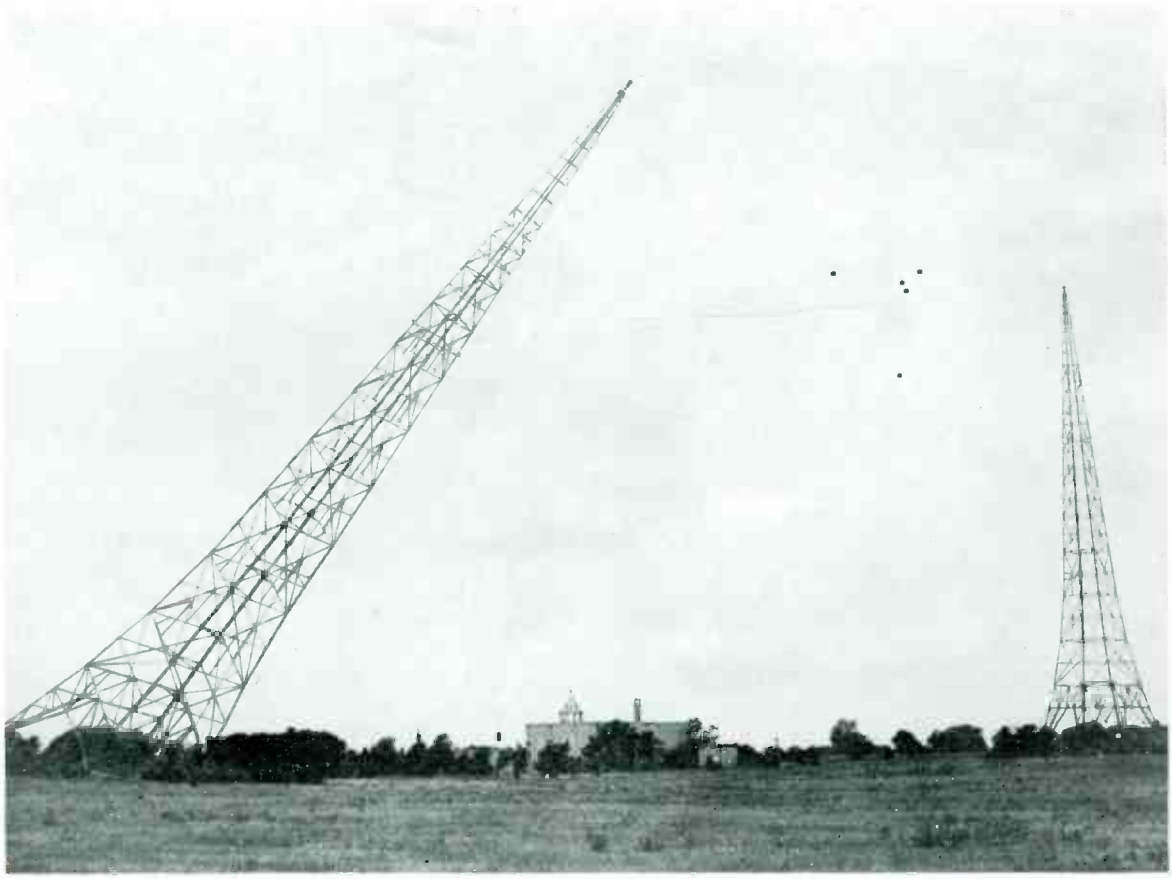
A·I·E·E JOURNAL

DIRECTED TO BROADCAST ENGINEERS AND EXECUTIVES



Old WENR Towers Razed—See Page One

OCTOBER [*Photographic Issue*] 1940

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NBC is your Answer! There are two outstanding NBC services available to radio stations for building audience-commanding local commercial and sustaining programs.

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OUR COVER

A lot of the old timers will shed a tear when they learn that the old WENR, Chicago, towers were razed recently. These two 300-foot towers were built in 1928, and at that time were the highest in the Chicago area. Long a landmark for Downers Grove, Illinois, they have been part of an historic transmitter that ground out many old favorites like the WENR Minstrels, Mike and Herman, The Smith Family, and a host of others that will never be forgotten. Radio, young as it is, moves forward with a swiftness that makes the yesterdays seem like dim memories when tomorrow comes.

Each tower weighed almost forty tons and was brought down by cutting off a few vital members near the ground, and then buckling the "knees" of the tower with cable and winch on a truck. They were sold for junk for about the price of a new car. Pathe News was on the job and filmed the event.

Speed Up Your Lens System

By J. W. Conn, NYVE

RECENTLY the television camera lenses in NBC's mobile unit, transportable equipment, and live talent studio "3H" were treated with a special process to reduce the amount of reflected light from their surfaces. The resulting improvement in the television picture has caused many of the "shutterbugs" around to wonder if their own negatives might be improved by the same method.

The moving picture people note many improvements when the lens of the camera is treated with this process. The July, 1940, issue of the Journal of the Society of Motion Picture Engineers (vol. XXXV, page 3) carries a very thorough investigation of the treatment by Mr. William C. Miller which is abridged here, and we are also indebted to them for the accompanying illustrations.

The resulting improvements, which check with those obtained with the television picture, include almost complete absence of "flare" even under the most difficult situations, increase in speeds of lenses so treated ranging from one half to a full stop, less "fog" due to less diffused light reaching the film and greater contrast range.

It is well known that highly polished surfaces such as camera lenses reflect from 4 to 6 percent of the incident light at each of the air-glass surfaces and that the transmitted light is correspondingly reduced. In an average camera having six surfaces, only about 73 percent of the incident light is transmitted exclusive of that lost by absorbtion.

About fifty years ago it was first

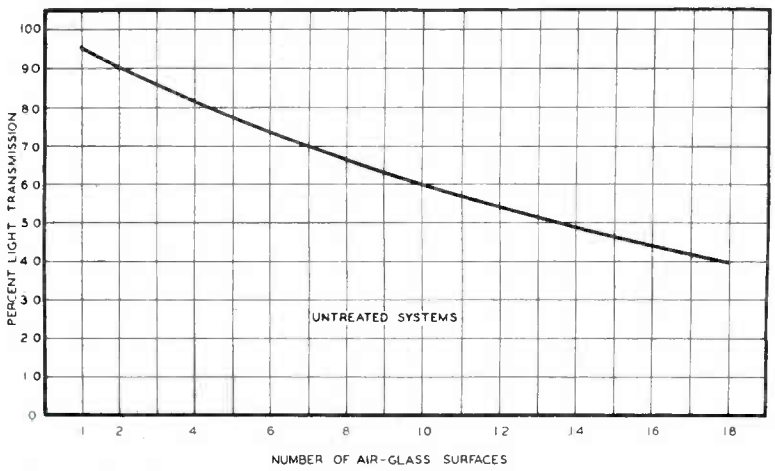

Fig. 1. The light transmission of optical systems in terms of the number of air-glass surfaces involved. A simple magnifying glass having two surfaces transmits about 90% of the incident light. Common camera lenses having six surfaces transmit, on the average, about 73% of the incident light exclusive of that lost by absorption. This curve is computed for systems having an average reflectivity of 5% at each air-glass surface. For systems having a higher average reflectivity, the losses would be greater, and vice versa.

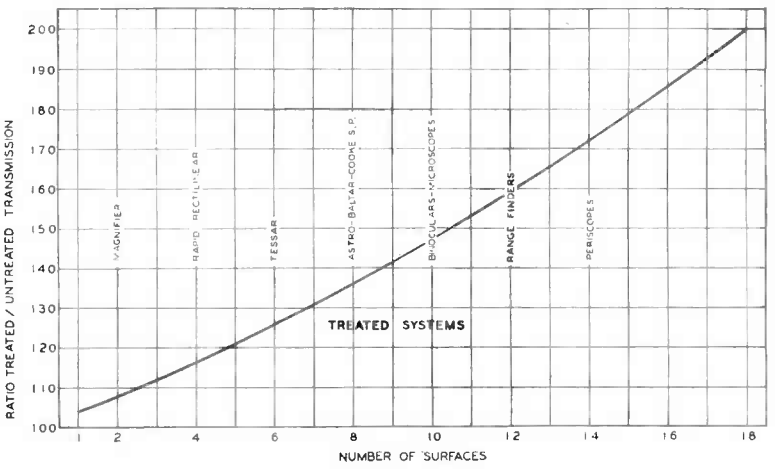

Fig. 2. The light-transmission ratio of treated to untreated systems in terms of the number of air-glass surfaces involved. This curve represents the gains which can be realized by treatment of systems normally reflecting an average of 4% at each air-glass surface. Several examples are noted on the graph of common optical systems composed of the indicated number of surfaces.

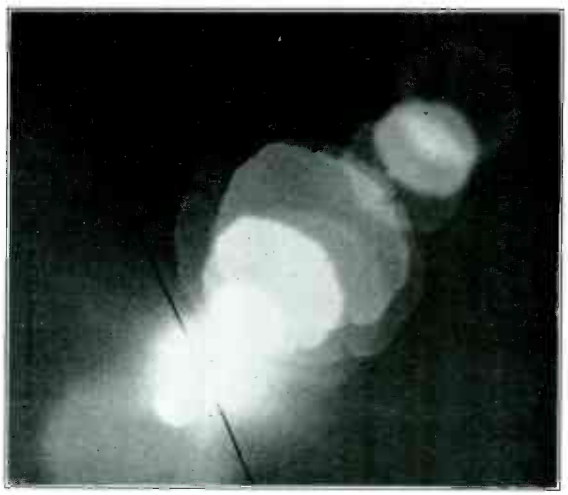

Fig. 3. An illustration of the flares obtained by shooting into the sun with an untreated Astro Pan Tachar lens. These flares are due to the inter-reflection of light rays between the elements of the lens. The black line going through the sun is a distant cable purposely silhouetted to supply an object for comparison in this scene.

