in the chutes, the horse...
RODEO PHOTOGRAPHY

dling of the livestock behind and in the chutes, etc. For these pictures, it is necessary to get permission from the livestock owner or the arena director. Usually if you will give them copies of the pictures you make, they will be glad to help you get the stuff.

A summary of pictures obtainable at a rodeo might be as follows—

EVENTS

- Saddle Bronc Riding
- Bareback Bronc Riding
- Brahma Bull Riding
- Steer Riding
- Bulldogging or Steer Wrestling
- Calf Roping
- Single Steer Roping
- Team Roping and tying of steers
- Wild Cow Milking
- Wild Horse Saddling and Racing
- Trick and Fancy Riders and Ropers
- Rodeo Clown Acts

SPEED AND FOCUS

Speed, of course, must be determined by lighting conditions, but from 1/350 to 1/500

CALF ROPING. Insofar as entries and cash prizes are concerned, calf roping is the biggest event in the rodeo. Here are two steps of the event; top, showing the calf right after he has been roped, and bottom, the windup.

Photos, Duane Burdick
second are the best speeds to stop this fast action. Focus is hard to get because the photographer wants to catch the best action of the animal and the contestant, and therefore must wait until that action occurs before shooting. The best time to catch a bucking animal is on the peak of the upward jump. This is usually the time when all four legs are off the ground, displaying the most violent action. If taken from the front, the photo will show the face of the rider. If the rider bucks off at this peak, only luck will determine whether he falls off on the side of the photographer or on the side away from the camera.

Another important feature in photographing rodeo action is to try and shoot from the knees so that your subject will be wholly or partly framed against a sky background instead of up against a grandstand full of people. In some rodeos this is not possible, but in most arenas it can be accomplished. However, in getting to your knees for a good action shot, don’t fail to keep sufficiently alert in order to be able to jump quickly to either side if the animal turns towards you.

Most shots of rodeo action should be made on an estimated distance of about twenty-five feet. Try and get the action at its peak, or as near that point as possible. Most of the pictures illustrated in this article were shot at f/11 at about 1/350 to 1/500 second, depending on lighting. Fast film was used, with a focus distance of 25 feet. The f/11 aperture gives pretty good depth so that anywhere from twenty to thirty-five feet is fairly clear.

YOUR ATTITUDE

Photographers can be very unpopular in rodeo arenas or they can get along with no trouble at all, depending on how thoughtful they are of others. The interference with contestants, mentioned previously, will put a photographer in wrong with the cowboys. To be constantly standing up in the arena poised for something to happen, always in the way of the spectators, will make the man with the camera unpopular with the audience.

Keep down low at all times except just at the time of shooting. Then the action is so fast that one keeps clear of everyone.

Photographing rodeo action with Graflex or other types of cameras where the photographer has to look into a hooded finder is very dangerous because the bucking or performing animal looks far away in comparison to its actual distance. You are likely to be looking into the hood of a Graflex and suddenly look up to see the animal almost on top of you. The best type of camera is the Speed Graphic—with which all these pictures were taken—because one can keep both eyes open and use the large wire finder. The image can be practically centered and you can still see accurately just how far away the animal is. Then you have time to get out of the way after the picture is taken.

Another thing of importance in this type of photography is the film size. A 4 x 5 film with a 5½ or 6-inch lens will give the best results. One cannot always center the action of a bucking horse on the film, so a large field of film surface will help when finishing. The small candid cameras are not so well adapted because the field is too small.

Closeups like this one, showing excellent detail, make fine subjects for the alert rodeo photographer.

Photo, Andrew Crofoot, Jr.
SHUTTER SPEED MEASUREMENT

G. L. Tawney, Sc.D.
Sperry Gyroscope Company, Inc., Former Westinghouse Research Fellow

The accurate testing of shutters by stroboscopic light is fully explained in this technical article. Both the focal plane and diaphragm or iris type of shutter are used as examples, with formulas given for the actual computing of shutter speeds.

Illustrations courtesy of Photo Technique.

When objects move too fast through one's field of vision to be seen clearly, one loses all recognition of what is occurring. Many times one wishes to slow down the motion and study the progression of events more carefully. If one could see all the phases of motion of a camera shutter one would note the narrow slit in the blind of a focal plane shutter passing over the film and usually speeding up as it is driven along by a spring. In a diaphragm shutter one would see the gradual separation of the leaves, the open period, the closing of the leaves, and perhaps a final rebound after closing to give another shorter open period—a common failing of diaphragm shutters. If one could time these events as well, the measurements of shutter speeds would present no problem at all.

One method of recording all the vagaries in the action of a shutter is by high speed motion picture photography. Here the detail is great and the information relatively complete, although the expense is usually greater than the results justify.

Stroboscopic methods are of a similar nature and, although usually applied to the study of periodic motions, they can offer some simple solutions to the problem of measurements of shutter speeds. These methods are frequently dependent upon the "retinal lag" or "persistence of vision" of the eye. When a rapidly moving object (a camera shutter) is illuminated by steady light, only a blur is seen. If the same moving object were illuminated by a flash or a series of flashes of light, one image or a series of images of the object is seen, each corresponding to the disposition of the object at the time of one of the flashes. If the flashing is sufficiently rapid, the eye sees all these images at once. For the study of periodic motions the flashes must occur at a regular rate—uniformly spaced in time. Various devices for producing sharp regular flashes of light at a controlled frequency have been developed for use in stroboscopic studies. Several methods of measuring shutter speeds by the use of such a device will be described.

FOCAL PLANE SHUTTERS

First, consider the focal plane shutter at high speeds. For a Contax these are speeds above 1/125 sec.; for larger cameras, speeds above 1/25 second or thereabouts. The blind allows an exposure time determined by two factors—the velocity of transit of the shutter aperture, \( v \), and the width of the aperture, \( d \). From these we can find the length of time any point on the film is exposed to light from the shutter.

Let us illuminate or silhouette the shutter by means of a stroboscopic source flashing at a frequency, \( f \). If \( f \) is large enough, we will see several images of the shutter blind aperture when the shutter is released. The persistence of vision of the eye will permit us to estimate \( d \), the width of the aperture, and \( D \), the separation of successive images. From these, noting that the velocity is given by \( v = fD \), we can find \( t = d/v = d/fD \), the shutter speed. Here the accuracy will be limited by the ability to picture accurately the images as the shutter is released and to estimate the needed quantities \( d \) and \( D \).

Since the more accurate photographic method to follow depends upon making sufficiently large to provide from three to six or more images of the shutter blind aperture, this visual examination should always be carried out first.

Suppose we find that 200 flashes per second will be satisfactory, and wish to record photographically the images we have just seen. We load the camera with film (preferably fast) and set the exposure to 1/250 second. When the shutter is released, each time one of the flashes is received, a separate image of the shutter is recorded on the film.
THE COMPLETE PHOTOGRAPHER

indicated by the appearance of the print.

The acceleration of the blind is noted from the increasing values of $D$: $D_1$, $D_2$, $D_3$, indicating an increasing velocity. This variation of $v$ across the film produces a corresponding inverse variation in the exposure time allowed for different parts of the film. This is sometimes a serious fault in focal plane shutters. In the Contax the variation is such as to allow less exposure for the sky and more for the part of the scene below the horizon, which is desirable; for vertical pictures one side is given more exposure than the other, which is not desirable. Fortunately, the effect is too small to be noted readily.

DIAPHRAGM SHUTTERS AND SLOW SPEEDS

For the lower shutter speeds the aperture in the blind may be as large as the film itself and the method just given fails, with no simple means of knowing how many flashes occurred while the shutter was full open. Under these conditions another method, which is also useful for diaphragm or iris type of shutter, is available.

In this latter method the lens is put back into the camera (loaded with film) and the focus is set for the distance of the stroboscopic source. If there is relative motion of the camera and the source around an axis in the direction of travel of the shutter, a series of images of the source will be found on the film after the shutter has traversed it, as shown by Figure 4. If this series is approximately parallel to the edge of the aperture of the shutter blind, the number of

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FIG. 1. Set-up for testing a fast focal plane shutter, as described in the text.

FIG. 2. Print from a test negative, showing the stroboscopic flash exposures when testing a Contax focal plane shutter at (left to right) 1/125, 1/250, 1 500, and 1/1250 seconds. For analysis, see Figure 3.
images on the film is a direct measure of the length of time the film was uncovered.

With \( n \) spots and a frequency of flashing \( f \), \( t = n/f \). In Figure 4, there are 5 spots and \( f = 200 \), so that \( t = 5 \times 200 = 1/40 \) sec. For these slower speeds the effect of acceleration may not be as important as at higher speeds. It can be determined by taking several series of images one above the other on the film, thus giving the exposure for several regions.

When this method is used with the diaphragm shutter at moderate and high speeds, it gives no accurate indication of the exposure of the film, since the light intensity varies as the leaves of the diaphragm open and close, while the number of spots indicates nearly the total time the leaves were open, whatever the degree of opening. An estimate can be made of the length of the opening and closing shutter from the intensity of the images, but the accuracy will not be high. Especially at the higher speeds will this difficulty arise. Here it may be difficult to obtain a sufficiently high value of \( f \) with conventional stroboscopic equipment, and only two or three images will appear on the film. Thus, the stroboscopic methods may be entirely inadequate for the study of a Compur Rapid diaphragm shutter operating at 1/500 second. At low speeds the difficulties mentioned above disappear and accuracy will be satisfactory.

In Figure 5, two prints are shown, made by the method just given using a Compur Rapid shutter. Note that at a setting of 1/50 second the spots on the end of a series have less exposure than the ones near the middle, indicating the presence of stopping and starting transients. Maximum \( f \) was 240 per second, so results for higher speeds were of low accuracy. For 1/5 second, little if any transient is detectable. An improvement in accuracy is obtained by making a number of exposures as shown and averaging the results.

Since the camera can be more easily rotated than the source, this is the usual procedure. It is sufficient to rotate the camera in the hand, releasing the shutter just as the source comes into the field of the camera.

A THIRD METHOD

Another method combining the properties of the first two will finally be discussed. If we reconsider the first two methods described, we note that in each case we needed only a small portion of the film to record the information—one dimension. But two dimensions are available.

