GOERZ AMERICAN

THROUGH QUALITY AND PERFORMANCE TO WORLD FAME

The C. P. GOERZ AMERICAN OPTICAL COMPANY

REMEMBER: For making first-class pictures "GOERZ AMERICAN" lenses have given profitable satisfaction over half a century

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GENERAL INFORMATION

COATING OF LENSES

We furnish all our lenses with reflecting surfaces coated. Uncoated lenses can be furnished upon special order.

Used Goerz lenses coated and adjusted if repairs require their disassembly. Further details under above heading are given in the pages following.

REPAIR FACILITIES AND SPECIAL WORK

Our factory is fully prepared to make all repairs on our lenses. Depending on the conditions of the lens, we can repair and repolish old or damaged lenses without any undue delay, and at reasonable cost.

We undertake the manufacture of special optical and mechanical instruments, and develop ideas and inventions of others along optical-mechanical lines.

WARNING

Due to careless handling used photographic lenses may have gotten out of adjustment. This condition may not be noticeable to the casual observer. There have also come to our notice cases where unscrupulous persons have faked unknown lenses by remounting and engraving them with our name and trademarks.

Therefore, we offer this friendly suggestion to anyone who is thinking of buying a second-hand Goerz lens:

Make your purchase subject to a check-up by us. We will gladly test and report on any used Goerz lens. There is no charge for this service.

WARRANTY

Goerz products are sold strictly on their merits and we will gladly exchange or replace anything that is found wanting in quality.

SHIPMENT OF GOODS

All prices and quotations are F.O.B. factory and transportation charges are additional. We insure under a blanket policy and each shipment is charged with this cost proportionally.

All goods should be sent to us by parcel post or express prepaid, carefully packed and fully insured. We return goods in the same manner. We are not responsible for damage or loss occurring in transit and if packages are received in damaged condition, the matter should be taken up with the carrier.

To avoid miscarriage and delay please be sure to use our full name and address as given below. We have no connection with any other firm.

The C. P. GOERZ AMERICAN OPTICAL COMPANY

MANUFACTURERS OF LENSES AND ACCESSORIES
FOR ALL BRANCHES OF PHOTOGRAPHY
DESIGNERS OF OPTICAL INSTRUMENTS

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The Optics of Lenses

In this book we discuss the subject of optics pertaining to the modern photographic lens, as thoroughly as space will permit. For additional information we would recommend some of the numerous photographic publications that treat of the matter more elaborately. The knowledge gained in this way will be of great assistance in the proper selection of a lens.

For the modern requirements in the photographic field the old-time rectilinear and portrait lenses have been largely supplanted by the highly corrected anastigmat type of lens. This is on account of certain defects in all the older types of lenses which render them not only unfit for solving any photographic problem calling for a combination of speed and covering power, but also incapable of giving critically sharp definition over an extended area.

THE ABERRATIONS most prevalent in the old-style lenses are spherical and chromatic aberration, astigmatism, curvature of field and distortion.

SPHERICAL ABERRATION is the deviation in focus of the rays of light passing through the outer zones of the lens from that of the rays passing through the lens near its center, or axis, the various rays being focused in different planes. It results in general loss of definition and a fogged appearance in the negative.

CHROMATIC ABERRATION is of very similar character, and is explained by the fact that the violet and blue rays, which are most active on the sensitive emulsion of the plate or film, are focused by the lens in a different plane from the red and yellow rays, to which the eye is most sensitive. If a lens suffers from chromatic aberration, the image recorded on the negative will be blurred, notwithstanding that the eye may have observed a sharply defined image on the ground glass.

ASTIGMATISM is the most serious defect in the old-style lenses. It shows itself in uncorrected lenses in such a manner that the horizontal and vertical lines of the object, although lying in the same plane in front of the lens, cannot be focused with equal sharpness at the same time on the ground glass. When the horizontal lines are sharply focused, it is necessary to move the ground glass forward or backward, in order to get the vertical lines sharp. This defect is principally visible along the margins of the negative, and results in a serious falling off of definition. Not until glass manufacturers had found a way of producing the so-called Jena glass—a material of entirely different properties from any glass previously known—were the opticians able to produce lens systems free from astigmatism. These lenses are known under the general name of anastigmats.

CURVATURE OF FIELD is another common defect and it is found even in some modern anastigmat lenses. Theoretically, no lens has an absolutely flat field of sharp definition, but in Goerz Lenses the unevenness has been reduced to a negligible minimum. The remarkable flatness of field of Goerz Lenses is one of the principal reasons for their popularity, and in fact, has placed our lenses in a class by themselves.

DISTORTION is inaccuracy in recording the lines of the object, straight lines, for instance, being shown as slightly curved in the image, especially if they lie near the margins of the negative. This aberration is present in all single meniscus lenses, and in many of

the higher-priced lenses as well, *including some anastigmats of unsymmetrical construction.* The Goerz DAGOR, Wide-Angle (Super) DAGOR and ARTAR *are symmetrical anastigmats;* i.e., they consist of two similar combinations. *This construction insures complete freedom from distortion—a point of the greatest importance in selecting a lens for architectural and engineering photography, copying and legal photography of every description.*

In our Double Anastigmat Lenses these various aberrations have been corrected to such a degree that Goerz Lenses are recognized as a standard for excellence among the finest photographic lenses of today. The possessor of a Goerz Lens is assured that his work will not suffer through any of the above-mentioned optical deficiencies. There are, however, other considerations to be taken into account in selecting a lens for any particular kind of photography. These considerations are discussed below.

FOCAL LENGTH OF A LENS—The equivalent focal length is the distance between a point in the lens system, called the second node, and the ground glass, when an object at infinity is in sharp focus. In symmetrical lenses this nodal point can be said to lie in the plane of the diaphragm between the two lens components. The focal length is then, for all practical purposes, the distance between the diaphragm in the lens and the ground glass, when a distant object is sharply focused. The choice of a lens of suitable focal length is important because:

First, the focal length determines the scale or the image size of the object photographed.

Second, the focal length of the lens used in relation to the size of the negative determines the angle of view—that is, the amount of subject included in the picture. With the same size negative the angle decreases as the focal length increases. (See table under heading "The Angle of View.")