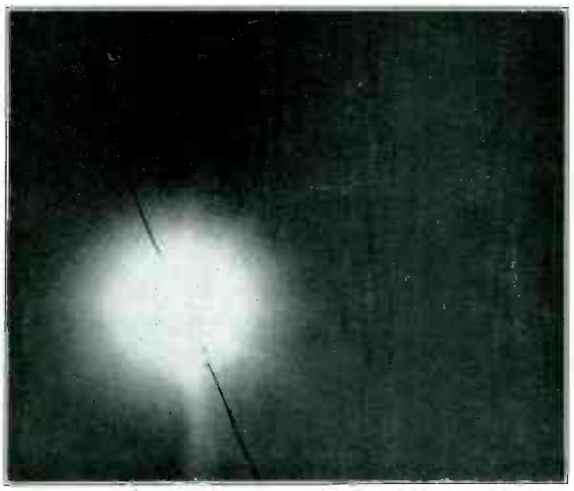

Fig. 4. This is the same subject as shown in Fig. 3, photographed with a treated Astro Pan Tachar lens showing its freedom from flares.

observed that certain optical glasses acquired a tarnish after prolonged exposure to the air, and that the tarnish was not reducing the light transmission of the lens but on the contrary, was increasing it by reducing the amount of reflection from the affected surfaces. It was later found that certain glasses, notably the dense lead flints, can be treated with a nitric acid bath and the surface etched in such a manner that reflections are reduced without producing scattering of the transmitted beam. The chemical treatment dissolves out minute particles of the lead oxide lying near the surface of the glass. The result of the penetration of the air into the small cavities is that the average index refraction of the surface layer is reduced. There are three reasons why the chemical method has not been widely applied. First, the reduction of reflections by the chemically treated surface is low; second, the types of glass that can be treated are limited; and third, the process can get out of control and ruin expensive optical elements.

Realizing the seriousness of these limitations, Dr. John Strong, of the California Institute of Technology, began an investigation of this phenomenon in 1935. It was his aim to find a method that would be more effective in reducing the reflections from glass surfaces and would be independent of the chemical nature of the surface upon which it was to be applied. Also, it was his aim to find a process whose effect could be removed when desired, leaving the glass in its original condition. This aim was achieved by a physical rather than a chemical treatment of the surface.

It can be shown theoretically that if a transparent film 1/4 wavelength in thickness be deposited on the glass surface and if this film have an index of refraction equal to the square root of the index of the glass upon which it lies, the intensity of the normally reflected light will be zero. It is impossible to achieve this result in practice, however, because it calls for an index of 1.25 which is a value less than any stable solid substance. However, by making the film at the exposed surfaces hard and sacrificing correction there, and making the inside surfaces soft where they will not be handled, it is

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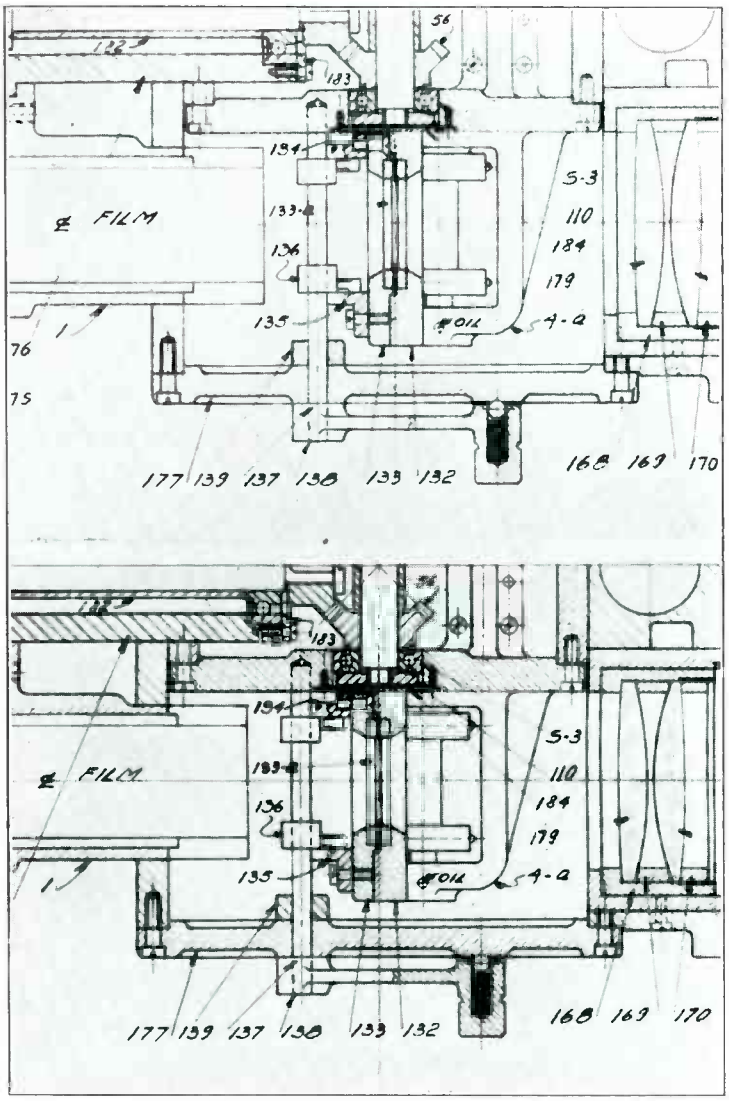

Fig. 5. (*Upper*) Photograph of a pencil drawing made with an untreated lens.

Fig. 6. (*Lower*) Photograph of the same drawing under identical conditions made with treated lens. Notice the increased contrast and strength of the reproduction compared to that shown in Fig. 5.

Fig. 7. (*Upper*) Photograph made with an untreated lens at very low light levels with an untreated f/2.3 Astro Pan Tachar lens.

Fig. 8. (*Lower*) Same subject as shown in Fig. 7 under identical conditions, with a treated Astro lens.

Filming Modern Surgery

By Robert R. Jensen

NBC — Chicago Engineer

AFTER a certain length of time, most amateur photographers, whether they be of the still or movie variety, desire to shoot something besides Aunt Minnie and Uncle Lucifer. Some prefer to enter contests with their prize efforts, others sell pictures to newspapers, magazines, etc., but here we discuss something a little more exciting.

One day, while in a local photographic store, a clerk said there was a need for some one with a fair knowledge of the problems of photography to produce surgical films. It so happened the night trick at the transmitter would not be interfered with by morning sessions at the hospital, so interest was immediately aroused. The problem of the surgeon was to get films that could be used at medical meetings, medical schools, and also, for a photographic document of special cases. Several of the more energetic surgeons had cameras and were trying to take their own pictures. They would set the lens, hand the camera to a nurse and hope for the best, but sad to say, their hopes were soon fallen. Many of the doctors were good average amateur movie men and might have been able in their own right to make decent pictures, but it was impossible for them to operate and run a camera at the same time. Here was the need for an outsider.

After an interview with one of the most promising customers, the salesman at the photo store was advised that we were ready to start on the first film. There was only one hitch,—the doctors all wanted 16 mm. film, and my camera was an eight. Well, the said salesman would be glad to help fix that up, whereupon the Eastman Magazine job was withdrawn from the show case in all its glittering splendor. Only $137.50, with case.—the $25 bank account looked a little slim, but after visiting all of the relatives, the deal was closed.

Seven-thirty the following morning found a pile of lamps, cameras, film, etc., outside the operating room in which the first movie was to be made. The place was humming with activity, nurses everywhere, running around with mask-covered faces, carrying in all sorts of junk. Frankly, it made one feel a little out of place and also, a little dizzy, after hearing innumerable stories about people passing out at the sight of blood.

In a few minutes, the surgeon arrived and started to scrub up. This process took ten minutes, during which he explained a few things about working in an operating room. Touch nothing, keep out of the way, and take pictures only as instructed was the order. Since it was necessary to work quite close to the operating table, it was also necessary for the photographer to wear a sterile gown, mask, and head gear.

After very carefully washing lamps, camera, and cords in alcohol,—a practice which is always advisable,—it was time to move the equipment into the operating room. Walking around an operating room compares favorably with setting up mikes on an orchesta stand. Stepping too high knocks over the tenor sax and if you don't dodge at the right moment, you come to with a bull fiddle around your neck. Caution was the watchword, and by some strange fate, the setup was made without dumping all of the instruments on the floor.

In a very short time, the "subject" was wheeled in and transferred to the operating table. The next few minutes were consumed in adjusting straps, anesthesia equipment, and linen to their proper positions. During this activity, lights were moved and a few meter readings taken to determine the degree of illumination.