Suppose we have a long discharge tube flashing at a rate \( f \). It must be long in the direction of motion of the shutter. The lens is placed in the camera and focused on the discharge. When the shutter is released, the camera is rotated around an axis in the direction of motion of the shutter, as in the second method given. For low speeds we

**SHUTTER SPEED MEASUREMENT**

**FIG. 3.** Analysis of the various images, as shown in Figure 2

**FIG. 4.** Set-up for testing a diaphragm or iris type of shutter. Relative motion between the lens and camera produces a series of displaced images on the film
might be classed as stroboscopic. In general, they involve photographing rotating, oscillating, or freely falling objects, where velocities and times can be computed from some previous measurement or law of nature. Examples are the photographing of spots painted on a rotating turntable of a phonograph, or of the length of blur produced by a freely falling object.

Efficiency is defined for diaphragm and focal plane shutters as the time-average illumination divided by the maximum or theoretical illumination for any point on the film plane—the average being taken over the total time the shutter is open—whatever the size of the opening. For the diaphragm shutter this is best represented by:

$$\eta = \frac{1}{AT} \int_0^T \text{adt}$$

Where \( \sigma \) is the instantaneous area of the shutter opening, \( A \) is the maximum or theoretical area (the area of the aperture of the lens), and \( T \) is the total time of opening. For the method of measurement given, \( T \) is given by the number of spots and the average illumination must be estimated by the density of the spots (Fig. 5).

For the focal plane shutter, the efficiency can be shown to be:

$$\eta = \frac{1}{1 + \frac{D}{Fd}}$$

where \( D \) is the diameter of lens aperture, \( F \) is the focal length, \( d \) is the width of aperture in shutter blind, and \( e \) is the distance between the film and shutter planes. In the methods given, \( d \) is measured exactly if the aperture is small, and \( \eta \) is computed from measurements. It is obvious that \( \eta \) is dependent on speed and aperture for both types of shutters.

FIG. 5. Two prints made for testing a Compr Rapid shutter and taken with a General Radio Strobotac, showing presence of stopping and starting transient (see text). Left: 1/3.5, 30 flashes per second, marked speed—1/5 second, computed speed—1/6 second. Right: 1/3.5, 240 flashes per second, marked speed—1/50 second, computed speed—1/43 second

now have an indication of the length of time the shutter is full open—the failing which prevented the use of the first method with focal plane shutters at low speeds. Note in Figure 6, the analysis of the action of a focal plane shutter at 1/125 second and at 1/25 second. Here the information is very complete. The computation for the first is identical with that used in Figure 3. In the second, the three solid bars in the center indicate the passage of 3/100 second, while interpolation of the portions at the ends add .7/100 or 3.7/100 = 1/27 sec. With a more elaborate array of discharge tubes the motion of the camera can be dispensed with. Here a number of tubes are placed side by side and flashed consecutively by some mechanical switch.

So far it has been assumed that the duration of an individual flash was short—less than about 100 micro-seconds. It is possible to use sources excited by sine wave voltages. Here the images are no longer sharp and interpolation must be used between the adjacent images. Ordinary neon or mercury sign lights can be used and even special exciting apparatus can be dispensed with in favor of the standard 60-cycle supply, which gives f = 120 cycles per second.

OTHER METHODS

Many other methods of testing shutters
The speed of modern color film now permits the photographer to obtain unusual action pictures like this one, with speeds varying from snapshots up to 1/500 of a second in some cases.
COLOR SECTION

LOLA AND ASADATA DOFORA (above)

Two Kodatron speedlites were used to illuminate this African ceremonial dance scene. Kodachrome for artificial light and Type II Kodatron bulbs were used in making this picture at f/8 and 1/10,000 second.

BARBARA MORGAN

ANTIAIRCRAFT GUNNERS (left)

A strong color photograph taken at night with artificial flash illumination.

WILLINGER
HIKERS (above)

THE ORGANIST (right)

Strong close-up compositions are very effective to show interesting details in color

From Free Lance Photographers Guild

From a Kodachrome Original
The use of large simplified color masses give good color composition with all the interest focused upon the welder.
SKATER AND DANCER

Sequence action pictures in color have a fascination . . . especially when the model is a pretty girl. These fast action pictures were taken for Look magazine.
THRESHING (above) SPEEDBOAT (below)

Photos from The Milwaukee Journal

FRANK SCHERSCHEL
ACTION PHOTOGRAPHY FOR AMATEURS

Wyatt Brummitt
Editorial Writer, Eastman Kodak Company

Good action photography can be informal and yet dramatic in its immediate appeal. In this story the author introduces the elementary steps in covering action with all types of cameras. Main thing is to work within the limits of your equipment. Read the following pages for a full discussion of picture positions, panning, high speed action, candid action, and just ordinary information often overlooked on this important subject.

Give a youngster a camera—a simple little box Brownie, for example—and very likely his first question will be, "How fast does the shutter work?"

When you tell him it's somewhere around 1/40 second, he'll mutter, "Jeepers!" and scurry off. In a day or so he'll bring you his first pictures, one of which is a fire engine screaming down Elm Street. Maybe, by your sophisticated standards, the picture isn't so hot; but Johnny is not only satisfied, he's vastly pleased.

He has a right to be. And if he isn't too early inducted into the mysteries of higher-speed cameras, he can encompass a lot of good action pictures with that little box of his. In fact, all of us, novices and otherwise,
can learn much about picturing action if we deliberately concentrate for a spell on the possibilities of the common, ordinary, everyday snapshot speed of 1/50 second.

As Einstein pointed out, all speed is relative. And in action photography it appears that Mr. Einstein has something. For our humble 1/50 is quite capable of stopping very zippy action if we handle our cameras cannily. Our young friend with the Brownie and a yen for fire engines probably stumbled on the basic rule for stopping action with a slow shutter. That rule, translated freely, runs thus: Catch 'em as they come, not as they pass. There's a corollary to the rule, too. It reads, somewhat cryptically, the faster the farther.

For most of us an action picture is something spontaneous and utterly natural—something like this, which is a classic picture. It was made at 1/25 second.

The instant before the ball goes into play is the time when many excellent sports shots can be made, and at relatively low shutter speeds. 1/50 was used here.
To prove this rule, which is not in the least arbitrary, go down to the railway some day when a freight is rumbling along. As you stand there, looking up the track from a point fairly close to the right-of-way, you can easily distinguish the markings on cars which are half-a-dozen car lengths away from you; but as those same cars go bounding directly past you, you have to swivel your head in a frenzy to see more than a blur. The ease with which your eye discerns those details is comparable to the ease with which a slow shutter can glimpse them for your camera. In other words, catch 'em as they come, not as they pass.

You can also prove the corollary during your visit to the railroad. Take a good look, if you can, at the cars passing closest to you. Then move back fifty yards or so, and look again. Cars are still moving directly across your axis of vision, but now there’s no blur; you can see each one distinctly. In short, the farther you are from the motion, the easier it is to “stop” it with your eyes—or your camera. As the speed of action increases, so must the distance increase, if you’re to have sharp negatives.

There’s a chart accompanying this article which, I hope, clarifies the situation. Let its lesson sink in. Then, when you start using your higher shutter speeds again, you’ll understand not only the how but the why.

PICTURING ACTION—A NEGLICATED ART

It’s an odd sidelight on our national camera habits that many of us neglect the possibilities of action pictures. We may start out—boys and young men, especially—in a hke frenzy of picturing action, but we tend to become conservative. Possibly, it’s because we flaunt the rules, attempt the impossible, and are sobered by our failures.

The fact of the matter is that many an action picture can be successfully and satisfyingly achieved with simple, slow-speed equipment if we apply the basic rules, plus a few other factors which are pretty much common sense. For example, some of the best action pictures do not attempt to capture action in full cry; they picture, instead, the poised, tense moment just before action is released. A pitcher all
wound up, ready to throw, implies action more vividly at that moment than at any other. And at that instant a relatively slow shutter speed suffices. Similarly, an archer just before he releases an arrow, a baseball player poised to steal second, a diver on tiptoe ready for flight, a bird dog on point. All such moments are eloquent with action, yet they are relatively quiet.

There's another moment that bespeaks action—that which comes at the end of the follow-through. Here again, action itself is either absent or sufficiently slow to permit its capture with snapshot shutter speeds. The baseball pitcher serves again as an example. He has released the ball and, for an instant, is poised—arm and leg extended—as he watches to see what the batter does to his offering. True, pitchers differ in style; but a little study of a player's mannerisms will give you a clue to the moments at which his follow-through can best be pictured. In golf, rowing, and in such field sports as the shot-put or the discus throw, you'll find it easily possible to get good action material by concentrating on the follow-through.

There's a third phase of some sports which can be pictured with surprisingly slow shutter speeds but it takes, as the English say, a bit of doing. This might be called the peak moment—the instant of rest between rising and falling action. You'll find such moments in fancy diving, in the pole vault, in basketball, in soccer, and in some forms of dancing. In every instance, however, your success will depend on (1) your familiarity with the sport, (2) your own reaction time (the time between your brain's command and your trigger finger's execution of that command), and (3) the extent to which you are following or departing from the basic rules of direction and distance.

The instances of activity which can be pictured at approximately 1/50 second cannot be completely cataloged, but it is entirely safe to say that the list is longer than you suspect. With a little understanding, plus skill, you'll find remarkable satisfaction in mastering problems that others, less knowing and skillful, seek to solve only in terms of the higher shutter speeds.

**PANNING**

Before we turn to those forms of action which can be mastered only by high shutter speed, there's one other type of speed picture which, with a bit of skill and care, can be handled at ordinary snapshot speed. If you wish to photograph a speeding motorcycle, automobile, motor boat, or airplane, and your equipment is limited to a shutter speed of 1/50, or thereabouts, you can get some alarmingly good results through the use of a technic known as "panning," or panning.

What you actually do in panning is to convert your speeding subject into a relatively motionless one by the simple expedient of swinging the camera in pace with the subject. Here's Prof. Einstein again.
The technic goes something like this. First, set your focus for the point at which your subject will buzz past you. If the distance is about 100 feet, so much the better. Very well, take your camera firmly in hand, with the shutter cocked and ready. Now, sight through the view finder up the track toward the oncoming speedsters, pick out the one you want to snap, and follow it in the finder as it comes. By the time the speedster is opposite you, you'll be swinging your shoulders as you follow the action with the camera. Fine! Now, the trick is to trip the shutter at the right instant without interrupting the smooth swing of the camera—not to mention your whole torso. To make sure of a smooth swing, follow through, as in golf.