Third, the focal length determines the *perspective* at which objects appear in the picture, and the selection of the proper focal length is, therefore, of prime importance in architectural, interior and portrait photography.

As mentioned above, the equivalent focus of a lens is obtained when focusing objects at infinity. When focusing objects at nearer distances the focal length of the same lens increases in a definite proportion, expressed by the formula:

$$\frac{a \times f}{a - f} = b$$

where "a" is the distance of the object, "f" the equivalent focus, and "b" the resulting or effective focal length. It will be seen that if we focus at an object which is only twice the equivalent focal length away from the center of the lens, then the effective focus "b" of the lens has also increased to twice that of the equivalent focus, in which case the size of the image will be exactly the same as that of the object. Two other formulas are given here which express the inter-relation of object and image distance and focal length:

$$\text{Distance of object to center of lens} = (n+1)\, f$$

$$\text{Resulting focus} = \frac{(n+1)\, f}{n}$$

where "n" designates the scale which the size of the object bears to that of the image, and "f" is again equivalent focal length.

THESE FORMULAS will be found useful whenever the photographer is called upon to select the proper size of lens or film to meet certain conditions, and we give here a few examples of their application.

1. An object is to be photographed 1-10th natural size, at an available distance between object and lens of 25 feet. What must be the focal length of the lens? *Answer*—Focal length must be 27.2 inches.

$$25 \text{ ft.} = 25 \times 12 \text{ in.} = (10+1)\, f$$
$$300 \text{ in.} = 11 \times f$$
$$300 \div 11 = 27.2 \text{ in.} = \text{focus of lens}$$

2. What will be the size of the head in a portrait if we photograph the sitter with a lens of 14 inches focus at a distance of 120 inches between camera and sitter?

Answer—Size of head will be 1.32 inches.

$$120 \text{ in.} = (n+1)\, 14$$
$$n+1 = \frac{120}{14} = 8.6$$
$$n = 7.6$$

Taking the average size of a head as 10 inches, a reduction of 7.6 times would give an image 1.32 inches in height.

3. What distance is required to take a standing figure (six feet tall) with a 14-inch lens on a 5×7 inch negative? *Answer*—Distance between sitter and lens, 182 inches.

Possible height of image on 5×7 negative = 6 in.

$$72 \div 6 = 12 = \text{reduction number } n$$
$$(12+1)\, f = 13 \times 14 = 182 \text{ in.}$$

SELECTION OF FOCAL LENGTH—For general purposes—and among these we would class amateur photography—the lens should have a focal length not shorter than the long side of the negative. Different requirements of photographic workers along special lines make necessary other focal lengths, and the most suitable one should be selected for each case.

For architectural photography, especially interiors, it is frequently necessary to use a wide angle lens: *i.e.*, a lens of shorter focal length than the long side of the negative for which it is listed.

The fact should here be noted that in photographs taken with short-focus lenses, the perspective is apparently exaggerated: *i.e.*, objects in the background appear disproportionately small in comparison with those in the foreground. This is in the nature of an illusion; the perspective in a picture, like that in looking at the objects themselves, depends on the point of view. If a photograph taken with a three-inch lens could be viewed at a distance of three inches from the eyes, the exaggeration of perspective would disappear. But the eye is not able to see clearly at such short distance, and it is therefore advisable to use for landscape and record photography a lens having a focal length equal, at least, to the normal distance at which we can see the picture distinctly, which is about ten inches. Many objects—for example, all kinds of furniture—appear in pleasing perspective only when they subtend a narrow angle in the field of vision or on the negative. For such objects, a lens of relatively long focus should be selected—*e.g.*, a 19 or 24 inch lens for an 8×10 negative.

THE SPEED OF A LENS depends on the amount of light it transmits, and is measured by the ratio of its effective aperture to its focal length; for instance, a lens with a speed of F:6 has an effective aperture equal to one-sixth of its equivalent focus. The diameter of the free glass surface of the front of the lens must be equal, at least, to the effective aperture; but there are some lenses in which the glasses are larger than the effective aperture, and the diameter of a lens is in itself no criterion of its speed.

Neither is the opening of the iris diaphragm, with which all modern lenses are supplied,

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Neither is the opening of the iris diaphragm, with which all modern lenses are supplied,

equivalent to the effective aperture. In anastigmats the opening may be either smaller or larger than the effective aperture, depending on the construction of the front lens system. In our DAGOR each combination is a positive or converging element, and the diameter of the diaphragm is one-eighth less than the effective apertures.

It is a general rule (subject to the above-mentioned qualification) that the opening of the diaphragm controls the speed of the lens. The engraved scale, which shows the relative diaphragm apertures serves, therefore, as a guide to exposures under any given conditions, and the numbers on this scale are often referred to as "speed numbers." There are different systems of designating diaphragm apertures. The best known are the "F" System and the Uniform System (U. S.), one or the other of which is used by all American lens manufacturers, and the Stolze System, adopted in Europe.

In the F system each figure shows the ratio between the lens aperture and the equivalent focus. For instance, if we stop down the lens to F:11, it will work at an effective aperture equal to 1-11th of its focal length. The necessary exposures, however, do not vary in the same ratio as the F numbers, but in proportion to the squares of these numbers. In the Uniform System, the diaphragm figures increase in the same ratio as the required exposures. We designate the maximum speed of our lenses in the F values and our diaphragms are marked in the same system, in order to facilitate the calculation of exposures. The table below shows a comparison of three systems.

F values	4	4.5	4.8	5	5.5	6.3	6.8	8	11.3	16	22.6	32	45	64
Uniform System (U. S.)	1	1.2	1.4	1.6	1.9	2.5	2.9	4	8	16	32	64	128	256
Stolze System as used on German-made Lenses	1.5	2	2.3	2.5	3	4	4.6	6	12	24	48	96	192	384

Inasmuch as the focus of a lens increases when focusing nearby objects, whereas the diameter of the effective opening of the lens remains the same, it follows that at short distances lenses work at less speed than that which they are listed for. This should receive due consideration by giving prolonged exposures when photographing nearby objects. For instance, when copying in natural size, a lens listed at a speed of, say, F:8, operates only at a speed of about F:16, thereby requiring four times the exposure necessary for a lens of an effective opening of F:8.