After the stage was all set, the doctor arrived for the show. The old knees were knocking slightly, but there wasn't long to quake, as the ceremony was soon to start. It was to be a plastic operation on a woman with a deformed breast. The doctor gave instructions on where to stand to get the first incision, so after checking the focus on the camera, I told him I was ready. He replied, "Shoot!" And the first surgical film was under way.

There was no time to think about passing out after the operation was started. As soon as blood began to appear, the light had to be checked again to increase exposure, the lamps moved, focus changed, and film magazines replaced,—all of which occupied the mind very thoroughly. In about an hour, the last stitch had been drawn tight, and the operation was concluded. Four hundred and fifty feet of kodachrome had been exposed and only the processing laboratory could reveal the story.

We were all wringing wet with sweat, having been under photo floods constantly and in an operating room in which the temperature was near ninety-five degrees. After a shower, the surgeon issued an invitation to come into the doctors' lounge for cakes and coffee. It actually tasted good! Thus ended the first adventure into medical photography.

Upon examination of the film a few days later, it was found to be satisfactory, in fact so real that it was necessary to shut off the projector in the middle of the films to go out for air. There were things that could have been improved,—definitely. The pictures moved,—camera being hand held, the close ups were a little fuzzy, and the perspective changed due to changing camera position. The exposure was surprisingly good, so we didn't worry about that. The doctor was well pleased but could see room for improvement. He wanted to make another right away, but it was obvious more equipment was needed to produce better results. Therefore, three things were purchased: (1), a tripod, (2), a range finder, and (3), a telephoto lens. By this time the debt was really high, but there was determination to produce a good film.

The second picture was much better,—an abdominal operation. And after a few little things like building a special lamp to throw less shadow, we were making nearly perfect films. Other surgeons heard about it, and soon business was doing nicely.

For those that might want to do some of this type of filming, it might be in order to discuss lighting a little more in detail. After producing the first two films, it became apparent that the only satisfactory method was the use of a telephoto lens from one position throughout, and with the camera on a tripod. The fastest lens available at that time was F4.5, and it was before the days of Type A kodachrome, so a great amount of light was needed. It would appear that the ideal light for such work would be a spot having a coverage of a two foot circle, but the

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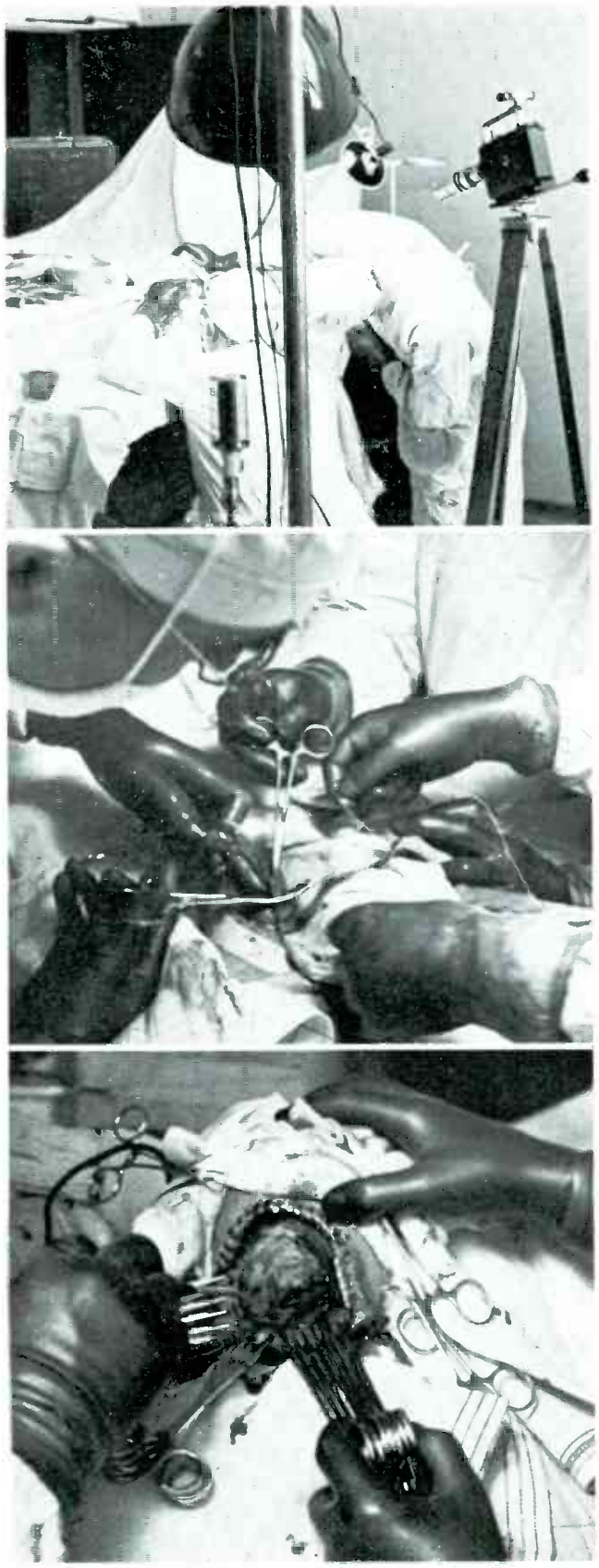

(*Top*) View showing typical setup for filming surgery. Special lamp appearing in foreground. (*Center*) Scene during operation for removal of appendix. (*Bottom*) Scene during operation for removal of brain tumor.

Photographic Pre-distortion

By Robert M. Fraser, NYFE

PHOTOGRAPHY as a hobby for the engineer gains by the application of his originality and technical ability. The engineer as a technician is interested in understanding the reasons behind photo-technique. This is in contrast to the large majority of "shutter bugs" who are satisfied by the results of camera clicking and drug store finishing.

The good photographer is also a good technician. He knows his apparatus, emulsions, and chemicals. He knows the limitations of present day photo-technique and does not use photography in an attempt to imitate engraving, painting, or other kindred arts. Science has so designed the photographic lens that it cannot be approached as a tool for the rendition of detail, form, and texture by the engraver's tools, the painter's brush, nor by any other means. Photography is definitely an art; but to be an artist in photography one first of all must be a technician.

The primary consideration of the photo-technician is the understanding of his equipment, of its capabilities and of its limitations. In the case of the camera, these conditions are set by the manufacturer's design, based on its probable use, and also on the basic natural laws that govern the design of the optical equipment. The box camera with its slow lens and its simplified construction is manufactured economically in order to bring photography to the masses. It therefore has severe limitations in its use, not fully realized by most of its users. Has any one seen a snapshooter use the aperture slide which is an integral part of most box camera designs? Instead of adjusting the exposure by means of the aperture setting he seems to prefer to turn the job over to the film manufacturer and the photo-finisher. The manufacturers have produced films with extreme exposure latitude and printing papers of every conceivable contrast to aid the snapshooter in making pictures. Despite this help a large percentage of the snapshooter's negatives are so dense from over-exposure that no print can be made. This is the result of not understanding the capabilities of his camera. Such pictures would not have been failures if the user had understood the use of the changeable lens stops and had closed his lens down according to the instruction booklet that accompanies every camera. The box camera is limited to use under good light conditions, and yet, to make the picture darker, the novice blithely points his box with its full lens opening and its fixed twenty-fifth of a second shutter speed at scenes where the experienced photographer would hesitate before using his f 1.5 lens and a tenth of a second. There are photographers with an understanding of the limitations of the box camera who have used it to produce prints of salon quality consistently. However, few who consider photography seriously as a hobby would be content with such a limited instrument.

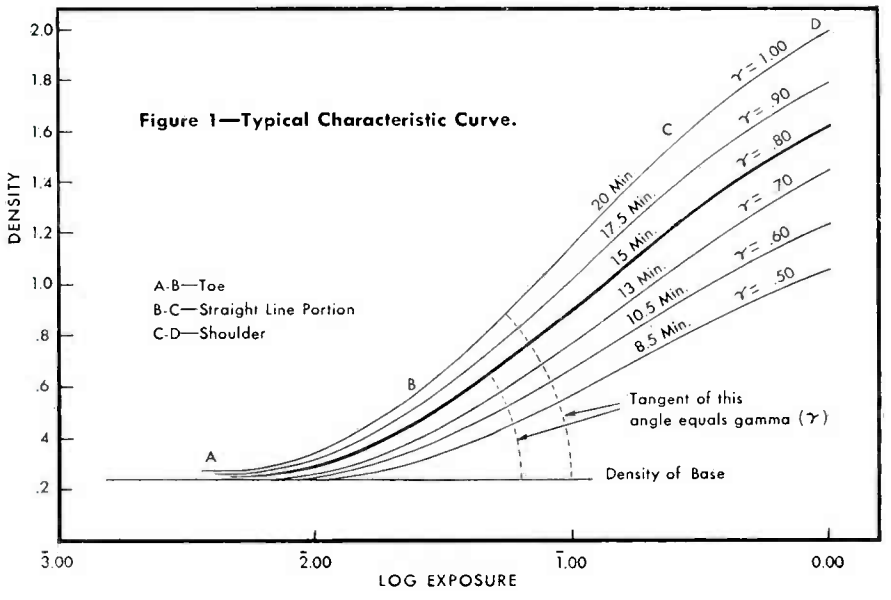

Figure 1—Typical Characteristic Curve.