The resulting picture will, we hope, show your subject cleanly and clearly. But everything else, fore- and back-ground, will be a pattern of horizontal streaks. You may discover that this liability is really an asset, for the horizontal lines serve as "speed lines," to accentuate the sense of speed in the pictures.

Obviously, panning cannot be applied to foot races or horse races, for in those instances your subjects do not move as a unit—feet and bodies are not moving together. The feet are doing a lot of scrambling to keep the bodies moving ahead. Within its limits, however, the panning system is a very present help in time of need. Practice it and have it on tap, in your photographic bag of tricks.

HIGH SPEED SUBJECTS

There are, of course, many forms of action photography for which high-speed shutters are absolutely essential. As your shutter speed increases, so also is increased your need for good light, fast lenses, and fast film. In recent years, the advent of the synchronized flash has solved the light problem for reasonably close-up shots of action. Scarcity of flash-bulbs, however, has forced most of us to rely on existing light and to increase emphasis on lenses, films—and our own skill. The matter of exposure is not strictly within our province at the moment, but it cannot be ignored. Unless you balance your high shutter speed with generosity in aperture and film speed, you cannot expect to obtain satisfactory results.

Parenthetically, it's worth noting that the truly high-speed action pictures of today (and tomorrow) are not made in terms of fast shutters. Flashes of light lasting
1/30,000 second or less do the trick. The equipment is costly and is not likely soon to be available to other than the specialists.

In general, to revert to our primary concern, the forms of action which call for speeds beyond the ability of slow shutters are (1) those in the “danger” zone of our chart, (2) those in which the action is scrambled, as in a game where there’s much movement in all directions, and (3) close-ups of swift moving or unpredictable subjects.

It is only the extraordinary situation, however, that cannot be handled successfully by shutter speeds found on the better conventional cameras. The need for speed in excess of 1/400 or 1/500 is limited to a very few situations, most of which you can by-pass by choosing a more favorable angle or distance. If you happen to have one of the few
THE COMPLETE PHOTOGRAPHER

This fine action photograph taken by Arthur Griffin really typifies the American boy in action. Note the glowing pride on his face, the oversized sweat shirt, pants, and shoes.

cameras offering shutter speeds up to 1/1000 you are in the position of a man with a 500 h.p. car; he can either take up racing as a career or can resign himself to the use of his car's full power on only the rarest occasions. You, with your high-speed camera can specialize in high speed work—or be content with a top speed of about 1/400 for 99-2/3 per cent of your picture making.

A tabulation is included below which specifies shutter speeds in terms of the speed of the subject being pictured, its distance from the camera, and its direction, relative to the camera. It is, in effect, complementary to the simpler chart referred to earlier.

CANDID ACTION

A few years ago there was much to-do about "candid" pictures—unposed pictures of the great, near-great, and un-great, snapped by lurking photographers equipped with miniature cameras. The rage died down as it tended to overstep the bounds of good taste.

The basic idea of candid photography, however, is still perfectly good. Unposed portrayals of unaware subjects can be at once interesting, amusing, and in perfectly good taste. A gardener mopping his or her

### TABLE OF SHUTTER SPEEDS TO RECORD SUBJECTS IN MOTION

<table>
<thead>
<tr>
<th>Subjects in Motion</th>
<th>Approximate Speed of Subject in Miles per Hour</th>
<th>Distance of Subject from Camera</th>
<th>Motion Toward or Away from Camera</th>
<th>Motion at About 45° Angle to Camera</th>
<th>Motion Right Angles to Camera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscapes Including Slowly Moving Water</td>
<td></td>
<td>Beyond 25 ft.</td>
<td>1/50 to 1/100</td>
<td>1/100</td>
<td>1/400</td>
</tr>
<tr>
<td>Pedestrians, Slow-moving Animals</td>
<td>5—10</td>
<td>25 ft.</td>
<td>1/100</td>
<td>1/200</td>
<td>1/400</td>
</tr>
<tr>
<td>Construction Work, Street Traffic</td>
<td>50 ft.</td>
<td>50 ft.</td>
<td>1/50</td>
<td>1/100</td>
<td>1/200</td>
</tr>
<tr>
<td>Boating, Children Playing</td>
<td>100 ft.</td>
<td>100 ft.</td>
<td>1/25</td>
<td>1/50</td>
<td>1/100</td>
</tr>
<tr>
<td>Athletics, Baseball, Yacht Races</td>
<td>25 ft.</td>
<td>25 ft.</td>
<td>1/200</td>
<td>1/400</td>
<td>1/1000</td>
</tr>
<tr>
<td>Horse Racing, Motor Boats</td>
<td>40 ft.</td>
<td>25 ft.</td>
<td>1/100</td>
<td>1/200</td>
<td>1/400</td>
</tr>
<tr>
<td>Surf Diving Views from Trains</td>
<td>100 ft.</td>
<td>50 ft.</td>
<td>1/100</td>
<td>1/200</td>
<td>1/400</td>
</tr>
<tr>
<td>Auto Races, Motorcycles</td>
<td>60 and up</td>
<td>100 ft.</td>
<td>1/100</td>
<td>1/200</td>
<td>1/400</td>
</tr>
<tr>
<td>Airplanes, Fast Trains</td>
<td></td>
<td></td>
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</tbody>
</table>
brow after a hard bout with weeds; a youngster at a bubbling drinking fountain; Doc’s concentration over a poker hand; Bud struggling with a rebellious lawn mower. These are typical subjects to watch for and to get.

Getting them is primarily a matter of your own alertness. The shutter speed should be sufficient to stop casual movement at close range; usually 1/50 will be adequate.

Sometimes the light conditions will not be really favorable. In that case you’ll have to allow maximum exposure, lens wide open and shutter slowed down to the slowest snapshot speed. Candid photography, as a “school” of photography, flourished in terms of f/2 and f/3.5 lenses. If your camera has no such fast lens, your field of operations is perforce limited, but even ordinary cameras can master many a candid situation. The emphasis falls, of course, on your own skill —your ability to find and capture pictures within the capabilities of your equipment.

STOPPED ACTION DOESN’T MAKE A PICTURE

It’s all very well to “stop it cold,” but if the result isn’t good as a picture, you can hardly claim complete success. For one thing, composition is just as important to action pictures as it is to still lifes. The type of composition best suited to action photographs is, naturally, dynamic. A static, centered, placid composition can discount the pictorial sense of action, while a dynamic, rhythmic composition adds to it. Watch the lines of your picture; let them lead into rather than out of the picture area. Give your action room to happen in.

Sometimes action can be too completely stopped. It becomes hard and brittle. For example, you probably have seen pictures of exploding surf which so utterly stopped the action that the water lost its fluidity and became stony. It’s far better, in such cases, to let a little motion creep in.

Another point to remember is this: know beforehand what you want your picture to show. If you’re making tennis pictures, brush up on your own game so that you refresh you sense of tennis values: of form, of vital, meaningful attitudes. You may discover that a shot of Doc poised at the net, as he waits for Bill’s cannon ball serve to which past him, is more interesting than one of Bill as he gyrates into his serve. Don’t attempt football pictures, or baseball, or fencing, or swimming, or basketball pictures, unless you know what the most pictorial moments are. Good sports news cameramen have an instinct for those moments.

KNOW YOUR CAMERA

Whether your intent is to make ordinary domestic action pictures or pictures of a more specialized type, it’s essential that you know your camera perfectly, understand its capabilities and limitation, and work with it, rather than fight it. Only time and experience can give you that understanding, but you can accelerate the process with a little study and experiment.

Use a film that is fairly fast, but remember that film speed isn’t the primary desideratum. Shutter speed is more important. But most important of all is your own appreciation of what makes a picture.

The cascading water was not "stopped cold" by the Brownie which made this picture, yet that very fact adds to the interest and sense of motion in the picture.
The use of motion picture photography in teaching sports has grown to such an extent that, at present, almost every large school in the country employs a regular staff member to photograph their athletic events. This type of photography requires a technic of its own. The author, who has been doing it for many years, explains its fine points.

Motion picture photography can be used advantageously for coaching in the classroom if the events and subjects being taught are photographed properly. This article explains the proper way of getting the desired results, as used by the writer through the past ten years at the University of Minnesota.

The first consideration in the filming of an event should be the position from which it is taken. To my mind this position, with few exceptions, should be some distance from and above the subject. For instance, let us take football, which has come to be the most widely photographed athletic event. Nearly all large schools now have a member of their staff take movies of their games so that they may show these pictures on the following Monday or Tuesday to the team members, pointing out to them the mistakes of the preceding game. The best position from which to film a football game is in, or on top of, the press box, as near to the center of the field as possible. At Minnesota, the writer has a position in the front row of the press box on the fifty yard line, a distance of 225 feet from the center of the football field. Since the press box at this institution is en-

A panoramic photo of the field of play. This type of shot is re-run for the players the Monday following the game in order to point out errors, places for improvement, etc.

POSITION

Having decided the spot from which the event is to be filmed, the next consideration is the lens to use. From the above-mentioned position, a short lens would cover a large area; in fact so large that it would include a considerable portion of the football field in closed, there is an opening in the glass approximately 15 inches high and 30 inches long. Directly behind the center of this opening is a block with a tripod head upon which the camera rests.

LENS AND SHUTTER
MOVIE ANALYSIS OF SPORTS AND ACTION

which there would be no action, and the images would be very small. Therefore, it is necessary to use a telephoto lens of a length that would bring the players closer to the photographer and at the same time cover the field used by both teams when in play. On the kick-off both teams are pretty well spread out and, by using a 2-inch lens, we have found that the field of vision is about one-third that of the entire playing field, taking in all of the players on the opening play. This, of course, is in the larger stadia. After the kick-off it will be necessary to switch to a longer lens, say a 3- or 4-inch lens, depending upon the distance of the photographer from the playing field, but governed by the field of vision taken in by the longer lens. This longer lens should cover the players of both lines and the offensive backfield before the ball is put into play.

Most colleges today use the 4-inch lens. Our thought concerns the speed of the camera. Since the slightest motion of the camera will cause a blur with a telephoto lens, it is necessary to eliminate this fault as much as possible. This can be done by speeding up the action of the camera, which will produce slow motion on the screen. Since the rate of normal action of a camera and of a silent projector is 16 frames per second, the camera should be adjusted to run at a rate of speed such as 32, 48, or 64 frames per second. The writer has found 32 frames per second to be more suitable than the higher rates of speed because in the normal running of the projector the motion is not monotonous, and will give the coaches and team plenty of time to see what has transpired. Moreover, the projector can be reversed and the play run over and over again if the coach or players wish to view any particular play more than once. If the photographer can anticipate what the offensive team is going to do—for instance, pass—then it will be rather pleasing to get that particular play at 64 frames per second, keeping in mind that as the speed of the camera is increased, so must the lens opening be correspondingly increased.