Anastigmats of extreme speed are necessarily more bulky than those of moderate speed, and they cannot be fitted to some of the smaller hand cameras. Extreme speed also involves a sacrifice in covering power, and in depth of focus when the lens is used wide open. The latter implies the necessity of greater care in focusing with the DOGMAR than with the DAGOR, when the lenses are used at their full aperture. For most amateur work a speed of F:6.8 is sufficient, and as a lens for general photography we especially recommend our DAGOR to the amateur. The DOGMAR is, however, admirably adapted to portraiture in the home or studio, to news photography, and to many kinds of outdoor photography under unfavorable conditions of light. Both lenses are fine for color work.

COVERING POWER is the ability of a lens to evenly illuminate and define an image over its entire circle of illumination. The field of a lens being circular in form, the largest negative which may be used is such as can be set in this field without cutting off the corners. Goerz DAGOR Lenses are celebrated for their most remarkable covering power; they will embrace an angle of view to 90°, making them most satisfactory for wide angle work. A DAGOR 6" for instance, listed for the 4 x 5 inch negative will cover a 6½ x 8½ negative when smaller diaphragm stops are used.

For photographing "skyscrapers" and large manufacturing plants, and for interior views in cramped situations, it is necessary to employ a special lens intended for wide

angle work. Among special wide-angle lenses, the Goerz SUPER-DAGOR and Goerz RECTAGON are supreme.

THE DEPTH OF FIELD expresses the range within which a lens will reproduce near and distant objects sufficiently sharp on the negative. Theoretically a lens can only image sharply on the ground glass or on the negative objects lying in one plane in front of the lens. We find, nevertheless, that objects at different distances appear equally sharp in the picture; and the reason for this is that our eyes are unable to discover the very slight unsharpness with which these objects have been imaged by the lens. It is approximately correct, therefore, to speak of the depth of field of a lens.

This is a fixed quality in all lenses, and depends simply on the relation between the focal length and the aperture of the lens. In general it decreases as the focal length and size of aperture increases. Of two lenses with the same speed but of unequal focal length the one of shorter focal length will have the greater depth. Of two lenses of the same focal length but of unequal speed, the slower one will have the greater depth, *but if both are stopped down to the same aperture the depth will then be equal.* Depth of field can always be obtained by stopping down the diaphragm, but this, of course, means loss of speed and proportional increase of exposure. It will thus be noted that when using fast lenses of rather long focus, at their full opening, it is impossible to obtain both far and near objects equally sharp on the negative. The question of depth of field is of great importance when photographing, for instance, street scenes with objects at various distances from the camera. For such subjects, pocket cameras with short-focus lenses possess a great advantage over bulkier outfits.

We append below a table giving the distances between which objects will appear perfectly sharp in the negative when using lenses of various focal lengths, if the index on the camera is set for a certain distance on the focusing scale, as provided with almost every hand camera. In contact prints the depth of field will be found considerably greater than indicated by the table.

The maximum depth of field is obtained if the index is set at the so-called *hyperfocal distance*, given in the table for the various diaphragm openings, when it will extend from one-half the hyperfocal distance to infinity. The formula for the hyperfocal distance is

$$\frac{F \times F \times 250}{\text{F-value}}$$

in which F is the focus of the lens in inches and F-value the size of the diaphragm stop in the F system. The multiplier 250 indicates the allowable circle of diffusion, 1-250th of an inch. It can be decreased to 200 or 100 if the negatives are to be used only for contact prints.

Depth of Field

Index on Focusing Scale			9 Ft. = 108 In.		12 Ft. = 144 In.		15 Ft. = 180 In.		25 Ft. = 300 In.		Hyperfocal Distance Inches		
Equivalent Focus	Diaphragm		The Depth of Field Extends										
	F:	U.S.	From	To	From	To	From	To	From	To	Index	Range From	Range To
3 Inches	4.8	1.4	88	140	116	208	130	292	181	830	**470**	235	Infinity
	5.5	1.9	86	147	107	222	125	322	173	1118	**410**	205	
	6.8	2.9	81	161	100	242	117	396	157	3300	**330**	165	
	8.	4.	78	176	95	299	110	504	.....	.....	**280**	140	
3½ Inches	4.8	1.4	92	130	118	186	140	251	204	567	**637**	318	Infinity
	5.5	1.9	90	134	114	194	136	256	195	705	**557**	278	
	6.8	2.9	87	142	109	212	129	300	180	900	**450**	225	
	8.	4.	84	151	105	231	122	340	168	1398	**382**	191	
	11.	8.	78	178	95	302	109	521	.....	.....	**275**	137	
4¾ Inches	4.8	1.4	99	119	128	164	156	213	239	403	**1175**	587	Infinity
	5.5	1.9	98	121	126	168	153	218	232	424	**1025**	512	
	6.8	2.9	96	124	123	174	148	230	220	470	**830**	415	
	8.	4.	94	128	120	181	143	242	210	522	**705**	352	
	11.	8.	89	137	112	200	133	278	189	725	**512**	256	
	16.	16.	83	156	102	244	119	368	162	2031	**352**	176	
	22.	32.	76	187	92	331	106	612	.....	.....	**255**	127	
6 Inches	4.8	1.4	102	115	134	156	165	199	259	357	**1875**	937	Infinity
	5.5	1.9	101	116	132	158	162	202	254	367	**1637**	818	
	6.8	2.9	100	118	130	163	158	210	242	394	**1262**	631	
	8.	4.	98	120	128	165	155	214	237	409	**1125**	562	
	11.	8.	95	124	122	175	148	231	219	474	**817**	408	
	16.	16.	91	134	112	194	136	265	196	644	**562**	281	
	22.	32.	85	147	106	223	125	323	173	1141	**407**	203	
	32.	64.	78	176	95	296	110	504	.....	.....	**280**	140	
7 Inches	4.8	1.4	104	113	136	153	168	194	268	340	**2550**	1275	Infinity
	5.5	1.9	103	114	135	154	167	196	264	347	**2227**	1113	
	6.8	2.9	102	115	134	156	164	200	257	359	**1800**	900	
	8.	4.	101	116	132	159	161	204	251	373	**1530**	765	
	11.	8.	98	120	128	165	155	215	236	411	**1112**	556	
	16.	16.	95	126	121	177	146	235	216	494	**765**	382	
	22.	32.	90	134	114	195	136	266	195	653	**555**	277	
	32.	64.	84	151	105	231	122	340	168	1398	**382**	191	

THE ANGLE OF VIEW—For those desiring to find the angle of view included by lenses of various focal lengths on the standard size negative, we append a chart of angles.