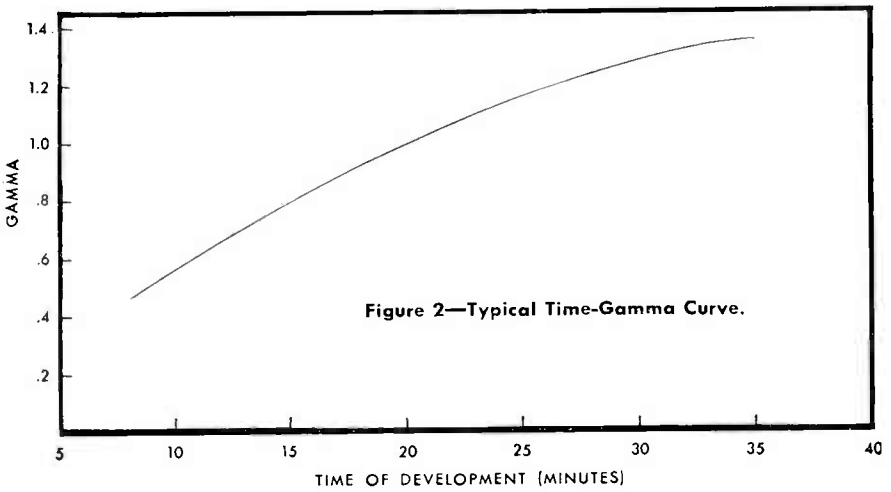

Figure 2—Typical Time-Gamma Curve.

The most important operation in photography is exposure. It presents the greatest difficulties because of the numerous factors to be considered in calculating the time of exposure. The speed of the film, exposure latitude and the other properties of the film enter into the determination of exposure. These properties of the film are analysed by means of numerical measurements. The science of such analysis is known as sensitometry.

Very little work had been done on the properties of emulsions used in the making of photographic plates and films until 1890. Ratings of emulsion speeds were based on the threshold method; the measurement of the minimum ex-

posure necessary to produce a visible impression on the emulsion. If one unit of exposure affected a certain emulsion, and two units of exposure produced an equal impression on a second emulsion then the first emulsion was rated twice as "fast" as the second emulsion. The fault of this method, while it did give the relative sensitivity to light, was in the fact that it was not a guide to the exposure necessary for the correct rendering for gradation.

Hurter and Driffield, two amateur photographers, were dissatisfied with this method of determining emulsion speed rating. They began investigating the properties of emulsions in a series of classical research problems, which resulted in the H. and D. system of sensitometry in 1890. This system differs from the threshold method in that the speed of sensitive material is determined from several densities rather than one. The correlation of several exposures and the resultant densities affords a better indication of the properties of the sensitive material.

In determining the properties of the photographic material by the H. and D. method, the material is subjected, by means of an instrument called a sensitometer, to a series of exposures, each greater by a constant factor than the preceding step. The density of the film or plate is measured, step by step, on a densitometer and plotted against the logarithm of the exposure that produced it. (Fig. 1) The result is called the characteristic curve of the material.

On examining the H. and D. characteristic curve it will be noticed that there is a region at the bottom of the curve where the rate-of-change of density increases as the exposure becomes greater. This section is called the toe of the curve. For exposures less than that at *a*, no density results. At *a*, and for longer exposures, density results, and a difference in exposure results in a difference in density. From *a* to *b*, there is an increase in the density difference as the exposure increases. In other words, the rate-of-change of density increases with increase in exposure.

From *b* to *c* is the straight-line portion of the curve. This represents the range wherein density increases proportionally with the logarithm of exposure; i. e., the rate-of-change of density per unit log. of exposure remains constant.

Above *c*, the rate-of-change of density becomes less until at *d* it becomes equal to zero. This region is the shoulder of the curve or region of overexposure. Exposure differences are not represented by proportional density differences. At *d*, an increase in exposure does not result in any further increase in density. It is in this region that many of our box camera addicts place their exposures when they take pictures at the beach on a very brilliant day. If they do get prints, the pictures are very flat due to the lack of gradation. That is, the shadow detail is represented by a density on the film corresponding to *c* on the curve, and the high light detail is at *d*.

It is interesting to note that if the exposure is increased tremendously beyond that needed to produce the density represented by point *d* on the curve no further increase in density results but instead at a certain point a reversal effect sets in and as exposure increases density decreases! The exposure needed to produce this reversal effect is so great that it has no practical value except in the making of solarized negatives and in the production of direct-copy materials.

Other properties of the emulsion which may be obtained directly from the characteristic curve are gamma, latitude, and fog density. Gamma is a measurement of the negative contrast due to development. This is not to be confused with subject contrast, which is a function of the brightness values of the subject. Gamma is measured by the slope of the straight-line portion of the characteristic curve, or in other words, by the tangent of the angle it forms with the horizontal. An increase or decrease in development time will change the slope of the straight line portion of the curve. It will not change the speed of the film, and therefore it is impossible to compensate for overexposure or under-exposure by changing the development time. A negative that has good shadow detail and also detail in the highlight region, that is, a perfectly exposed negative, may be so developed that it has a low range of contrast by short development, or a high range of contrasts by prolonging development. Fig. 2 shows the relation between gamma and time of development. The time-gamma curve may be used to determine the correct developing time for the desired negative gamma. These data may be obtained

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Speed Up Your Lens System

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possible to achieve a lens treatment which will eliminate 85 percent of the surface reflection.

This low index of refraction was obtained in a novel way. A film of suitable material was deposited on a glass surface by the high vacuum evaporation technic. Dr. Strong discovered that the film could be deposited in a porous form so that air was able to penetrate it. Thus the film exhibited an index which was an average of the index of the evaporated material and that of the included air. By controlling the factors involved in the evaporation of the film, he was able to get an index very nearly equal to the square-root of the index of the glass. The success of Dr. Strong's experiments is attested by the fact that he succeeded in reducing the reflectivity of plate-glass from 4. to 0.6 percent. For plates treated on both surfaces this corresponded to increasing the transmission from 92 to 99 percent.

Since this film obviously cannot be ¼ wavelength thick for all colors, the reduction in reflectivity must be more for one color and less for others. For all practical purposes this is not a serious discrimination but if desirable even this can be compensated.

The degree of improvement depends on the character of the lens treated. That is, the number of reflecting surfaces contained in the complete lens system. For a Tessar this number is six, and the accompanying curve shows the ratio for other types of lenses.

The gain in transmitted light is by no means the chief advantage, for with modern, fast films a gain of a half or full stop does not mean much. However, it does mean that for the same light conditions the lens may be stopped down more with resulting gain in depth of field. The color correction remains unchanged.

Due to the fact that the treatment reduces the amount of diffused light reaching the film, there is much less fog, negatives are clear and bright, and show remarkable detail in the shadows. This is especially valuable for "low key" scenes.

Flares, so often encountered when photographing point sources of light, are practically eliminated as the accompanying photos show.

The contrast range is increased by the lessening of the fog produced by diffused light and the resulting increase in shadow detail.

The next question is where can this treatment be obtained and how much does it cost? We have no figures on small camera lenses, but the 3 inch diameter television lenses only cost $25. Smaller lenses should be correspondingly less. Massachusetts Institute of Technology did that particular job and we understand will perform the same treatment for any individual or company. RCA in Camden is also now equipped to do this work by the high vacuum evaporation process, as is C. Hawley Cartwright in Indianapolis.

Filming Modern Surgery

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shadow effect from the parallel rays was objectionable. If you have ever done any filming in sunlight with kodachrome, you have found that the shadows are black and with no image detail. The same holds true with artificial light. There seemed also to be more reflection into the camera from the polished surfaces of the instruments. Two photo flood reflectors were then tried, each reflector containing two No. 2 bulbs. This was fine for the shadow effect, but the light was thrown at such a wide angle that it was difficult to get illumination of proper intensity on the subject.

Finally, a lamp was made to order that was to be super-super. The source of illumination was a No. 4 photo flood in a deep sixteen inch reflector. The reflecting surfaces were baked white enamel to give as much diffusion as possible. The next thing to be constructed was a dimmer for the lamp, such a device to be desired for several reasons. In the first place, the heat under one of those lamps is terrific for any length of time, so when film was not being exposed, the lamp was at half brilliance. There was still plenty of light for the surgeons to operate, all of whom enjoyed working under the light, as it gave much greater illumination than the regular operating room lamp. Secondly, there was less chance of breakage, as the lamp could be warmed gradually and not be allowed to cool off during the intervals. Theoretically, it should also increase lamp life, as the constant turning off and on was eliminated, the filament never being allowed to cool off entirely. The dimmer unit was built into the metal housing of an old battery charger and consisted of two five hundred watt heating elements in parallel, leads being brought out so that the resistance could be shorted out when full brilliance was required. The control consisted of a cable with a switch on the end of it, so that the lamp could be controlled from the camera position. A fifteen ampere fuse was also in the box for protection. The entire lamp assembly was mounted on a cast iron tripod standard which could be moved about easily on its rubber castors. The lamp could be adjusted to any height up to ten feet and to any angle desired.