FOLLOWING TECHNIC

The last consideration is how to film the game so that the whole play is on the screen. If the play is going to the right, the ball-carrier, who is generally the man behind the interference, should be on the left edge of the screen, thereby having the right side of the screen covering the ball-carrier's interference and the tacklers of the defensive team.

On a punt or kick-off, do not follow the ball in the air. On the kick-off follow the players down the field. On a punt, hold the camera on the kicker until the ball has been kicked and long enough to know that the kick was not blocked, then move the camera slowly down the field and pick up the ends of the kicking team and follow them to the ball-receiver. No coach is interested in what the ball is doing in the air, but they are interested in knowing whether the ends going down under the punt are getting down the field or are being blocked out. If the ends are kept on the back side of the finder, the camera will catch the ball-carrier when tackled. In this manner, the coach will have a picture of what has transpired on the field even when the ball is in the air. The main object to keep in mind is that the coach and players are interested in what they can see happening on the field of play. If a player breaks loose through the line or around end and is out in the open, the photographer should keep the ball-carrier on the front side of the screen in order to catch any tacklers coming in from the rear. On a forward pass, if low, keep the ball on the top of the screen;
Sometimes the camera records an amusing incident, high in human interest value. In the two pictures above, within the circled area, an official of the game is being tackled by mistake by the players.

but if it is a high pass it is best to follow the ground under the pass, moving the camera so the receiver will appear in the finder just before the ball gets to him.

OTHER USES

Fundamentals of football may be staged by the coach for instruction purposes by having a player make different blocks, tackles, passes, punts, pass receiving, place kicks, drop kicks, and fundamental line plays showing positions and movements of both offensive and defensive teams. These pictures should be taken at 64 frames per second with a short focal length lens from a position that will cover the material desired to the best advantage. On individual work, ground level photography is acceptable, but for team work a position which looks down from above will give the best view of all players and their positions.

While the coaches and players are interested in each and every play of the game, the general public is more interested in exceptional plays such as vicious blocking and tackling, a sensational catch of a pass, or open field running. With this in mind the writer, at the conclusion of each football year, has made up a film called the High Lights of the Season. This was inaugurated in 1933 and has been continued each year. This film shows the good plays made not only by Minnesota, but by all their opponents. Among these plays often appear some very amusing incidents such as the official getting dumped on the ground, the ball being stolen and a touchdown being made by the ball-stealer. Sometimes an official is blamed for a poor decision and the films show him to be right or vice versa.

OTHER SPORTS

Films can also be used in other athletic events. They can be taken with the same precision and care but with varying speeds of the camera, depending upon what is to be derived from the films. For instance, in track, the field events should be taken at 64 frames per second, but when a star performer is available it is advisable to operate at 128 frames per second. This will show the muscular action and other fine details of technic. The camera should be focused so that the image completely fills the frame. The running events can be taken at different speeds such as the hurdles at 64 frames, the 100-yard dash at 32 frames, the 220- at 48 frames, the 440- at 24, and the 880- or over at 16 frames per second.

Basketball should be taken from an elevated location on the side near one end of the court. From such a position the playing area can be covered with a minimum amount of camera movement. The speed should be 32 frames per second.

Ice hockey, an extremely fast game, should be taken at not less than 32 frames, from an elevated position above the center of one end of the rink.

Diving is grace itself. It should be taken at 128 frames per second with a 4-inch lens, and at a distance far enough away from the diver to permit the diver nearly to fill the frame. Such a distance from the diver requires only slight movement of the camera to follow the performer from the board to the water, even when the dive is made from a very high tower. The participants of this sport are often photogenic mermaids, making it the ideal sport to photograph. It is often photographed in slow motion.
While we have mentioned a few of the athletic events to be taken, there are numerous others, such as golf, baseball, tennis, badminton, squash, handball, and the grip of bat, racket, or club as the case may be. The lens should be focused on a point about midfield or at the most central point of action. Most of the time the focal point may be at infinity. However, with the telephoto lens, sharper pictures may be obtained by focusing either with a visual focuser on the camera or by determining the distance from camera to the central point of the activity being photographed.

**Equipment**

There are three choices of film that can be used, namely, color, reversal, and negative. Each of the three has its advantages and disadvantages. Color film is slower than the other two and requires a brighter and more even light. On a bright day the color film will produce a beautiful picture. However, the film must be sent to one of the very few processing laboratories, and requires a long time for its return. Reversal film can be had in varying speeds and is more adaptable, although it requires about the same time for processing and must be sent to a special...
processing laboratory. Because of the above conditions regarding reversal and color films, the writer uses negative film. The advantages of this film are: first, it can be processed by a local firm and the positive print returned to the photographer sooner; second, duplicate prints can be made at once or at any future date without keeping the original print from use.

When using negative or reversal film, the photographer must keep in mind the fact that the finished product will be in black and white and proper color separation should be taken into consideration. The writer has found that a green filter will darken the maroon numbers and lighten the gold suits of the players of the Minnesota team. The use of filters should therefore be considered in respect to the separation of colors when negative or reversal film is used.

It is advisable to have two cameras if possible. Each camera when loaded will use one hundred feet of film, and while one camera is being used the second can be loaded by an assistant. This combination will prevent the loss of a single play. When using only one camera it is necessary to reload during the play. As this takes about two minutes, a most important play may be missed by the photographer. Often this particular play is the one the coach would have wanted most to see. In the early days of taking pictures, the writer experienced this catastrophe. Since that time he has used two cameras.

Lenses should be kept immaculately clean for the best results. In cold weather, when going from indoors to outdoors, lenses should be carefully checked as they will fog the same as eye glasses, and should be cleaned before attempting to take pictures. One of the best ways to clear up the moisture on a lens is to blow upon it but not with the breath as this will make the fog worse. The writer carries a small syringe or bellows for this purpose. The syringe is also useful in blowing dust or lint off the front of the lens.

Some times it becomes necessary to shoot pictures in damp or rainy weather and on these days the camera will get wet. At the first opportunity the camera should be thoroughly dried. The writer has found the use of a hair drier very good for this purpose. The warm air from the drier will not only force the moisture out of small places in the camera, but will also dry spots impossible to get at with a cloth.

To keep the camera from sticking in extremely cold weather the use of a chemical heating pad held against it occasionally will keep it from freezing.
In this picture the photographer has waited for the peak cycle of the vicious actions of the dogs. Imagine this same picture with the three dogs quietly posing and looking at the camera. The contrast from complete repose to peak action is tremendous.
Muybridge used the camera very effectively to study the action cycles of people and animals. These photographs were made about 1883. Muybridge set up twelve cameras which were automatically released when the horse ran through a strong thread stretched across the track.

Even in the early days of snapshot photography action played an important part. This photograph was used in the Museum of Modern Art Exhibition, The American Snapshot.
The system of taking action pictures used by Muybridge was not mechanical. The photographs were made at quick intervals showing the cycle of certain actions. However, today the photographer can use his camera with more freedom to record the expressive cycles and peaks of action.

IN THE SPRAY

The spraying water forms an unusual background pattern for these youngsters who are playing in a fountain. From the Museum of Modern Art Exhibition, The American Snapshot.
The partly blurred effect of flying rice and the moving couple is very important in this picture made at an average shutter speed of possibly 1/50 of a second. If a high shutter speed had been used such as 1/500 or 1/1000, the action effect would have been killed because the flying rice would not have left streaks as in the case of the slow speed. Here is where it is important to use a slower speed to heighten the action results. From the Museum of Modern Art Exhibition, The American Snapshot
In this picture the simple action of the girl blowing the seed parachutes of a dandelion gives the active charm of the scene. Here again we can imagine just a posed shot of the girl looking at the camera. Without the animation it would have been just another ordinary picture. From the Museum of Modern Art Exhibition, The American Snapshot.
The "ing rain heightens the central action of the airplane propeller which was photographed at night with artificial light. The surrounding darkness helps to concentrate the action interest toward the center of the picture.

From The Folmer Graflex Corporation Exhibition, Graflex Sees the War

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The slow heaving action of the ocean is framed by the parts of a Navy destroyer. The ships in the distance are more intimately related to the protection of the destroyer because of this use of skillful foreground framing.

From The Folmer Graflex Corporation Exhibition, Graflex Sees the War
By using an extremely high shutter speed, the photographer has arrested the violent action of these two skaters. Here is where a high shutter speed was used to good advantage in order to stop the motion long enough for more detailed study.
This baseball photograph is packed with action among the spectators as well as in the players. This picture won first prize in the sports class at the Eighth Annual Exhibition of the Press Photographers Association of New York, Inc. Photographed during the game between the Yanks and Cleveland.
Here is one of the many remarkable photographs which are being made by photographers in World War II. This dramatic scene shows allied bombers and fighters striking to soften axis defenses. The paper trails mark the paths of the escort planes.
THE NEWS PHOTOGRAPHER IN ACTION

Carl Thusgaard
Former Photographer, Acme Newspictures

In a news picture, the human element is all-important, which explains why the news cameraman’s view finder takes in such a variety of people. The scope of the news photographer’s work in relation to people is told in this article, which includes covering police cases, society news, features, celebrities, and sports. And the author’s four simple rules for success are well worth noting.

All photographs by Carl Thusgaard for Acme.

People make the news. In other words, human nature is an important element—the most important element, I should say—in the making of news pictures. It is the press photographer’s first job to be enough of a seeing and feeling human being so that he can get the expression and human interest in his work which the editor and the public of today demand. The stiff posed shots are a thing of the past; with the rapid development in recent years of photography as a medium of public information, the picture that “tells the story” is the one most wanted.

Since the advent of synchronized flash photography a much greater variety of indoor shots is available to the editor and the public. It is now possible to catch the fast changing expressions of an animated public speaker (a good example of changing expressions in a speaker is Mayor Fiorello H. LaGuardia of New York) or expressions of people conversing with one another, shots of couples dancing at a society party, and many others. This naturally produces much more interesting material for public consumption.