Example No. 1—Find the angle included over the diagonal of an 8 x 10 negative, when using a lens of 12-inch focus.

1. Take length of diagonal for 8 x 10 negative from table to be 12.9 inches.

2. Take on horizontal base line focal length of 12 inches and on vertical line diagonal of 12.9, or practically 13, and find where the fine vertical and horizontal lines running from these points intersect.

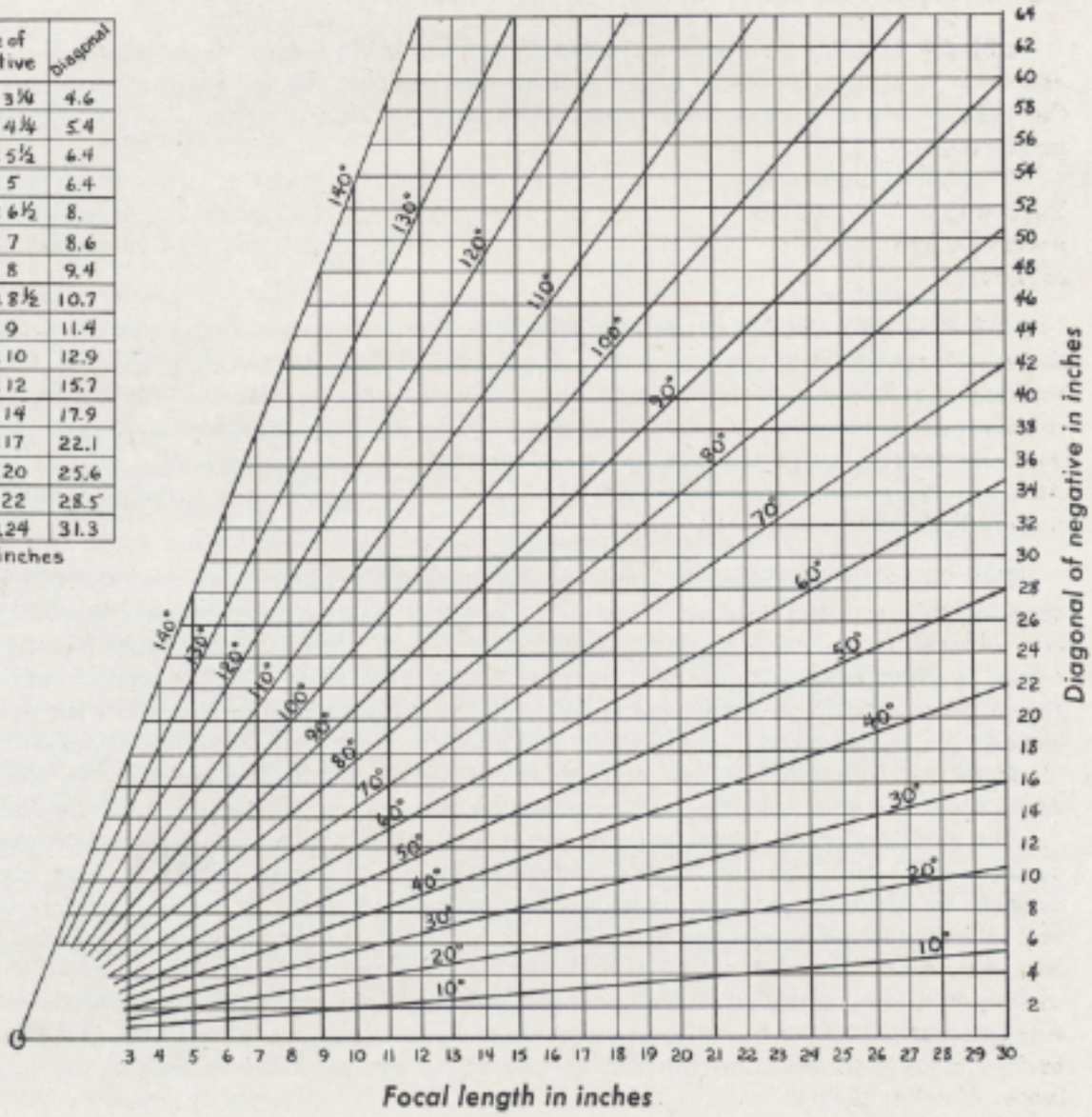
It will be found that the intersecting point lies just about half between the 50° and 60° line, so that the angle of view is 55°.

Example No. 2—What focal length must be used to include an angle of 90° over the diagonal of 11 x 14 negative?

Diagonal of 11 x 14 negative is 17.9 inches, or practically 18 inches, so follow fine line from 18 inches point on vertical until it intersects with the 90° line and follow down to horizontal line, which gives 9 inches as the required focal length.

Size of Negative	Diagonal
3¼ x 3¼	4.6
3¼ x 4¼	5.4
3¼ x 5½	6.4
4 x 5	6.4
4¾ x 6½	8.
5 x 7	8.6
5 x 8	9.4
6½ x 8½	10.7
7 x 9	11.4
8 x 10	12.9
10 x 12	15.7
11 x 14	17.9
14 x 17	22.1
16 x 20	25.6
18 x 22	28.5
20 x 24	31.3

inches



For landscape work and portrait photography an angle of view of about 40° will usually be sufficient. For street scenes and genre photography, an angle of view of 40° to 60° should be selected. For interiors any angle of view up to 90° may be used to advantage. Wider angles, from 90° to 135°, should be included in a photograph only in case of necessity, as the exaggerated perspective explained before is annoying to the eyes in extreme wide-angle views.