With this equipment, all worries should have been over, but such wasn't the case. Along came a customer that was a brain specialist. The first film for him was the removal of a brain tumor. The start of the film entailed the opening of the scalp and cutting through the skull to the brain. This shot caused no worry as it was large enough to be easily covered at six feet with the telephoto. By using the range finder which had been carefully calibrated and mounted on the camera, the distance for focus could be quite accurately checked. The real problem hadn't yet presented itself. In a few minutes, the

surgeon was into the center of the brain and had exposed the tumor. It was a cream colored mass of about one cubic inch and about the consistency of cheese. The problem was to photograph the removal of this mass as it was taken out bit by bit with a small spoon-shaped instrument.

It was immediately realized that it would be only luck to get sharp focus and proper framing on so small a subject. The only thing to do was try. The lens was calibrated down only to four and one-half feet so that was as close as it was possible to go and still know the focus. The range finder was calibrated to three feet, but its accuracy at that distance might vary one-half inch either way. Nevertheless, the adjustments were made and the surgeon proceeded to remove the unwanted growth. When the films came back, there was a moment of suspense as the close-up of the tumor came on the screen. Sure enough, it was missed half an inch. The point of focus was just ahead of the center of the mass. When the films were taken to the office of the surgeon, the worse was expected. There was forty-five dollars worth of film involved, not to mention overhead. He had a perfect right to reject the films because they were always made with the understanding that if not entirely satisfactory, they could be refused with no cost whatsoever. When the close-up appeared, nothing was said, and when finally, the projector was turned off, he made some remark about it being a fine film and that the tumor showed up better than he thought it would. That was a relief!

He accepted the film and said that in two weeks he wanted to photograph a "nerve splice". When questioned as to what it was all about, he explained that the nerve we would be filming would be about the size of light wrapping cord. Now, there were more worries than before. In other words, we were going to make movies as he sewed together the ends of two pieces of string!

That called for a trip to the camera store. The problem was explained, and an Eastman Cine Special was withdrawn from the show case. It would do anything,—had everything on it but the kitchen sink, and that could be found in the book of accessories. The device that was of immediate interest was the reflex finder with ground glass focusing. By means of a small mirror and a ground glass, it is possible to see the exact image picked up by the lens. The reflex action is almost identical in construction to the Graflex, or similar reflex cameras, but is on a smaller scale. This was the answer to the problem, so a trade was arranged, the bank account diminished to zero and more trips to the relations.

The nerve splice job was filmed successfully, and the surgeon was very happy with the results.

The incidents mentioned here are but a few of the problems that confronts one who is to do medical photography. It is hoped that you as the reader may have obtained some ideas that might be useful in the event you ever desire to try similar cinematic adventures. In my own case, the work is done purely for the enjoyment of making movies that can be used for something constructive. The work can't be recommended as a money making proposition, unless done on a full time basis, but the profits, if any, are easily applied on another lens, or some other extra equipment which always seems necessary.

In watching the saving of a life, one is brought to realize firsthand the great skill of the doctor and to understand why the medical profession is honored and respected above all others.

Top: "Swans"; Carnegie Lake, Princeton, N. J.—By Jon Larson, NYFE
Bottom: "Kurious Kitties"—By Howard E. Wheeler, WGY Engineering

"Rodin's Thinker," at La Plaza Once, Buenos Aires, Argentina—By Jon Larson, NYFE

Frank L. Capps and His Lathe

By Isabel Capps Rainey

FOR more than forty years Frank Capps has contributed enormously to the field of sound and sound recording. His earlier inventions were major factors in the perfecting of the phonograph, while his most recent one, a patented needle for instantaneous recordings has been a foundation stone in the building of a new and growing industry.

He is recognized today as an outstanding expert in the recording field, is labelled a genius by those who know him and yet he has never been given wide publicity. He never wanted it for that matter.

In the past few years, however, many people have wanted an article written about him. The demand comes not so much because of the specific things he has done as because of the outstanding personality that he is. This article is written in response to that demand, and I have chosen the title, "Frank L. Capps and His Lathe" because they had been so closely associated throughout Mr. Capps' entire career. In fact his lathe is as much a part of him as his powerful eyes and skillful hands.

He was nineteen when his father gave him the lathe. His father was a fairly prosperous business man in Springfield, Illinois, who knew that he would never succeed in making a store-keeper or real estate broker like himself out of his son, Frank.

Frank, from his boyhood, had had just one consuming interest, his workshop. He would come home from school, do his chores, and immediately disappear into his bedroom. There he had tools and books on mechanical engineering, electricity, sound transmission and so on. So absorbed would he be "monkeying around," as he put it, that he would have to be called a dozen times to his supper and scolded later at night into blowing out his lamp and getting to sleep.

His bedroom was his first workshop, and only twice in all the years since has he been without a well-equipped shop in his own home, the two times when, setting up in business for himself, he transferred his precious lathe to the business premises.

Frank was a quiet boy, rangy in build, shy in manner and always devoted to his family. He was particularly proud of his mother, a remarkably energetic and intelligent woman whose lifelong hobby was collecting Lincolniana.

Her parents had been Lincoln's nearest neighbors in Springfield in her own childhood. She delighted in telling Frank, together with his two brothers and two sisters, how she used to go over to Abraham Lincoln's house and climb up on the great man's knee; and how Lincoln would come across the street to her home to borrow coals to start his fire.

From her Frank inherited his remarkable vitality and energy. Even today he can outwork the youngest of his employees; a remarkable feat when one considers that he has always scorned vacations and for years has spent almost every night until the small hours of the morning working in his laboratory at home or in the shop. He also inherited his vigorous independence and splendid eyesight from her. In spite of the fact that he has been doing precision work for so many years, fashioning delicate little mechanisms too small for the naked eye to see, he seldom needs glasses today. His capacity for taking infinite pains with his work, his patience, his easy-going, tolerant good nature and droll sense of humor he acquired from his father.

Frank's working career began at seventeen. He got a job then in the superintendent's office in a watch factory in Springfield. At nineteen he was making the tools used by the watch makers in the factory.

After work at night he would eat his dinner and disappear, as usual, into his workshop now removed to a more spacious place in the cellar. His mind was beginning to produce original ideas and he probably talked a great deal to his father about them. At any rate, that was when the lathe was bought. In all his life, he says, he never received a present that thrilled him so much. Certainly no gift could have been more lastingly useful.

He was nineteen when The Bell Company offered him a job as Trouble Man. He liked it well enough until the Boston office passed a ruling that the Trouble Man must go out and climb the poles whenever anything went wrong on the line.

"I didn't mind climbing poles," he says, "but I didn't always like the weather. So I quit."

Two weeks later they called him back and asked him to go to Chicago and work in the Bell Research Department there. Their recalling him is not surprising because, young and relatively inexperienced as he was, it was while performing his daytime duties as trouble man that at night he invented and patented the magnetic principle now used for picking up sound, the first important work he and his new lathe turned out. The magnetic principle is still used, of course, in magnetic pickups.

Whether Capps was led into his work with the telephone company because of an interest in the whole field of sound, or found himself absorbed in it after his experience as trouble man, I do not know. Musical talent was pronounced in his family, and while his sister Mabel, now Mrs. John Bretz, of Springfield, Illinois, became a distinguished concert pianist, he seems to have resolved at this time to devote his talent and love of music to the instrument of sound, the phonograph. True there was a flute lying about in his workshop in those days. He admits, with a wry grin, that he sometimes enjoyed making horrible noises on it. But he evidently abandoned the idea of making music himself for the broader one of perfecting the instrument through which great music and great artists might be preserved.

The phonograph industry was in its infancy at that time. It was the day of wax cylinders, of enormous tin horns and of the expensive business of having to recall the artist to make an original recording whenever a second or third copy was desired.

Capps, still working in the Bell research laboratories, put his mind to work on this problem. Again he and his lathe went to work. The result was a duplicating machine that effectively eliminated this previously awkward and expensive process and made copies a simple matter.

Characteristically he did not attempt to make a fortune or seek publicity with this invention, although he undoubtedly could have.

"Didn't you patent it?" I asked him. "Oh, yes," he replied, casually, almost disinterestedly.

"But—didn't you make any money out of it?" I persisted.

"Well," said he, "the United States Phonograph Company in Newark offered me double the salary I was making with the Telephone Company if I would build duplicating machines for them. If you double your salary every once in a while you are doing all right, aren't you?"

After he had built the duplicating ma-

chine for Mr. Tewkesbury and his United States Phonograph Company, Capps decided to go into business for himself. He opened a shop in Newark and busied himself making phonograph parts, sapphire needles for wax recording, shaving knives and so on. His lathe, of course, went with him into his new shop and took part in the next invention.

Phonograph machines were at that time driven by storage batteries. Storage batteries, of course, are fine when charged; but they do have an annoying habit of giving out at the wrong moment. So Mr. Capps conceived and built a motor driven by a spring and took it around to Mr. Tewkesbury for a demonstration. Mr. Tewkesbury was delighted. The United States Phonograph Company, I neglected to say, had the exclusive handling of all Thomas Edison's talking machine and record sales in addition to making recordings of their own. On seeing Capps' spring motor, Mr. Tewkesbury, therefore, naturally wanted to show the motor to Edison.

"I doubt if Edison will be interested, though," he said. Nevertheless, he took it out to Edison's plant.

He said, "Mr. Edison, here is a new kind of motor that I want you to let me show you. It is driven by a spring and eliminates the need of storage batteries."