Tact and diplomacy are important qualities for the press photographer to have in photographing people. He will also do well to make a practical study of psychology and become acquainted with the many quirks of human nature. The immediate state of mind of the subject is an important thing to know. If a person has just achieved the greatest success of his life, and you are to make his photograph, it is usually a pretty safe bet that he will be quite agreeable and will cooperate in letting you make the shots you need. In a case like that, the exalted state of the person’s mind will often reflect in the facial expression and thus work in your favor.

On the other hand the person to whom a great tragedy has just occurred presents a much greater and more difficult problem. Here tact should be used, and it would be well for the photographer to acquaint himself with as many details concerning the story as are available at the time.

Police Cases

When Mrs. Edgar J. Lauer was to be released from prison after serving a sentence for customs fraud, I was sent to the Women’s House of Detention on the West Side, from where she was to be released at midnight. There were several photographers covering the story, and as we were waiting in the rotunda outside the prison, Judge Lauer arrived a little before midnight. I certainly could appreciate the way the Judge and Mrs. Lauer would feel about publicity in this case, and I sympathized with their plight at this time—but you can’t let sentiment run away with you when you have a job to do.

This story was hot at the time, and I know that the editor would not have thought much of my ability as a press photographer had I not brought back a picture of Mrs. Lauer leaving the prison. There were four of us photographers, and we approached Judge Lauer in a body trying to convince him that he and Mrs. Lauer should pose at the prison exit with their chins up. In ordinary circumstances and in an ordinary frame of mind a man of Judge Lauer’s intelligence and background would have listened to the logic of our arguments, but at this time he refused to speak to us. He was then admitted to the prison office, and I knew that the only chance...
we had of getting a picture of them was to catch them on the fly.

When they emerged through the prison gate, he tried to shield their faces as much as possible with a fan and the result was that I got a shot that shows part of their faces, thus making a much better news picture than if they had walked out with their heads high. From their point of view, however, it would have made a much better impression on the public had they not covered up.

An outstanding example of peculiar and unfortunate trends in human nature is the murder case of Edward Haight who raped and murdered two little sisters, Margaret and Helen Lynch. I was assigned to go to Bedford Village, N. Y., to cover the search for the bodies of the murdered children. Police and firemen, civilian defense workers and volunteers were dragging through the dark waters of the Kensico Water Reservoir for the body of young Margaret when I arrived. This was where Haight had told the police he had thrown the body. It was about 11 p.m., and grappling hooks and underwater lights were used for a long time without success.

In the meantime, Haight was sitting well guarded in a police automobile. I don’t think it was known to the crowds that were gathered at the scene that the murderer was right there—if they had, it would have been difficult for the police to protect him.

When I made a shot of him in the back of the police car with the officer sitting beside him, he had a silly smirk on his face. A newspaperman is supposed to be impartial and not to take sides, but in this case my impulse was to throw the camera at him and wipe that expression off his face rather than to take the picture. However, I did snap the picture and recorded that expression. I hope that it has helped show the public what type of criminal he was. Fortunately the law took swift action in this case and Haight will never again commit such a crime.

**PICTURING CELEBRITIES**

The press photographer seldom has difficulty in getting pictures of people in public life. For instance, stars of radio, stage, and screen are usually very pleasant and cooperative subjects. When you realize that good publicity is essential to their success and that they know well the oft-repeated saying that one good picture tells more than a thousand words, this attitude is logical and easily understood. In fact many of the stars often give you ideas for gag pictures.
I recall one instance with Joe E. Brown, the well-known movie comedian, on board a luxury liner returning from Europe before the war broke out. Ethel Merman, well-known actress, was another prominent passenger on the same ship. Just as we (the ship news photographers) had posed Miss Merman in the conventional ship manner on the rail with her legs crossed, Joe E. Brown walked up, grabbed a camera from one of the boys, and soon had everybody, newspapermen and passengers alike, in stitches with his antics in making believe that he was posing Miss Merman on the rail. This was a swell shot as it was out of the ordinary, and this was proved by the excellent play it got in the dailies.

Politicians and people in public office are cooperative for the most part, and appreciate the problems confronting the photographer in getting the shots required for his publications. Candidates running for high public office are photographed innumerable times during their campaign tours, and they show an almost unexhaustible patience in cooperating with the lensmen.

On the occasion of Willkie’s campaign for President, I was assigned to follow him around when he was in New York City, and when I say that I was provided transportation with the official party with screaming police sirens and speeding automobiles, it may sound like an easy assignment. But it was far from that. Wherever the party went there were crowds, and it is very important not to get caught in the crowd, for the official caravan does not wait for anyone but Willkie, and when he is there the cars leave.

Part of the New York City itinerary for that day called for a stop at a rally in the Waldorf Astoria Hotel, and the next stop after that was the lower East Side. On leaving the Waldorf with the party, I was unfortunate enough to get caught in the crowd that closed in behind the candidate, and by the time I had fought my way out in the clear in the driveway the last car was pulling away. By sprinting after it I managed to leap on the bumper of this large open touring car filled with plainclothesmen. I rode on this bumper all the way down to the lower East Side with my camera bag on my back, my camera in one hand, and holding on for dear life with the other, as the car was traveling at a high rate of speed without stopping. I slid from one side to the other at each turn. But had I missed the car, it would have been impossible to catch up with the party again.

**CHILDREN IN FEATURES**

Children often figure in the news, and they are a most welcome subject for any news cameraman. From my personal experience I find that pictures of children, “cheesecake,” dogs, and monkeys, (rated in that order) have the best chance of being published as features. For the information of those who are not familiar with professional slang, “cheesecake” means pictures of good-looking girls with a goodly portion of their legs appearing prominently in the picture.

Considerable patience is often required in working out feature shots with children, but the photographer often finds himself rewarded with unusual expressions or actions of his subjects. My children have often been put through their paces by me to make unusual shots that have been reproduced in papers all over the country. On a number of occasions I have been in the “doghouse” with my wife for trying to make what she terms impossible shots with the children. She has always forgiven me, however, when she saw the results.

There was a time I made a hot-weather shot of our daughter, at the age of three, cooling off by sitting in the refrigerator eat-
ing an ice cream cone. Another time she was placed in a barrel of water with her little Boston Bull pup, both of them licking an ice cream cone. Many times children produce excellent results without posing them.

If the cameraman can gain confidence, he can often catch certain desirable expressions on the children's faces while he is talking to them on some subject that interests them, or if they are watching something that absorbs their entire interest. If it is desirable to make your subjects smile (and this applies to grown-ups as well as children) and if your time does not permit you to wait for a natural smile, try to make your subject say "Gee." This will produce satisfactory results in practically any case.

**SOCIETY NEWS**

Society is usually a pleasant assignment. The most difficult thing about it is to get names accurately. Society people are pleasant to the press photographer whether you meet them at the opera, a ball, or the races. The debutantes and the younger set are always good copy.

A few years ago a party of debutantes and their dates went on an amusement trip to Steeplechase Park at Coney Island. The tour was sponsored by the Stork Club and I was assigned to go with them and make some feature shots of them having a good time. What struck me in particular was their ability to enjoy themselves and as far as pictures were concerned they were most cooperative. When the evening was over I came back with a series of pictures which showed these young people enjoying themselves thoroughly in many of the different amusements in the park.

In most cases the society assignments are known to the editor well in advance of the time they occur. Thus, photographers who are assigned to the job have a chance to dress if it is required. There was one occasion where I had no warning at all on a very important assignment. I was covering a routine dinner assignment at the Waldorf Astoria Hotel when I made a check-in call to the office (when on assignments one must keep in touch with the office at intervals) about ten p.m. My editor then instructed me to rush right over to the old town house of Mrs. Cornelius Vanderbilt at Fifth Ave. and 51st St. There was a ball for the benefit of the USO and at the last minute it had been ar-
THE NEWS PHOTOGRAPHER IN ACTION

ranged for one photographer to take shots for all the syndicates and dailies. It was apparent that Acme should supply the photographer and the Acme desk decided that I should do the job.

Upon arriving at the mansion in a taxi, I felt quite out of place in my light suit among the formally-dressed guests. If the old mansion had been able to express itself it surely would have raised an eyebrow, for—as I was told by one of the servants—this was indeed the first time a press photographer had been permitted to make pictures in this sacred abode. Fortunately, I soon became so busy that I did not have time to worry about my uneasiness.

There were many prominent people present, and Mrs. Cornelius Vanderbilt was at the head of the receiving line when I arrived. I made a shot of Mrs. Vanderbilt greeting the guests upon their arrival, then wandered through the different rooms and made shots of groups of people.

About midnight, the office sent a messenger over to pick up the stuff I had already made. I stayed there until about 4 a.m. At that time I had a number of other shots: a picture of a young society couple sitting under one of the huge tapestries holding hands, and a man dozing off in the corner of a sofa in the huge library.

There was one of these Bund meetings in a hall on 86th St., which was a "honey." We got a flash in the office that there was trouble at the meeting, and I hopped into a cab and was up there a few minutes later. There was a guard at the door in a storm trooper’s uniform, who informed me in no uncertain words that photographers would not be tolerated at the meeting upstairs. I turned around as if to walk away, but as the guard was busy talking to some other person, I managed to slip behind his back and up the stairs.

Upon reaching the first landing I heard a terrific rumpus coming down toward me. As yet I could not see what it was, but I backed off into a corner of the landing, and set my scale for the distance to the last step coming down. Then things developed fast. Three men appeared, one in a storm trooper’s uniform, pummelling another unfortunate man all the way down the stairs. They were so busy with their bloody work that they didn’t notice me for a moment, but as soon as I let the flash go they took a great deal notice of me and left their victim in order to chase me down the stairs. Fortunately for me I reached the relative safety of the street before they caught up with me. It finally came
out that a group of Jewish war veterans had gone to the Bund meeting and had protested some of the proceedings, whereupon the Bundists had given them a severe beating. The shot I got on this assignment was a dramatic one, clearly showing the brutal methods of the Bundists.

It is this sort of thing, I guess, that makes the life of a news cameraman an exciting venture.

**SPORTS**

Another large group of people confronting the lenses of the press photographers are the athletes. They offer by far the widest variety, and often most outstanding, of facial expressions, as well as thrilling action. In getting photos of athletes in action, the photographer cannot pose his shots but must usually wait until they confront him.

This calls for split-second timing and, in many cases, the cameraman must anticipate the action. The speedlamp tube which has been used in the last few years for sports photography has been instrumental in securing many unusual shots at the extreme speed of 1/10,000 second.