RESOLUTION—To determine the sharpness of a lens, the most convenient way which is customarily used, is a test of line-resolving power. This test is made by photographing a chart, showing various patterns of fine lines of equal width and equally spaced apart in tangential and radial direction, in order to discover the resolution of the highest number of lines. Space here does not allow for a lengthy discussion. The procedure for the test is outlined in a National Bureau of Standards circular, entitled "A Test of Lens Resolution for the Photographer" (by Irvine C. Gardner), obtainable at Government Printing Office, Washington, D. C. A comprehensive article on this subject is also found in "Photographic Optics" (by Allen R. Greenleaf), published 1950 by The Macmillan Company, New York, N. Y. This book covers practically any subject concerning photo-lenses. There are text-books, containing a wealth of information along above lines, which are listed for sale in almost all photo-magazines or kept on file in the public libraries.

USE OF LENSES FOR ENLARGEMENTS—When using lenses for enlarging it is well to use them in reverse position, with the front lens towards the enlarged picture, except in the case of strictly symmetrical lenses, which may be used in either position with equally good results.

If artificial light is used for enlarging, care must be taken to prevent the lens from becoming unduly heated. In the case of cemented lenses, the cement may also suffer from excessive heat. Screen the lens from the light except during the time necessary for the exposure.

AIR BUBBLES OR BELLS IN LENSES—Almost every modern anastigmat lens shows in some of its component parts minute air bells or bubbles. The exacting purchaser is often inclined to refuse acceptance of such lenses, believing the presence of these bubbles to be a defect. It is, however, impossible to obtain from the manufacturers of optical glass this material entirely free from bubbles; and, furthermore, the presence of a few air bubbles does not in any way affect the work of the lens. Their presence is rather a guarantee of quality than otherwise.

THE CARE OF LENSES—All lenses should be cleaned from time to time, but with proper care, as the adjustment of an anastigmat is easily disturbed by careless handling. Dust the surfaces first with a perfectly clean camel's-hair brush, which every photographer ought to have especially for that purpose. Then wipe them with a piece of lens tissue. Never use any acid or other strong fluid on the glass surface of your lens for it will be ruined. We have had to repolish many anastigmats which had been thus damaged.

In all our cemented lenses, such as the DAGOR and SUPER-DAGOR, the clampring which holds the glasses in their cells *must not be removed*, or the centering will be disturbed.

The surfaces of all lenses may become oxidized in the course of years, through exposure to the air. This condition is indicated by an iridescent reflection from the glass surface. To prevent oxidation, keep the lens capped when not in use and remove at once any moisture which condenses on it. Surface oxidation can be removed by repolishing the lens. All repairs to anastigmat lenses should be entrusted to the manufacturers of the lens, as only they are equipped with the necessary test glasses and tools for this delicate work. Any attempt at repairs by others may result in the complete loss of the lens. Our New York factory is fully equipped for repolishing and repairing Goerz Lenses, but we do not repair lenses of other makes.

COATING OF LENSES—To increase the light transmission and brilliance, practically all photographic compound lenses are now given a magnesium fluoride coating. This very thin, but hard and durable coating is baked, in a vacuum by evaporation of various metallic fluorides, onto the glass-to-air surfaces of the single elements of a lens. It is done to void the undesirable interference of certain innumerable light rays reflected forth and back in all directions from the surfaces of the various component elements of the lens. These unwanted reflections finally emerge from the rear of the lens and scatter in a haze over the entire negative causing a reduced contrast in the image on the emulsion. After all, the image should show, in the print, a true picture of the object just as seen by the human eye.

Coating of our lenses is done before the single elements of a lens are cemented together and/or mounted and burnished in their mounts, because in producing a hard and scratch-free coating the single elements must be subjected to high-temperature baking.

It is a fact that coated lens surfaces lose only about 1% of light by reflection, while uncoated ones lose about 4%.

Uncoated lenses, if desired, can be furnished upon special order.

Choosing a Goerz Lens

FOR AMATEUR PHOTOGRAPHY—This includes a wide variety of work, comprising most of the recognized branches of photographic activity. For landscape and architectural photography it is an advantage to possess a lens which can be used as a wide angle lens on a considerably larger size of negative than that for which it is listed, and which has a front or back combination efficient enough for instantaneous exposures, whenever larger images of distant objects are desired. No lens which works much faster than F:7 can meet these requirements. We therefore recommend the DAGOR with its maximum speed of F:6.8 as a universal lens for outdoor and indoor amateur photography. The extra speed of the DOGMAR F:4.5 can be used to advantage in amateur portraiture and for instantaneous photography in dull weather; but whenever the DOGMAR is used wide open and focused by scale, especial care must be taken to estimate the distance of the object correctly.

FOR COMMERCIAL PHOTOGRAPHY—The photographing of machinery, furniture, glassware and merchandise in general, and the recording of progress in building and construction work are the principal tasks of the commercial photographer. A good perspective effect and perfect rendering of details are the necessary results to be obtained in this class of work. To obtain the proper perspective is merely a matter of selecting the proper viewpoint and using a long-focus lens, so that the camera can be set up at a suitable distance from the object; but to get the proper details and correct drawing of the object a lens that is corrected for distortion, spherical and chromatic aberration and astigmatism is of paramount importance. The DAGOR lens is the most suitable for this class of work. The wide-angle efficiency of the DAGOR, especially, is of prime importance to the commercial photographer.

NEWS PHOTOGRAPHY, though a branch of commercial photography, has its special requirements, and these are perhaps better met with the DOGMAR. Professional and amateur specialists in high-speed photography frequently obtain good pictures with the DOGMAR, under conditions which would mean failure if a slower lens were used.

PHOTO-ENGRAVING—To meet the requirements of the photo-engraver, we offer two special anastigmats of the uncemented type—the Apochromat ARTAR for color separation and the GOTAR for black and white enlarging. These two lenses are widely known in the Graphic Arts field.

FOR PORTRAIT PHOTOGRAPHY—Home portraits by window light can be successfully taken with the DAGOR, and it is also an ideal lens for all kinds of flashlight photography. To those who specialize in home photography we would, however, recommend the DOGMAR. This lens has sufficient covering power for taking home groups, children at play, etc., and its speed reduces the necessary exposures from seconds to fractions of a second, thereby saving many negatives which would otherwise be hopelessly blurred by motion of the subjects.