Mr. Edison replied that there was only one way to run a motor, by electricity; but agreed to look at it.

"First, though," he said, "listen to a really *good* recording," and, turning to an assistant, he asked him to demonstrate a machine. The assistant went off only to come back and report that there was not a single charged battery in the place at that moment. This was Mr. Tewkesbury's opportunity.

"That's just what we're up against, Mr. Edison," he exclaimed. People are constantly complaining because their machines fail when the batteries suddenly go dead. This motor does away with that."

So the Capps spring motor was demonstrated and Mr. Edison was immediately pleased. He got in touch with Capps at once and had him move out to the Edison plant where for several months he supervised the building of his spring motors for Mr. Edison's talking machines.

However, he made no attempt to reap large sums from it and was pleased when The Columbia Phonograph Company of Bridgeport, Conn., immediately called him there to supervise the building of machines for them.

The years 1901 and 1902 were spent perfecting the molds for the newly in-

vented method of molding cylinder records, and the designing of recording machines and apparatus for disc records which were just being perfected. This was for The Columbia Company.

In 1903 Columbia asked him to spend a year abroad making recordings for their European catalogue. With his wife, a charming and intelligent woman, and their two small children he set out on this assignment with great excitement. It was a rich experience for it took him into every country in Europe and brought him into close contact with artists and technical men everywhere. He learned to speak a half dozen languages sufficiently well to make himself understood, and he and wife made friends wherever they went. They both possessed great personal magnetism, both were entirely free from artificiality and were so genuinely friendly, so interested in everyone and everything that they were extended an intimate hospitality usually denied the traveller.

One such experience proved more of an ordeal than a pleasure, however. He is reminded of it whenever anyone asks him to sample a special dish.

He will say, "It isn't raw fish, is it?" and then tell his story.

"Some people in Vienna wanted to give me a farewell dinner because I was leaving Vienna for Russia on the following day. Ordinarily the Viennese do not ask you to their home for dinner. When they have a guest they take him to a restaurant where cooking is on a par with home cooking anyway. Being invited into a home is a very special honor. Well, these people did invite me. They said they had a very special treat for me; a wonderful dish; a great delicacy. They raved about it. You can imagine how I felt when the delicacy was set before me and turned out to be raw fish, seasoned, of course, but raw fish just the same. Somehow I managed to eat it all because I did not want to hurt their feelings. As I ate they never took their eyes off my face, watching for the delighted expression they expected to see. When I managed to eat it all without betraying my real feelings they were overjoyed and insisted on giving me a second helping because I had seemed to enjoy the first so much! Some people really like the stuff," he goes on, "but to me it was awful. That was the hardest thing I ever did."

Mr. Capps was with Columbia for many years after that, supervising the manufacture of records and the building of machines, working far into the night at home on new mechanical improvements to be tried out at the factory. He was with them in fact, except for an interval when he performed similar services for the Pathe Company in Brooklyn, until a few years ago when he set up once more in business for himself.

It is typical of him that he foresaw new possibilities that radio would bring to the recording field and set out in advance to meet them. With the advent of radio his home became one large experimental laboratory. Wires were strung all over the place and whole boxloads of radio parts cluttered up his workshop. He said radio was going to change the whole recording field and before more than an isolated one or two people had thought of it, he was making recordings off the air at home, static and all. Some day, he said, there would be a lot of recording off the air. His prize such recording is Woodrow Wilson's last speech, delivered from the White House bedroom where Wilson lay at the point of death. It is not a very good recording; it was a pioneer.

Then in 1929 he made the decision that has brought about the triumphant climax of his career. Talking to his daughter about it he said, "You know I think that there is going to be a big demand for recording needles soon. Engineers are busy now perfecting a new kind of recording machine and there is a new kind of disc that can be played right back without having to be processed. I think radio stations and studios will start making recordings as soon as these machines are built; and people will buy them to use in their homes, too. But it is going to require a different kind of needle than we use for cutting wax and I think I'll go into the business of making them."

He admits now that he did not anticipate the vastness of the present demand. Nevertheless, seeing the possibilities for a business of his own he set out to perfect a cutting needle that could be used successfully in the new instantaneous recording technique.

Friends who saw him at work during the year or two that followed this decision marvelled at the energy, the patience and wonderful skill of the man. His health at that time was poor, in fact several years before that he had been pronounced incurably ill by several surgeons.

Frank Capps, however, not only disagreed with them but characteristically worked out his own treatment. He studied himself as impartially, as thoroughly, as he would have studied any mechanical problem. When he had isolated reactions that could be called facts he worked out the means for counteracting the symptoms. His friends and associates were amused, considered him merely eccentric. Today they know that this study of himself was a real scientific experiment for he is in better health now than for many years.

So it was with the handicap of bad health that he put in long, patient hours of experimenting on a new type of recording needle. Two, three and four o'clock in the morning would find him still at work, using his lathe to make new tools and the tools in turn to put new finishes on his needles. And

while he worked engineers were constantly in and out or calling him on the phone for advice on the designing of new machines. That he finally succeded in getting just the effect he wanted is well enough known and his business has grown from a small laboratory to a flourishing enterprise.

Those who know about those experimental years from 1930 to 1933 credit him with making new strides in recording technique possible. Herbert Berliner of Canada, himself an expert recording technician with a life long association in the phonograph field, said recently, "You know, there's no possible doubt about it. The phonograph industry and particularly this new instantaneous recording technique would not be where it is today if it had not had the help that Frank Capps has given it. He advised the engineers on how to build the machines and he perfected a needle capable of the same high quality they used to get only on wax. He is a great man."

He is a big silver haired man today, with kindly eyes and the careless poise that comes from wide travels and a deep simplicity. From long habit his mind singles out the essential things, discards irrelevancies, a habit which automatically keeps him from worrying. A case in point is his unconcern in the following matter. Some time last winter a man announced over the radio that he was the inventor of the first spring motor for the Edison phonograph. More recently a magazine printed the statement that still another man invented not only the spring motor but the duplicating machine as well. I asked him about it. For reply he got up and sorted out the patents, a great sheaf of them, that have been issued to him from time to time in Washington. The spring motor and duplicating machine patents were both there, plainly issued to Frank L. Capps, a man who never bothered about getting publicity for what he had made because he was too busy making something else. He showed me the patents and smiled. "All I know," he quipped, "is what I read in these papers." He wasn't bothered about it.

His employees literally adore him not only because he is a monument of achievement but because he never fails to enliven the day with his dry wit.

Recently he sent a suit out to be cleaned and donned a very old one as a temporary expedient. Wally Rose, startled at the sudden transformation said, "Well, hello Cappsy! I think I've seen that suit before." "Yes," Capps replied, "but have you seen it behind?" and turning around he revealed a gaping tear in the seat of his pants.

On another occasion standing beside the bench where one of his employees was making reproducing needles a friend asked him if he might have one. Mr. Capps handed him the needle with his usual elaborate casualness.

"Take it along," he said and waved his friend way. The friend, however, reached for his wallet. "No, no!" he exclaimed. "I'm paying for it."

"Why should you?" Mr. Capps grinned. "It doesn't cost me anything! All I have to do is ask the girl for one!"

If his lathe could talk it would tell a fascinating story. Beside it the great and near great, executives, artists, engineers, and an occasional friend in distress have sat and talked while Frank Capps worked. The reminiscences, the witty conversations, technical discussions and hard luck stories that have taken place in its presence would fill a volume of highly entertaining reading.

Together Frank Capps and his lathe have had a remarkable career and bid fair for many years to come. No doubt Frank's father if he were alive today would be proud of his son and glad that he gave a lathe to the boy who was always "monkeying around with tools."

Frank Capps has always supervised in a big way and the lathe was where he made the necessary parts for his brain children. When he had the model perfected he would turn it over to his machinists, of which he always had the best and they would take it up from there. He is an exceptional executive and most of his work came under that heading. The lathe was his hobby and outlet resulting in his approximately fifty patents.

(Editor's Note: It is fitting, at this point, to put in a word for Isabel Capps who is a chip off the old block and rapidly rising on her own merit as her father did before her. In her, Frank Capps has a worthy successor. Her technical improvements on angles and radii convince us that should her father devote less time to needles and more to improvements in recording instruments and their requirements, both fields would be gaining by it.)

Photographic Pre-distortion

(Continued from Page Seven)

from the film manufacturer for use with recommended developers.

Since gamma is a direct indication of the ratio of the contrast in the negative to the contrast in the original scene, one will ordinarily use the highest gamma which will still allow the overall density range on the negative to lie well within the exposure range of which the printing material to be used is capable. The choice of gamma in the negative therefore depends upon the printing process. For enlarging, a gamma of 0.8 is ordinarily used. Thus two objects in the original scene having a brightness ratio of ten to one (and both of a brightness such that the exposure each produces lies in the straight line portion of the characteristic curve) would produce a density ratio on the negative of eight to one.

Exposure latitude of the film or plate is measured by the range of tones obtainable from dense black to clear base. The average film has an exposure range of about 1:128. Most scenes have brightness ranges of 1:16 to 1:32, so that it is possible to make several different exposures all of which will be theoretically approximately correct and will fall on a usable portion of the characteristic curve.