**CAMERA TECHNIC**

Many think that the success of a press photographer lies in his ability to operate his camera. Naturally, he must be extremely familiar with the mechanical operation of his equipment, but this is comparatively simple. The most important thing for him is his ability to mix with people, to know "the ropes," and to know what and when to shoot.

In other words, you must be able to pick your shots and make them count. Of course, one cannot expect to get a picture published each time the shutter release is pressed. To work on the basis of the law of averages, which is to make a large number of exposures on one subject in order to get one usable one, is fundamentally unsound and does not speak well for the good judgment of the cameraman.
Among the major metropolitan newspapers and syndicates the average runs close to half of the exposed shots being published. This average percentage of pictures used, probably runs much lower in the case of many of the picture magazines.

If you are assigned to make posed shots of a person, it is important to try to get a plain background, except in cases where a certain background has a definite bearing on the story at hand. The impression a picture makes is too often reduced by a background that contains pictures on the wall, a table with flowers, or other disconcerting lines or figures that tend to draw the attention away from the main subject. Whenever possible, select a plain and neutral background.

CONCLUSION

The work of the press photographer need never get monotonous. Human nature—which has a fascinating basic sameness—is constantly varying, too, and the press photographer who pictures people will never lack interest in his subjects if the interest is human. A few general rules will apply in most cases.

1. On spot news assignments with fast moving developments, shoot your picture first and beg people's pardon afterwards. Do not adopt an apologetic attitude on any assignment. You have a right to do your work and you have a right to take people's pictures if they feature in a news story.

2. Use common sense in solving your assignment problems. Try to put yourself in the place of your subject and it will help you to understand his attitude better.

3. Be quick on the trigger—particularly on sports assignments.

4. Be a gentleman at all times.
It would be hard to find the person who fails to recognize the appeal in this picture, which goes back to something familiar in their own experience.

CHILDREN IN ACTION

Helen Post
Child Photographer, New York City
All photographs by the author.

Being one of those persons who got into photography rather accidentally, I cannot help being influenced by my earlier work in education. From this background I bring my conviction that the photograph has almost limitless possibilities as a teaching medium. We have seen two examples of the application of this theory become stronger and stronger in recent years: one, the mushroom growth in popularity of photographic journalism; and, two, our most extraordinary collection of public documents of life in these United States, the work of the Historical Section of the Farm Security Administration. Photographs have been accorded a place among the tools of our national government. They speak a democratic language, understood and appreciated by a widely diversified audience.

Despite the recognition of the many uses of the photograph, people are only beginning to realize the extent of its educational use. In the interpretation of the democratic way of life ahead of us, I believe we shall see even greater developments. There is a directness about photographs, a plain-spoken quality which fits in with American realism. Formality in photography is giving way rapidly under the influence of the documentary school.
We like calling people by their first names, seeing them in their work clothes, hearing them say what they think. The true action photograph lets the reader come almost dangerously close to the subject, exposing all the little imperfections.

We have made some of our best advances in informal photography through child photography, probably because (unless they are asleep) it is easiest to see children in action, and next to impossible to prescribe any foolproof way to control their actions. The nicest thing about photographing children is their freedom from preconceived notions about photographers and picture taking. Rare is the adult who doesn't feel more charitable toward his dentist than his photographer. This is largely our own fault. We have been bogged down too long in the static interpretation of people come to "sit for a portrait." Finally, perhaps, because children so frequently react so badly to being trotted to strange places, the photographer has become "mobilized" and accepts the discomfort of carrying heavy equipment, in favor of having his subject in a better mood.

Another of our great sins is that of too great dependence on retouching. Working with children has shown us the desirability of freeing ourselves from the heavy burden of long hours of retouching. Pictures taken while the subject's features are in static condition leave the observer time to look carefully at every little imperfection which during ordinary changes of expression are never noticed.

It is very important to be generous with time in working with children. The approach to each individual child is different. The child must never be allowed to feel that the photographer is under pressure. The camera is not important until the child has either forgotten it or decided to disregard it. You may have to go through a lengthy technical explanation to satisfy their natural drive for knowledge; or you may even have to allow yourself to be photographed. Once the equipment you use is familiar, and con-

Even in the quiet of the expression of the sleeping child, the detail of this picture contributes to the whole impression. Note the fly on her forehead, the presence of which does not disturb the expression of complete relaxation.
confidence is established, you are free to begin investigating the subject’s personality.

At this point I wish to expand on the subject of school photography. It used to be that schools had to halt all study and proceed almost in the manner of a fire drill to receive the photographer. Somehow, a few photographers woke up to the richness of the crop of pictures which could be made inside the school. Schools began to realize the
value of the photograph to show education in the process, a subject which teachers found difficult to put into words. Educational methods have been changing, parents and the general public had to be convinced. So where there has been any outstanding educational experiment, you will find there has usually been the use of the photographer to help put it across.

These same photographers had to be educated to see what the school wanted to say; because it is essential to recognize learning in action in order to photograph it. You can't pose it. Demonstrations staged by a teacher who chooses a few students to represent her group at its best are far from accurate, and usually make dull pictures. We now have a corps of photographers who are flexible enough to go into a school without interrupting any of the normal routines and come away with pictures of children which document the learning process.

Teachers and pupils alike are asked only one thing: to ignore the antics of the photographer, no matter how close he may creep, or Action does not proceed at a constant rate of speed, but usually follows a somewhat rhythmical pattern in which there are times when, even though the composition contains all the elements of dynamic motion, the subject is still for a moment.

Pictures that record qualities about a child that parents like to remember, ought to build up into a series which tell parts of, if not the complete story of a child's growing up. Apple eating is not the best pose for a picture which is made up by the dozen, but it is pretty nice as part of a group of pictures to which a few were added about once in eighteen months. Above (left) an apple eater grown up enough to know quite a lot about a phonograph record (right).
Mothers separated from their children while working on production lines do better work knowing their offspring are receiving the best possible protection from the strain of war in well-run child care centers.

(Below) Factual pictures about children have double meaning to parents with a serious job to do. The solidiy of the soldier John is modeling (left), or the plucky determination in Billy's face (right) as he concentrates on the tune he whistles, can do a lot for a father's spirits.
YOUNG BRAVE. This 15-year old Sioux boy, son of an Indian cattleman, is dressed in the dancing costume of his tribe. He wears a head-roach (made of porcupine bristles), beaded arm bands, long underwear dyed yellow, fur, and leather decorations. The boy was participating in the tribal celebration held annually by the Oglala Sioux on the Pine Ridge Reservation in South Dakota.
turning up in education and there are few photographers available for civilian use. The need is growing for semi-professionals who know and enjoy children. There is a job to be done. The story of the home front needs to be recorded and it has to be done with restricted film and natural light—both excellent disciplinary factors.

An illustrated letter to a relative in the service, a report to the community on a child care project, a record of the work done by the older children as part of their contribution to the war effort—these are a few of the purposes a home-front photographer may have.

In regard to publications, the demand for pictures of children to be used in books for young people has been steadily growing. Children like pictures of other children doing familiar things. In preparation of reading material being published in two languages for Indian School use, the Education Division of the United States Indian Service presents an interesting experiment. The photographic illustrations for Ann Clark's *Brave Against the Enemy* are documentary.*

*Brave Against the Enemy—Ann Clark and Helen Post. Published by the Education Division of the United States Indian Service. Printed and sold by Haskell Institute, Lawrence, Kansas, 75c paper bound copy.

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When children are completely absorbed in their work, and unaware of being photographed, they make excellent studies. Note the rapt concentration of the boy above, the tongue thrust out between his teeth, the natural position of hands which really are at work, how foolish he may look standing on tables, bookcases and window sills.

At present, many new developments are
HIKING WITH A CAMERA
Hulbert Burroughs

The western part of the United States is a hiker's paradise when it comes to photography. But no matter where you live, the advice the author gives here on hiking with a camera will stand you in good stead.

All photographs by the author.

For infinite variety and spectacular beauty of scenery there are probably few places in the world to equal the great American West. From Mexico to Canada and from the great Rockies to the Pacific, lies the photographer's long-sought paradise. Towering Sierras, desert palm oases, eternal snows, giant Sequoia forests, hidden lakes, extinct volcanos, wild game, prehistoric Indian cliff dwellings, rocky coasts where the pines dip down to the sea, fantastic rock formations—all offer an endless file of subjects for the lensman.

There is no better way to attain the fullest appreciation of all this superb scenery than on foot with a camera. Having a camera on a hike seems to make you look a little deeper, a little longer, for all the rich beauties that are to be found. What is more, you bring back with you a permanent record of what you did and what you saw.

Hiking in the West can be as simple or as elaborate as you choose to make it. A day or half day's stroll through the woods and mountains, or an all summer backpack trip over the High Sierra's John Muir Trail—each raises the same questions in the mind of the photographer-hiker. How can I make the best pictures and have the most pleasure on my hike? What's the best type of camera to take on a hike? What kind of film and filters? The easiest way to carry my camera, meter, film, and other accessories? What shall I shoot to get the best story-telling pictures of my hike? Finally, where shall I go for a hike?

WHAT EQUIPMENT SHALL I CARRY?

First of all don't burden yourself down with heavy, cumbersome, and unnecessary equipment. The less you carry, the less fatigued you'll be, and that's mighty important. Remember the three essentials of a good picture—a camera, film, and an idea. Without the idea, fancy cameras and a multiplicity of gadgets won't help much, except perhaps to work off a few extra pounds. On longer hikes when pack animals are used for the camping equipment, you can, of course, take along extra accessories which can find a place on the pack.

Light-weight miniature cameras are ideal. But any camera that is light and compact with carrying case and shoulder strap will do. Unless you want to be a "Westoner," stick to the light outfit—an 8 x 10 view camera gets pretty heavy after the first...
hundred miles. A good exposure meter, a sunshade, and filters should complete your essential equipment. A light telescoping tripod might be included, but is not important. In the western mountains short thunder storms are frequent; hence it is wise to include a light waterproof bag or covering for camera and film.

As to the type of film, the medium speed panchromatics seem thoroughly satisfactory for black and white photography. Fine-grained emulsions like Eastman Panatomic-X and Agfa Finopan are excellent for outdoor work and well suited to the use of filters. If you are shooting color, Kodachrome is undoubtedly the best emulsion available to date.

WHAT TYPE OF PICTURE SHALL I SHOOT?