For professional portraiture we offer two anastigmats—the DOGMAR, in its longer focal lengths is in use in the best American studios. To the photographer who must rely chiefly on one lens for bust portraits, three-quarter and full-length figures and small groups, and who must be able to secure critically sharp definition on demand, we recommend the DAGOR. The DAGOR is also the best lens for large groups. At its sharpest focus it gives beautiful but not "fuzzy" definition. Any degree of diffusion desired can be obtained either with the DOGMAR or DAGOR, by focusing for a soft effect. It is a good rule to use a lens of a focal length at least twice as long as the largest bust to be made with it: e.g., a lens of at least 14 inches focus for a seven-inch bust on an 8 x 10 negative. But in home portraiture and work in short studios, it is frequently necessary to disregard this rule. In all such cases special care must be taken in posing the sitter; if this is done, good portraits can be obtained with a lens of any focal length. We give below the distances between lens center and sitter when using various focal lengths of our lenses for different sizes of portraits.

Focal Length, inches.....	10¾	12	14	16½	19
	Distance in feet between sitter and lens center				
Cabinet standing figure, 4½ inches high.....	14	15¾	19	22	25
Paris full-length figure, 6 inches high.....	10¾	12	14	16½	19
Cabinet bust, 3⅓ inches in size.....	5⅓	6	7	8¼	9½

Further details concerning Goerz lenses are given in the following classified sections. For other technical information on lenses in general we recommend the textbooks mentioned under the heading "Resolution" (page 14). For further information concerning your special requirements we would be glad to have you write us.

LENSES FOR GENERAL WORK

The "GOERZ AMERICAN" DAGOR ANASTIGMAT F:6.8 and F:7.7

(The Universal All-Purpose Lens)

The DAGOR, consisting of two cemented triplet combinations, symmetrically placed in front and back of the iris diaphragm, has been the favorite lens of photographers for almost sixty years.

It combines in one lens:

1. A perfectly color-corrected rapid Anastigmat,
2. A wide-angle lens of smaller stops,
3. A long-focus lens when single element is used.

On account of its adaptability in practically every phase of photography, we recommend it for architectural and commercial photography, for interiors, exteriors, scenic views, colorfilm, copying and enlarging.

It is the outstanding selection for taking group and banquet photographs.

The maximum speed of f:6.8 is fast enough for sport photography and rapidly moving objects under good light conditions or, with the modern high speed negative emulsions, even on dull days.

At smaller stops the complete Dagor will include an image field angle up to 87 degrees, i.e., it will cover a plate with a diagonal of nearly twice the focal length. The single element, either front or back, at a speed of f:13 may be used alone, furnishing a focal length about 1¾ times that of the doublet.

Focal Length		Recommended Negative Size. Angular Field About			No. of Shutter adaptable, either Regular or Synchro, except when specified			Diameter of Front Lens Cell for "Slip-over" Filter-holder or Cap
f:6.8		56°	70°	87°	Wollensak Rapax	ILEX		
In.	mm.	f:6.8	f:16	f:45		Acme	Univ.	mm.
1½	40	1x1½	1¼x2	1¾x2¼				
2⅜	60	1½x2⅜	1⅞x3	2½x3⅜				
3½	90	2x2¾	3x4	3¼x4¼	2			21.
4⅛	105	2¼x3¼	3¼x4¼	4x5	2			29.5
5	125	3¼x4¼	4½x5½	5x7	2			29.5
6	150	4x5	5x7	6½x8½	2	2 syn.		32.5
6½	165	3¼x5½	5x8	7x9	2	2 syn.		32.5
7	180	5x7	6½x8½	8x10	3	2 syn.		37.
8¼	210	5x8	7x9	10x12	3	3		43.
9½	240	6½x8½	8x10	11x14		3		48.7
10¾	270	7x9	8¾x10¾	12x16		4		55.3
12	300	8x10	10x12	14x17		4		60.8
f:7.7								
14	360	10x12	12x16	16x20		4		65.8
16½	420	11x14	14x17	20x24			5	73.5
19	480	14x17	17x21	22x26			5	87.5

To convert millimeters into inches divide by 25.4

(For prices see current price list)

For MICROFILMING with 35 mm. document cameras we are prepared to furnish on special order Dagor lenses of 40 and 60 mm. focal length. Inquire for detailed information.

For AERIAL MAPPING we make a special lens built on the fundamental design of the Dagor. This lens is called the AEROTAR and is now widely used by the leading aerial mapping concerns in the U. S. A. Special information upon request.

The "GOERZ AMERICAN" RECTAGON ANASTIGMAT F:6

A NEW LENS DESIGN—COMBINING EXCELLENT DEFINITION, COLOR CORRECTION AND COVERING A FIELD OF 90 DEGREES

U. S. PAT. 2,383,115

The RECTAGON is an unsymmetrical lens system, which was made for precision aerial mapping, requiring high resolution and no distortion over the entire field. The formula is such that the lens can be used from infinity focus down to 1:1, where the image equals the size of the object. The lens is now available for all-purpose photography.

Although the RECTAGON is rated at a speed of F:6, the elements are actually oversize to admit more light and give more illumination to the edges of the large field. The front and rear elements are almost twice the diameter of the largest effective aperture.

The maximum aperture of f:6 is preferred for focusing. For excellent sharpness and resolution stop down to f:8.

When the negative is to be greatly enlarged, the lens should be stopped down to F:16, at which aperture the optimum average resolution is attained.

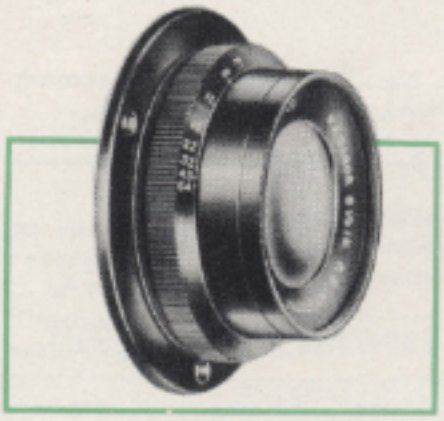
At the present time a 3" focal length is available either in iris barrel or fitted to shutters as shown below.