It is the common belief of most photographers that the exposure and, if possible, the brightness range of the subject should be so adjusted that the entire exposure lie on the straight line portion of the characteristic curve, i. e.: the section between *b* and *c*. The fallacy of this belief is that it fails to take into account the counter-curvature present in the characteristic curve of the printing material used. It is the major object of this paper to show that a better overall result in the final print will be obtained if the initial exposure of the negative is so adjusted as to occupy the region on the characteristic curve from a point between *a* and *b* (but close to *a*) to a point between *b* and *c*.

Many photographers have developed negatives that appeared to be so thin that they despaired of getting presentable prints from them. Yet, on the first or second attempt they have succeeded in producing prints beautiful in their clarity and shadow detail. How to make this type of negative consistently is a matter of precise manipulation of exposure, development, and also of printing. The secret lies in the utilization of the toe of the characteristic curve of the negative material. The exposure should be adjusted so that the light reflected from the darkest object in our picture just begins to register on the sensitive material. Automatically, this will place all brighter objects along the toe and up into the straight line portion of the characteristic curve. If our subject has a brightness range of 1:32 or less, we will have represented on our film a density corresponding to each brightness in the subject. The least bright portions of our picture will lie along the toe of the curve, where differences in density increase with increase in exposure. The brightest parts of the picture will lie along the straight line portion where differences in density are proportional to the difference in exposure. This type of negative will produce a print more luminous in shadow detail and with fuller detail in the highlights, than is possible using a negative exposed entirely in the straight line portion of its curve.

The reason for this lies in the curvature of the characteristic of any printing paper. As in the case of film there is a toe, straight line portion, and shoulder or region of over-exposure. But since we deal with reflected light rather than transmitted light, the range of tones that can be represented on paper is less than that possible on our film. In order to produce a pleasing print it is necessary to use the full scale of the paper, from the clear tone of the base paper to the deepest black. A print which confined its gradation to the middle portion, though it might have true gradation in that portion, would appear to be flat and dull, as there would be no clear highlights and no deep shadow detail. It is accordingly necessary in the case of the printing paper to utilize the entire characteristic curve and not merely a portion of it as was possible in the negative. Therefore, if the original negative was exposed by the orthodox method so that all densities lay on the straight line portion of its curve, a distortion will nevertheless be present in the print due to the curvature of the paper characteristic and the light values will not be properly reproduced.

If, on the other hand, we expose the negative as has been indicated, so that the exposure centers about the toe of the characteristic, a pre-distortion of an opposite nature will be introduced into the negative which will therefore cancel that present in the paper. In other words, by this method the OVERALL OR COMBINED characteristic curve of film and paper taken together is made linear over the region used, rather than the characteristic curve of the film alone.

In printing our negative the densities along the toe of the curve of the negative which represent shadow detail will fall along the upper straight line portion of the paper, while the densities along the straight line portion of the negative representing the brighter parts will fall along the toe of the characteristic curve of the paper where the contrasts are compressed. By choosing the correct contrast of printing paper and making our printing exposure very carefully so that the highlights approach the paper base in tone, and the deepest shadow brings out the maximum black, the print will be a true representation of the scene pictured, "a thing of beauty to enjoy and behold."

New Low-Power Marine Radiophone

THE marine radiophone for commercial and pleasure craft is a relatively new development in the radio field and one in which both the boat owner and the equipment manufacturer has had to feel his way, not to mention the F. C. C. and the telephone companies who operate shore stations. But excellent progress has been made with the results that boat-to-shore telephone service has been worked out and licensing requirements for the shipboard station and its operation have been simplified. Equipment, too, has been rapidly developed with the result that it is now available in wide variety.

In this latter activity, however, the owner of the small boat has heretofore been somewhat neglected. It is therefore of interest that one of the larger manufacturers has just introduced a radiophone unit expressly to meet the more modest requirements of this type of service and at the same time the more modest budget of the small boat owner.

The Hallicrafters Model HT-11 Marine Radiophone is a unit which combines ample working range for off-shore cruising yet without excessive power which imposes undue drain on the boat's battery. Because it is rated to deliver relatively low power into the antenna (12 watts) its cost is much below that of the 25-, 50- and 75-watt rigs generally available. Yet anyone familiar with transmission ranges will realize that 12 watts into even a fair antenna system will provide, over water, a range of coverage entirely adequate for the requirements of the great majority of boat owners.

As is the usual practice, both the receiver and the transmitter are included in a single unit. The husky metal cabinet with built-in loudspeaker measures only 14⅛" x 8⅝" x 9¼". The power supply is a separate unit connected to the main unit by cable. This power supply operates from either a 6 volt or 12 volt battery source, or other supply units are available for 32 or 110-volt D. C. operation, or for 110-volt A. C. supply.

The receiver is manually tuned and covers two ranges: 550-1700 kc. and 2000-3000 kc. Both ranges are fully calibrated on the illuminated tuning dial. The tube line-up includes a 6SK7 r.f. amplifier; 6K8 mixer; 6SK7 i.f.; 6SQ7 detector, a.v.c. and first audio; and 6K6G power output tube. The rectifier includes two 6X5G's.

The transmitter provides three crystal-controlled operating frequencies in the 2000-3000 kc. range. Once the circuits are internally tuned in accordance with the crystals selected, switching from one to the other is instantly accomplished by the 3-position panel switch. The tubes are a 6V6 oscillator, 807 power amplifier and two 6V6G modulators.

The controls (external) include this transmitter channel switch, receiver band-switch, receiver tuning knob, volume control and on-off switch, stand-by switch, speaker-headphone switch, and a send-receive push-button on the telephone handset.

Washington

By A. R. McGonegal

It seems like late fall in the Nation's Capital—temperatures in the sixties—leaves beginning to change color. Anyway, it's good politicking weather, and the campaign seems to be getting under way in dead earnest. A. E. Johnson, Washington engineer-in-charge, recently returned from Elwood, Indiana, where he supervised engineering arrangements for Willkie's acceptance speech; and has left again for Coffeyville, Kansas, where he will cover another major speech. Following this, he will board the Republican candidate's train for a trip to the west coast. K. B. Williams and Al Powley have covered two speeches by the President in Tennessee and two in Washington within the past two weeks. In addition, Al is spending most of his week-ends at Poughkeepsie, lately, in order to be handy if needed at Hyde Park. It looks like a busy season ahead.

Wally English is the latest Washington engineer to buy a new car—a Buick this time. This makes four Buicks in the Washington Chapter, and brings Buick into second place in popularity. Chrysler still leads with five. (Advertisers—please note.)

Friday the thirteenth—what a day for an operation. But Bill Chew had his appendix taken out on Friday, September thirteenth, and is well on his way to recovery. Don Cooper, who has also been on the sick list recently, is back at his desk again. Charlie Fisher, the third member of the Hospital Squad, has also returned to WMAL, following a long siege of pernicious anemia.

Mr. Lawrence Scully, of the Scully Machine Co., completed assembly of Washington's two new recording machines recently, and the recording staff is having a lot of fun learning to operate them. Concensus of opinion seems to be that even if they didn't work, they would still be worth the price as an ornament to the recording room. The machine work on them is beautiful. Two new recording channels, each consisting of an ND-45 AAGC and an ND-46 power amplifier, will be installed shortly to complete the recording equipment.

Work on WRC's directive antenna system has been temporarily suspended, in order to permit Mr. Duttera to give his full time to completing the WEAF project. Two engineers, Malcolm Hodges and N. B. Wilson, who were hired temporarily due to the construction work, have been released.

Who says Friday the thirteenth is a day of ill omen? Al and Helen Powley tossed a party on that date, and so far no complaints of boredom have been heard from any one lucky enough to be off duty that night. Highlight of the evening was furnished by Ralph Hamill and Eddie Burg, who leaped into the rafters of the cabin in which the affair was staged, and had to be coaxed down with peanuts two hours later.

WOR

By R. A. Schlegel

The column originally scheduled to be cancelled in this space . . . will not.

In looking through the September 15th issue of "Broadcasting" we found an item concerning James Bonney of WORL, Boston. Bonney is a technician at WORL and his favorite sport is bouncing around the water in his 21-foot "WIWONA". Jimmy sailed the WIWONA to victory during Marblehead's Race week over thirty-five other boats. He also took six firsts, six seconds and seven thirds out of twenty-five other regular races.

Our Sound effects department, Fritz Street, Supervisor, have devised a sound effects machine, complete with a system of relays and circuits, which reproduces all sounds made by or heard over a telephone. At the turn of a switch, the gadget simulates a dial tone, busy signal, incoming ring, the click of the receiver on the hook at either end of the line, interrupted rings and other telephone effects. A telephone receiver is attached to the device so a dramatic director can achieve the effect of a voice heard on the phone by having actors speak directly into the telephone instead of through a filter mike. All this causes us to wonder if the machine will also be able to give wrong numbers.

While we are on the subject of sound effects, why, in radio sketches, no matter how expensive the car, the brakes must always squeal when applied? Whyinell don't they get those brakes fixed?

To the movies the other night and caught Arthur Q. Bryan in one of those Grouch Club movie shorts. The change of climate certainly has done wonders for Art. He would never be able to get into studio 7 announce booth with all that poundage. Wonder if he remembers the WOR sign off chimes after all these years?

Jim Carter spent his vacation fishing and caught three large striped bass. Jim sent Vince Barker (Empire State) a wire telling of his good luck. Barker came up for a try at the fish but was unable to report any success. Carter continues to show the foto of the fish upon the slightest provocation.