Before starting your hike, establish roughly in mind what sort of picture you want to shoot. Are you particularly interested in landscapes with beautiful clouds? Sunsets? Action along the trail—your fellow hikers doing things? You might try a picture story of the entire hike in sequence—members of your group loading up for the trip at the beginning, action shots on the trail, beautiful scenery along the way. If it’s an overnight hike, there can be shots of camp preparation, later a campfire scene. In other words, take pictures of the sort that will recall to your mind in the years to come just exactly what you did on the trip. Make your pictures tell a story.

Don’t think just because you’re surrounded by beautiful scenery that landscapes are the limit of your photographic subjects. Landscape pictures are naturally a part of your trip, but a batch of pictures showing nothing but landscapes grows a bit monotonous. They are but one of the countless things you’ll see and want to shoot.

Have you ever noticed the interesting patterns and designs that occur in the bark of trees? A close-up of the rugged bark of a redwood can make a swell picture. Have you ever sat enraptured at the edge of a mountain stream and watched the velvety texture of the water just as it flows over the edge of the smooth slippery boulders? Have you ever thought of photographing it? Have you ever noticed the shafts of sunlight knifing down through the trees and striking the smoke from your campfire just at sunrise or sunset? Have you ever come across one of those ant hills in the Sierras with the huge black ants pouring in and out? How would it be if you are a back-packer out for an overnight hike. Burdened down with bed-roll, food supplies, and cooking utensils, you are apt to find picture taking along the trail rather discouraging if you cannot easily operate your camera. To have to explore through your pack to find a carefully hidden meter is no fun. It is even more exasperating to see a good picture loom into view—perhaps a wild animal poised momentarily in the trail—only to have your camera just out of reach on top of your pack.

HOW SHALL I CARRY MY CAMERA AND SUPPLIES?

The method of carrying camera and equipment will vary of course with the individual and his outfit. Whatever method you use, it is well to bear in mind two main points: 1) freedom of leg motion in hiking, 2) the ease with which you can unsling your camera and put it into operation.

The first of these is particularly important. It is tiring to walk long distances carrying something in either or both hands. Your arms should be free to swing along easily with your stride. Some hikers stuff their pockets with film, sunshades, light meters, filters, etc. Others sling the camera over one shoulder and the gadget bag over the other. The latter method gives a well-balanced load. I’ve tried both ways and found disadvantages to each. Recently I solved the problem for my own particular case by making a sort of photographic cartridge belt to go around my waist. To an old belt I attached several small leather pouches—one to hold 3 rolls of film, another my light meter, still another for sunshade and filters. Each pouch is easily accessible. I don’t have to unload an entire gadget bag or fish through my pants to find one small filter. There are no uncomfortably bulging pockets. My camera is slung easily over my back, thus leaving my hands entirely free.

The second point mentioned above—the ease of getting your camera and equipment into action for a picture—applies particularly
HIKING WITH A CAMERA

LANDSCAPES. Left: The headwaters of Lake Mead are excellent hiking grounds in the spring and winter months. The red cliff walls offer numerous composition possibilities, especially to the color shooter. Right: Late afternoon in the High Sierras is the time for sunset pictures such as this.

to try a close-up with your portrait attachment? Those ants are pretty big and you could probably get the shot. What about an intricate spider web with the early morning sun sparkling on the dewy fibers? How about some silhouettes of a fellow hiker or two against a glowing sky just after the sun goes down? Someone on the hike will get a good blister or two. Why not get either a close-up of the foot and blister or one of the poor guy doctoring it? It’s silly but it’s good for a laugh when you look at the picture in years to come. After all isn’t that largely why we take our pictures? It is for the fun

Campfire shots at night are always appealing. This one was shot at f/3.8, 1 sec., on Superpan Press film.
we'll get when the hike is a thing of the past and we want to relive those moments of fun and excitement.

WHERE SHALL I GO FOR A PHOTOGRAPHIC HIKE?

Now that you've determined the infinite possibilities of things to photograph on a hike, let's find a place to go. The West offers an unlimited variety. Some of the best, perhaps, are the National and State Parks. Well-built trails offer easy access to remote beauty spots unassailable by the motorist. Yosemite, Yellowstone, Grand Teton, Mt. Ranier, the Garden of the Gods, the Valley of Fire, Grand Canyon, Bryce Canyon—all offer scenes of beauty ranging from the most cataclysmic to the exquisitely delicate.

Enhancing the charm of these western scenes is a crystal clear atmosphere with scattered cloud masses sweeping across the skies, both of which offer problems to the photographer. A clear atmosphere means less haze, a deeper blue sky, with a consequent need for less filtering. In fact in many cases a proper exposure on a panchromatic film obviates the necessity of a filter at all. In any event a lighter filter will do. But experiment with one or two filters yourself. Try Aero 2, a “G”, and a red. Take a few exposures of the same scene with and without them. It's the best way to learn. You might like the effect of a darkly filtered sky on some of these vigorous Western landscapes.

During the last few years more and more people have been turning to mountain pack trips in the High Sierras for their summer vacations. Many rent pack mules and saddle horses, but an increasing number are treading the high National Park Service trails on foot. Some use pack animals for their camping equipment. The more rugged gluttons for punishment back-pack it over 10,000- and 12,000-foot passes. In the region adjacent to Mt. Whitney—highest peak in the U. S.—there are deep lakes, snow, rushing streams and rivers teeming with fish. There are gigantic rocks; there are open meadows surrounded by pines. There are pictures in almost any direction.

The desert regions of the Southwest offer splendid hiking opportunities in the cool winter months. In southern Arizona, the Saguaro National Monument is unique and presents some remarkable photographic studies. In Southern California there are countless desert canyons which at first sight seem to be as barren as the Sahara but which harbor thousands of palm oases where cool springs and even running streams are found. Recently burned Palm Canyon near Palm Springs is a much visited oasis. There are many such canyons still unnamed. New ones are constantly being discovered. To
HIKING WITH A CAMERA

Yons de Chelly and Del Muerto. Here there are fantastic pre-historic cliff-dwellings. There are two superb hikes in northernmost Arizona. One is from the Rainbow Lodge to the famous Rainbow Bridge; another from the lodge up 10,000-foot Navajo Mountain from which can be seen an awesome panorama to the north over territory that has never been completely explored.

Just north of Flagstaff is an extinct volcano over 12,000 feet high—the San Francisco Peaks. Superb snow scenes are on every hand. Even in early summer there is much snow. Southwest of Flagstaff is Oak Creek Canyon whose flaming red walls and lush forests are perhaps among the most beautiful in the west.

There are countless other places that could be mentioned. Thousands of little canyons and hidden lakes perhaps unnamed are waiting to be explored with a camera. It is not so important where you go as it is that you go with your eyes always open.

In snow-capped peaks, there are plenty of good ones in this region. Most of them are snow covered the year around. Mt. Hood in northern Oregon is an inactive volcano whose beautiful snow crusted slopes are ideal for wintry scenes. In the summertime Hood is not difficult to climb. In the winter it is one of the best skiing grounds in the world.

Massive Mt. Ranier in Washington is a dangerous climb, but there are many trails around its lower slopes that offer spectacular views of its crevasses and glaciers. Here is a mountain whose gigantic proportions suggest Himalayan peaks.

Portions of New Mexico, Arizona, and Utah are little known to the average traveler. The Navajo Indian country is a wonderland of interesting rock formations. There are endless walks under guide service in Can-

DESERT SCENE. Palm trees and rock masses offer the hiking photographer a rich field for pictures in the Southern California desert.

MOONLIGHT SHOT. A time exposure by full moonlight, looking down the slopes of Mt. Baldy in Southern California. Note the lights of the two towns in the distance. A flashlight played for a few moments on the trunk of the overhanging tree brought out some detail. Moonlight photography has interesting possibilities.
Creating thrills for the camera is an exact science in Hollywood. The stuntmen of the movies are specialists in taking risks for the camera. Rolling an auto over, tumbling down a flight of stairs, or sitting near an explosion are everyday routine, performed with exactness to make dramatic camera shots and to bring realism to the screen.

Each stunt is carefully worked out, each phase of the action is controlled by preparation, so once the action starts, the entire sequence fits a pattern according to the requirements of the script. While most stunts are out of control once they start, yet by coordination, timing, and able handling of equipment, the entire stunt fits a fairly predictable routine. The stuntman knows, and may tell the cameraman, “I will roll the car twice, will land here, and the car will come to rest on its left side.”

STUNTMEN

The best movie stunters have been at it twenty years or longer, and each of them has specialties. Allen Pomeroy rolls autos over; Harvey Parry does fights and water stuff; Mary Wiggins doubles for movie stars and does risks, although her specialty is diving in front of autos; Clifford Lyons works with horses, as does Yakima Canutt who came to the movies in 1923 after being at various times the World’s Champion Bronco Buster, Bulldogger, etc. Since then he has been doing, among other things, “movie bulldogging.” This is usually used in Westerns where the hero jumps or rides alongside the villain’s horse and drags the villain off, ending by both rolling down a hillside. Canutt has done this about five hundred times. He has let wildly galloping horses drag him scores of times, and can outline just how the action will unfold so the cameraman with camera car may follow and get the best angles.

At present the studios are concerned with war films and the stuntmen are recreating battle scenes for the screen. There are shots of tanks being blown up, men under shell-fire, and general war action. Allen Pomeroy recently completed a shot in which a tank supposedly hit by shell-fire was demolished by fire. He was in the tank, wearing an asbestos suit, and after a satisfactory film with shooting flames was made, the tank was returned to the army undamaged.

The powder men working with the stuntmen have fires and flames they can turn on or off, and explosions whose force can be controlled and directed while the stuntmen are within a few feet. In one such scene in a war film, the stuntmen were in a shell-hole playing the part of enemy machine gunners. The script called for everything to be blown up, including the men, and for a shot of them flying through the air from a direct hit by shell-fire. An explosive force was placed in a special barrel which directed the force away from the men; around the barrel were the men with smaller explosions for effect. Then when the layout was set, the explosions were set off and weighted counterbalances heavier than the men catapulted them. Cork in the explosion photographed like rock, fuller’s earth, the light debris added to the explosive effect. Often, air under pressure is used for explosion effects. It is harmless but it photographs like a powder explosion.
PHOTOGRAPHING MOVIE STUNTS

MOVIE STUNTMAN. Most Hollywood stuntmen have a specialty. That of Allen Pomeroy, one of the best stuntmen in the movie capital, is jumping motorcycles. He has jumped them as far as 60 feet for the movies.
By experienced control, autos, motorcycles, or wagons are blown apart with stuntmen riding them. Allen Pomeroy several times has ridden motorcycles over explosions to get film scenes showing man and motor blown into air. It is relatively dangerous because proper timing and a control over the action during the entire scene, even though the motorcycle is going 60 miles an hour, must be maintained. Pomeroy has perfected a system of doing this, in which his motor wheel trips the explosion just after he and the front wheel are past the part of the explosion that would
is often required for proper story values. The top of the auto is braced and reinforced, only enough gas to get it to the spot is used in order to eliminate fire hazards. Glass is removed, and handles in the car floor are installed for the stuntman. These he grasps and holds until the car comes to rest. So perfect are these preparations and timing of the stunt, that the movie camera often moves in for medium close-ups.