3" RECTAGON F:6 in Ilex Acme shutter No. 3, for 4 x 5 camera:
Apertures—f:6 to f:32.
Shutter Speeds—1 to 1/200 second, T&B, Diameter of Field at infinity focus—6 inches, correspondingly larger when focused at closer distances.

3" RECTAGON F:6 in RAPAX shutter No. 2, for 3¼ x 4¼ camera:
Same as above, except the lens is mounted in more compact cells to fit the smaller shutter required in many cameras. Due to the smaller cells, the lens does not cover the full 90 degrees, although this angle is not necessary for 3¼ x 4¼ and smaller negatives.

Above shutters are also available with built-in flash synchronization.

(For prices see current price list)



The "GOERZ AMERICAN" WIDE-ANGLE DAGOR ANASTIGMAT F:8

(Wide Angle 100 Degrees)

The W.A.-DAGOR is constructed on the proved lines of the standard Dagor, its principal outstanding feature is the greatly extended coverage.

To make focusing easier under poor light conditions, a maximum aperture of f:8 has been provided. To obtain the most perfect definition over the full field the diaphragm should be stopped down until the full coverage of 100 degrees is reached at f:45.

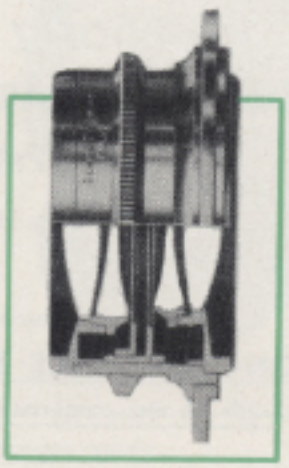
The front or rear combination may be used as a long-focus lens at medium stops. On account of the compact design the Wide-Angle Dagor can only be fitted in iris diaphragm barrel or the shutters listed below.

Focal Length	Negative Size Covered			Maximum Diagonal	No. of Shutter adaptable, either Regular or Synchro, except when specified.	
	F8	F22	F45		Rapax	Acme
3⅝"	3¼x4¼	3½x4½	4x5	8"	2	2 syn.
4⅜"	4x5	4x6	5x7	10.4"	3	3
6½"	5½x7½	7x9	8x10	15.5"	3	3

(For prices see current price list)

The "GOERZ AMERICAN" DOGMAR ANASTIGMAT F:4.5

(The Perfect Speed Lens)



The DOGMAR is the ideal lens for news and sport pictures, portraits and general photography under adverse light conditions. Its high color correction makes it a fine lens for color separation, Kodachrome and other color films.

The two single combinations, which can be used separately at the smaller stops, are of different size, offering the advantage of three focal lengths in one lens. The front combination has a focal length of about 1.92 times and the rear combination one of 1.52 times that of the complete lens. The relative increase in exposure over that with the complete lens at a given stop is about 4 times for the front and 3 times for the rear combination. At their maximum aperture, the single elements produce artistic, soft effects; critical definition may be obtained at smaller stops.

The Dogmar produces pictures of sparkling brilliance. Negatives will stand a remarkable amount of enlargement before breaking down in the artistic rendition of details.

Focal Length		Recommended Negative Size Angular Field About		No. of Shutter adaptable, either Regular or Synchro, except when specified.			Diameter of Front Lens Cell for "Slip-over" Filter Holder
f:4.5		48°	55°	Wollensak	ILEX		
In.	mm.	f:4.5	f:32	Rapax	Acme	Univ.	mm.
3⅛	80	1¾x2⅜	2¼x2¾	2			21.6
4⅛	105	2x3	2¼x3¾	2	2 syn.		29.5
5¼	135	3¼x4¼	3½x4½		3		42.
6	150	3½x4¾	4x5		3		42.
6½	165	3¼x5½	4x6		3		51.
7½	195	4¼x6¼	5x7		4		60.8
8¼	210	5x7	5x8		4		60.8
9½	240	5½x7½	6½x8¼			5	69.2
10¾	270	6½x8½	7x9			5	75.
12	300	7x9	8x10			5	83.

To convert millimeters into inches divide by 25.4

(For prices see current price list)

MOVIE CAMERA LENSES

The "GOERZ AMERICAN" CINE DOGMAR ANASTIGMAT F:4.5

Focal Length 150 mm (6 inch)

recommended for

LONG DISTANCE TELEPHOTO WORK

with 16 mm cameras for movie or television

Mounted in iris barrel or fitted to "C" focusing mount for 16 mm camera.

The field coverage is naturally very small in comparison with that of still cameras. It is, however, desirable to have a high resolving power at all angles over this small field. The answer is the CINE DOGMAR. It covers the 16 mm frame with excellent definition.

(For prices see current price list)

The "GOERZ AMERICAN"
APOGOR ANASTIGMAT
F:2.3

THE LENS FOR MOVIES AND TELEVISION, ***with microscopic definition successful cameramen have been waiting for—***

A new six element high quality lens for the 16 and 35 mm film camera. Corrected for all aberration at full opening, giving highest definition in black-and-white and color.