Shirley Davis commutes to Darien (Conn.), where he is reported to be living in the country. Shirley was extolling the virtues of his oil burning heating plant but we caught him building a de-luxe ash sifter. We presume that it was for the BarBQ pit in the yard.

What's happened to the A.T.E. net? I hope to be on the air again so hope to BCNU—73s.

New York

By Ted Kruse

Alfred W. Christopher, Maintenance Supervisor, recently made his radio debut. Chris was interviewed on the "Behind the Mike" program conducted by Alma Kitchell. All in all Chris handled himself like a veteran and only suffered slightly from Microphone Asthma, that shortness of breath resulting from being in "Front of the Mike".

Carlos Clark is one of the nicest persons we know, kind of heart and mild of manner, but we thought he was going to extremes when he had a date with a girl and took her boy friend along with them.

Ted Kruse finished his turn on the midnight trick cultivating something on his upper lip that grows wild on his chest.

Andy Waddell returned from vacation a wiser man than when he went away. Andy is now an expert on taking a square piece of cloth and making three cornered britches out of it.

Jimmy Coleman, who took up flying where we left off, is at this writing on vacation in South Dakota leading the life of an outdoor man, hunting and fishing and stuff.

Conscription being with us for the next five years, we know a lot of men between the ages of twenty-one and thirty-five who will never serve. Among the reasons for being rejected such as flat feet, flat heads, etc., a man may be turned down for "extreme ugliness of face". Oh happy us!

Joe Kay, SE, and Harry Zaz, Sound Effects, dropped in from Hollywood looking more prosperous and healthy than ever.

Saw some pictures of Jake O'Kelly prospecting and just sitting. Offhand we would say he does more sitting than prospecting as he looks stouter than when he left.

We missed reporting that George Shields and C. W. Westover have been transferred to the WEAF transmitter replacing Bill Haerer and Joe Miller who have been called to active service in the Navy. George Shields presents a problem all by itself. By the time we are ready to report that George has been transferred from here to there, he is some other place. From now on we will demand a written notice stating that George will be there long enough for us to report it in the column.

Ed Gundrum reports that on his last trip to Art Holub's home, he found Art painting the outside of the house. Art was wearing slacks and a pull-over sweater. Being a very warm day, Ed suggested he take his sweater off. Art did so, revealing a stiff shirt underneath. Arthur is a neat and correct dresser but we ask you, isn't that carrying things too far?

Bob Johnson spent his vacation on his 28-foot cruiser, exploring the east end of Long Island. Bob is now more than ever sold on boating and will keep his boat in the water for the winter.

Fritz Rojas has decided to join the long list of fresh water mariners by building a rowboat. After spending a small fortune buying magazines, tools and wood, Fritz is ready to start the actual construction . . . P. S.: He could have bought one for fifteen bucks.

Studio 8H, the likes of which even Hollywood does not have, has a new control booth, located on the stage proper. This will facilitate changing the mike setups, production, direction, etc.

The ATE National Convention will start November 11th, at the Abbey Hotel. We suggest that all New York and Engineering Chapter members drop in and get acquainted with the National Councilmen who will be present.

Flash! New York Chapter Steak Dinner (or Swordfish steak dinner) in honor of The National Council, to be held at the East Ball Room of the Hotel Abbey, Friday evening, November 15th, 1940, at 7 p.m. For reservations, see Ed Gundrum, Room 564.

Chicago By R. R. Jensen, S.E.

From the vacation list on the bulletin board, the season is now at its height, but according to a wire from Ely, Minnesota, the spirits of Field Supervisor Marshall Rife are at their lowest. It seems that Rife was toting a boat from one pond to another while in search of some bass. During the short trek, the boat got out of control and fell on his leg. Result,—both bones broken in lower right limb and an eight-week reservation in a plaster cast. We hope you will be back on the job soon, Marshall, and will be able to follow the San Felice between your desk and the field room in record time . . . From the stack of brown envelopes in the control room mailbox, Frances Mortion, sweetheart of the engineering department, better known as "Toots", is back from her vacation. If you work the night trick in Chicago, you already know the contents of the brown envelope but for the benefit of the alien readers, they contain a list of delinquent field reports. Being thus notified of the return of Toots we went up to twenty for an interview . . . Bill States and Charlie Townsend were welcome visitors as they stopped in Chi on their vacation from NY Television. The boys look about the same, weren't even wearing dark glasses . . . Sign on MCD lately, "No Hi-Li in Control Room, T.E.S." . . . "For E.G.E. Special Outside Phone, SE's keep off" is the dial label on a private phone installed in the engineers' room for Al Eisenmenger, in charge of technical operations on Ma Perkins, Kitty Keane, etc. The phone was made possible by a special fund collected from SE's who also like to make outside calls. Several of the boys have tried to use the phone but the party did not answer . . . Pres. Ed. Horstman has finally realized his boyhood ambition,—riding around with the fire department. In fact, he is in so good with them that on certain occasions the Chief personally escorts Eddie home. Seems as though the Chief and Eddie use the same brand of fire water and have become well acquainted. Recent interview with Chief brings statement that Eddie's early morning driving will soon qualify him to pilot tail end of hook and ladder combine . . . Since this issue is to be devoted to the shutter bugs it might be in order to mention a few activities of those creatures around Chicago. Most activity is of the flicker variety with the eight boys in a slight lead over the sixteens. Glenn Webster, "Vic and Sade" engineer, recently made a deal for a complete new 8mm Revere outfit, including camera and projector. Vern Mills, reference recording, is reported to have the best 8 mm color yet in captivity. Feat was accomplished with a Model 25 Eastman. Home processing is being done with very good results by several of the more ambitious emulsion exposers. Thornbury, S. E.; Wilson, S. E., and Washburn, ditto, are authorities on the subject of formulas, and Jim Platz, Jr., Supervisor, leads in making fancy developing equipment. The argument still goes on as to which is more for the money,—8 or 16. Rooters on the 8 mm side are: H. C. Luttgens, Division Engineer; Thornbury, Washburn, Wilson, Platz, Maher, MacCornack, Elkins, Webster, Mills and Lanterman. Those who figure that better pictures are worth the money are: T. E. Schreyer, Jackson, Bernheim, Conrad and Jensen.

KFI-KECA

By H. M. McDonald

Rumored that Major Armstrong will be affiliated with Howard Hughes in the construction of the latter's chain of FM-television stations on this coast.

Nuptials — While in Mexico City on his vacation last year Clarence Seamans, night MC supervisor, met a Miss Margaret Ely Halsted. Now he's a benedict, she's Mrs. Seamans, and we're all a-twitter. The story of the elaborate wedding ceremony and reception filled a column of the society page of Pasadena's leading newspaper, but Seymour Johnson, who was an usher, reports that much more could have been written about the decorations in the church, the 300 who attended, the police escort to the reception, the beauty of the lighting effects and flowers in the garden where the reception was held, three rooms full of presents, et cetera. The newlyweds will honeymoon a month in New York. We all wish them the best of everything.

Casualty — Harold Christensen's mother, wife, sister and daughter were injured and his new car demolished when another car driven through an arterial stop collided with his, up near Tracy, during his vacation. His wife was the most seriously injured and will be in a cast for many weeks. We're wishing her a speedy and complete recovery.

Yachting — The personnel of KFI-KECA were the guests of Mr. and Mrs. Seymour Johnson aboard their M/Y Seyelyn II, on a recent all day cruise to Santa Catalina Island. Minicaming, deck games, speed-boating, aqua-planing, canoeing, swimming and other sports were enjoyed and it was unanimously voted "a swell day".

Heard on the Red—"Difficulties having been restored we take you now—"

Cleveland By F. C. Everett

Fruit basket upset. Walker and Brandt have had their homes sold out from under them recently; Brandt is thinking of building while Walker has moved to his former location in West Richfield, more recently occupied by Clark. Cheeks has bought himself a house over the line into the city limits of Cleveland and thereby becomes the first transmitter man to own a home; except Russell who is a local boy and has "always" owned his. Hackett evidently thought he wasn't far enough away from work at Berea so is moving further into the sticks around that town. Housing situation in Brecksville is getting serious, so we may find more who will buy their own places.

McMahon has taken leadership of a "den" of Cub Scouts, included in which is his own son. He is enjoying the work hugely and has already initiated the boys into the mysteries of building radios. This makes two men in the scout business as Stewart is the Independence scoutmaster and was seen in the vicinity of that town the other day industriously trying to start a fire without matches. Stewart has been repairing the old model boats and building new ones just before his vacation and soon had Walker (or Walker's children) excited and building a cruiser also.

Hank Gowing is a bachelor while his wife is east and Bidlack is raising gourds this summer. If you need a new gourd see him.

Cheeks has become the big utilities magnate with an interest in several producing gaswells back on his grandfather's farm in Pennsylvania. We can think up a lot of cracks about gas taking the place of hot air at the transmitter, but will let the whole thing pass.

Everett has a new German built miniature, so is doing his part to help Hitler win the war. Butler has become a rabid 35 mm. fan, and is taking a large number of pictures in order to perfect his technique before going on vacation.

We note in a Cleveland newspaper that that well known southern author is writing a new book, "Gone With the Draft".

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