By running the camera slower than normal, the action seems speeded up. Such shots are seldom made at high speed because the thrill is greater on the screen if the action is blurred with speed.

WESTERNS

Horse stunts in Western thrillers have long been a favorite field for good action stunts. Recently, however, societies for animal cruelty prevention have stopped some of the more dramatic stunts, although the animals were injured less than the audiences believed they were. Such scenes are now supervised by members of these societies. One such was the “running W” in which horse and rider were thrown in a somersault. This was done by putting hobbles on each of the front feet of the horse; a cable was tied to each hobble and up to the saddle girth through a ring. The other end of the cable was anchored and when the galloping horse came to the end of the cable he and rider were thrown.

There are only about twenty stuntmen in Hollywood, of which five or six stand out. While they have tricks in doing the stunts, the actual proficiency is in “timing” and fast thinking. Most of them will say that bravery is not what counts, but planning and knowing how. Pomeroy has dived out a window three, “twice,” high onto a lawn actually in the lawn out of camera view was nothing more than some empty cardboard shipping cartons covered with a mattress. The cartons, along with properly relaxed muscles, absorbed the shock.

Often the pace of the film sequences is speeded up, and thrills added, by the angle in which a scene is photographed. Cattle stampedes have been photoed by the cameraman in a plank-covered trench so the running cattle run over the man and camera. This

Yakima Canutt, whose specialty is horse stunts, is shown in the act of bulldogging other stunters for a sequence in a Western. Canutt has earned as much as $33,000 a year doing stunts like this one

injure him. The actual trick and drama of the shot comes from his knowledge of knowing how to throw his own motorcycle. Seldom is a stuntman permitted more than one “take”; the shot must be right the first time.

Few pads, straps, harness, or similar protective devices are used because these men have found it necessary to be limber and relax their bodies to absorb the physical jar. The risk of tumbling down a flight of stairs or falling is largely eliminated with relaxation of muscles.

“Rolling autos” or diving them off cliffs
PHOTOGRAPHING MOVIE STUNTS

low angle with the cattle charging to and over the camera has all the essentials of thrill photography. Camera booms weighing over twenty tons that maneuver the camera and cameraman to any position are used to obtain tricky angles. Cameras are put on skates, skis, strapped to planes, etc., to get shots that follow the action. Seldom is the camera stationary because the camera must flow with the rhythm of the movement on the screen, must move with the tempo of the action being filmed, in order to make the screen seem in first person. Movie audiences prefer films that are in first person so that they may project themselves onto the scene and vicariously live the enactment of the screen action. The more closely the camera follows the action, the more impact the film has. To do this, much equipment is used: perambulators, miles of track to keep the camera steady, booms that maneuver the camera up or down stairs, over water, or into or out of scenes. The movie camera seems to have wings.

PROCESS SHOTS

Processes that broaden the camera horizons and increase its scope have been developed. The glass matte process is used to bring to the screen shots that otherwise could not be had. It consists of a combination of painting on glass and real set construction. The desired portions of the set in which the actors may work are built, then a huge piece of glass is set before the camera between it and the set. On the glass is painted the desired scene in a proper perspective. The camera then photographs the painting and at the same time through clear portions of the glass it pictures the action on the real set, combining the two on the movie film.

Another process widely used is the “process shot,” used to obtain street scenes, boat shots, or scenes with dialog that would be impossible without the process. Dialog and proper action in traffic, for example, could not be obtained as desired. For a street scene, an auto is placed on a platform or “parallel” in front of a projection screen. While the actors deliver their lines, a motion picture of the desired street and action is projected onto the screen. The movie camera photographs both the real auto and actors in front of the screen with the projected movie to combine the two. While actually the auto is stationary or only rocked, the movement on the screen just behind the auto and actors gives the illusion of movement to the car.

Nothing is less desired on the screen today than static films. To the stuntmen, camera-
MOVIE FIGHT. One method of filming a fight is shown above. Left: The top of a box car construction is built in front of a "process screen." Right: The car remains stationary while the picture on the screen moves.

men, and special effects departments goes much of the credit of making movies more active and real.

EQUIPMENT

The equipment used in shooting in the studios or movie stars' homes varies with the job to be done. While a Graphic is used for all around work, the miniature camera is used on the sets where it is necessary to shoot without speed flash or without interrupting other activities. The miniature camera is used for this type work because of its high-speed lenses and silent operation which permits the taking of stills during a "take" while the movie camera is "rolling."

The high-speed optical equipment on the miniature camera permits the taking of pictures without speed flash while the scenes are being enacted for the movie camera. I find that the miniature camera also serves a purpose because the results obtained with it give a more candid quality where that type of photography is required. Sometimes in telling stories with pictures, a candid casual quality documents the picture and adds a note of reality.

For my own work I prefer a Contax for a small miniature, although I have found the larger negatives of the Rolleiflex and Medalist preferable. The larger negatives give better quality and are not harmed as easily in darkroom accidents. Both my Medalist and Rolleiflex are synchronized with Sol flash equipment. The Medalist is synchronized with a special arrangement wherein the tripping arm of the synchronizer thrusts through a hole cut into the side of the helical mount of the lens and shutter assembly.

For sequence action work I have a machine-gun camera built out of a Sept mechanism. Starting with a Sept camera I added a special pressure locking device for better registration of the negatives during exposure and added a higher-speed lens. Leaves were added to the circular shutter to change its degree according to the shutter speed required, thus enabling shutter speeds from 1/60 of a second to around a possible 1/1,000. I also have an air camera, which though seldom used in the movies, has its use in the military stories I have done. This camera has various desirable features for air work. The whole camera is water- and wind-proofed with protective flaps for the lens. The flaps open up during exposure and are controlled by the same lever that makes the exposure. A curtain makes the exposure and an automatic self-cap closing feature permits winding shutter without capping lens. I use the same magazine film carriers on this camera that I use on my other Graphics.

In fact, wherever possible all of my equipment is interchangeable. All my battery cases on some 15 cameras are interchangeable. Sol permanent mounts are adjusted to each camera and any battery case or other equipment will work on the camera whether it is a miniature or a 5 x 7 Speed Graphic. For kodachrome work, particularly in shoot-
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ing covers, or where a larger negative is required, I have a 5 x 7 Graphic that has a rangefinder and is synchronized for a front shutter speed of 1/150 of a second as well as a synchronized rear curtain. I have used a 5 x 7 camera in shooting kodachrome with No. 31 flashbulbs at 1/295 of a second using the rear shutter. Daylight kodachrome may be used with blue gelatine bags or filters over the bulbs to raise the color temperature to about 5400 K. My other Graphics are 3½ x 4½ in size, of which I have found three necessary, and the equipment of anyone of these cameras is interchangeable. I prefer on the Graphics to use the shortest possible lens, preferably a 4½-inch Zeiss Tessar. The distortions and characteristics of the shorter lens may be used for narrative values and to give character to the pictures.

The illusions of slenderness or stockiness may be given a subject by using a shorter lens, a requisite often needed in fashion and glamour pictures. In addition to the covering power of the shorter lens it is possible to add a definite quality of composition and architecture with proper use. I have in addition to short lenses, a Carl Zeiss snap-on lens which still further shortens the focal lengths.

Each of my Graphics are equipped with a two-lens night-focuser device, the power for which is taken directly off of the battery.

All the electrical cords from the battery case to the synchronizer are covered with rubber tape over which is a plastic guard cable to insure overall wear instead of bad flexing or kinking at particular points. Broken copper wires in any speed flash equipment offer severe problems to the photographer in that the resistance becomes greater in the wire if any copper strands are broken, thus throwing off synchronization. Since the greatest wear and “point of trouble” in electrical speed flash cable is adjacent to the plugs, I mold a rubber composition around that point which sets into the properties of rubber, thus slightly stiffening and protecting the cords at that point. I never use speed flash cords on high voltage because the high voltage oxidizes the copper and often pits or adds carbon to the contacts which again makes synchronization unpredictable.

All equipment is light with a view of mobility and portability. It is essential in going into a movie star’s home, or anyone’s home for that matter, that the home is not unduly cluttered up with ponderous or un-

SONJA HENIE. Here is one camera setup used to film the skating star on ice. The camera is placed on runners and maneuvered around the ice to follow her. Notice the ice skates on the technicians.
sightly photographic equipment. I believe if a photographer walks in with clean-cut equipment there will be better cooperation in the subject and less resistance if more time or all-out cooperation is required. The photographer today should avoid moving furniture and making it a point that the home is not unduly disrupted as the result of the photographic setting.

All cameras or photographic equipment must be designed to fit the purpose for which it is used. Around the movie sets where extreme silence is necessary I have a “camera blimp.” It is made of metal and lined with sponge rubber. The camera may be operated from the outside. I also have available an under-water case designed to hold a Leica in which the camera shoots through optical glass and all controls are operated from the outside. The case is small enough so it may be carried around the neck while swimming.

In shooting kodachrome I use a three-way device at the camera which permits the firing of three globes simultaneously. To speed up operation the device is equipped with slip sockets. To avoid the necessity of carrying blue or more than one kind of bulb, I have an arrangement in which a blue filter is used over the colorless bulb to raise the color temperature to that desired for shooting speed flash with daylight type kodachrome. This filter carrier is so designed that it may be readily snapped into place for taking kodachrome, or removed for black and white fixtures.

To avoid possible breakdowns on equipment and the risk of misses on the job, all equipment receives such care that insures smooth operation. All metal parts are oiled with fishoil, even to the reflectors and battery cases, to cut down rust or corrosion. The latter is treated with Neatsfoot oil and colorless wax on all camera cases.