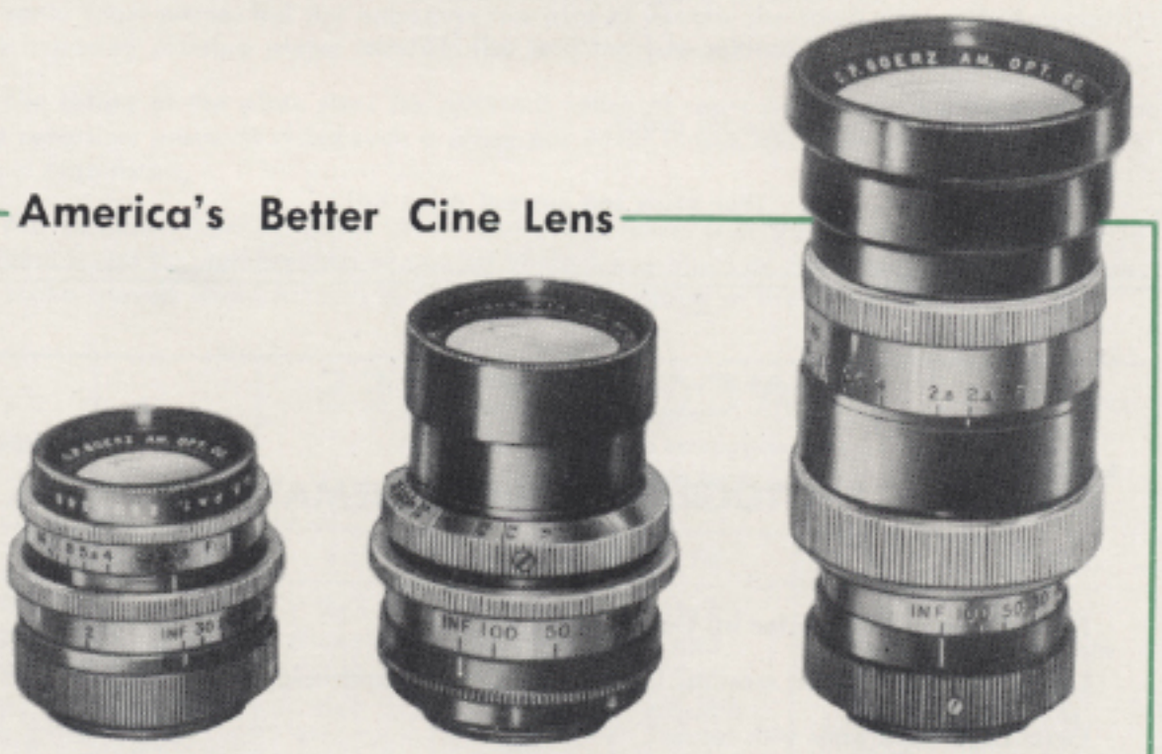
Made by skilled technicians with many years of optical training.

Mounted in iris barrel or fitted to a precision focusing mount, which moves the lens smoothly without rotating elements or shifting image.

These lenses can be furnished in "C" mounts for 16 mm cameras.

Fitting to other cameras upon special order.

America's Better Cine Lens



CALIBRATIONS: Focusing scale and Diaphragm stops

35 mm (1⅜")	50 mm (2")	75 mm (3")
2 feet to infinity f:2.3 to f:16	6 feet to infinity f:2.3 to f:22	5 feet to infinity f:2.3 to f:32

(For prices see current price list)

The "GOERZ AMERICAN"
HYPAR ANASTIGMAT
F:2.7

FOR WIDE-ANGLE WORK

It comes only in Focusing mount for 16 mm cameras

A LENS FOR MOVIE AND TELEVISION

Used by discriminating cameramen, both professionals and amateurs.

It gives microscopic definition and the resulting image has a remarkable brilliance and crispness.

Focal length: 15 mm (0.60")

Size of image: 16 mm frame

Diameter of front lens cell: 16 mm

Other focal lengths on special order.

(For price see current price list)

ACCESSORIES

PHOTOGRAPHIC and CINEMATIC

Extra Camera Flanges for all Goerz lenses.

Light Filters in screw-in mounts, in a variety of sizes and colors.

Extra caps (sold only with lenses).

Cable Releases.

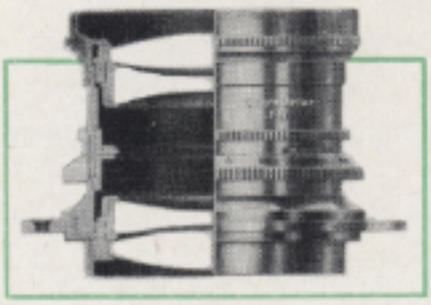
Metal Holders for gelatin filters for process lenses.

(For details and prices see current price list)

Light Filters in slip-over mounts in a variety of sizes and colors. Ask for circular showing prices.

For shutters adaptable to our lenses—see current price list.

PROCESS LENSES



THIS ILLUSTRATES BOTH ARTAR AND GOTAR LENSES

The "GOERZ AMERICAN" APOCHROMAT ARTAR

F:9 to F:16

(The Lens for Color Separation Negatives)

Designed to meet the special requirements of the photoengraver for color separation and black and white reproduction of flat surface designs. Also suitable for photography of outdoor scenes, architectures, furniture and other large objects.

The Artar is truly "apochromatic," which means that a very high degree of correction has been attained in this lens for the various color bands over the entire visible spectrum. The Artar not only produces through the various color filters images of equal sharpness at the same focal plane, but the negatives are also of exactly the same size so that perfectly superimposing printing plates result in the finishing process.

The listing of the plate sizes for different ratios of reproduction are based on the use of a reversing prism. Without such a prism our Artar lenses will cover an area about 15% larger than listed.

The standard barrels of the Artar series are fitted with iris diaphragm and have in addition a slot for the insertion of special Waterhouse stops or the thin gelatin color filters. We make special metal holders to facilitate the handling of the gelatin filters.

F Value	Focal Length	Plate Size for copying with Prism Reduction Scale From the listed sizes enlargement to respective scale may also be made—				Correct Size of Goerz Reversing Prism
	Inches	1:10	1:5	1:2	1:1	Inches
9.5	4	2x3	2½x3	2½x3½	4x5	see
9.	6	3¼x4¼	3½x4½	4x5	6x8	footnote
9.	8¼	4x5	4¼x6½	5x7	6½x8½	....
9.	9.5	5x7	5x8	6½x8½	8x10	2⅜
9.5	10¾	5½x7½	6x8	7x9	9x12	2⅜
9.	12	6½x8½	7x9	8x10	12x14	2⅜
9.	14	7x9	8x10	10x12	14x17	2⅜
9.5	16½	8x10	10x12	11x14	16x20	2⅞
11.	19	10x12	11x14	14x17	18x24	2⅞
11.	24	12x15	14x17	18x20	24x28	3¼
12.5	30	16x20	18x20	22x26	30x34	3¼
12.5	35	18x22	20x24	24x32	36x40	3¾
14.	42	22x27	25x30	32x36	42x48	5
15.	47½	25x32	30x35	36x40	48x56	5
16.	70	36x45	40x48	48x64	72x80	not made

Artar 4" and 6" intended for color separation blow-ups from 35 mm and larger color film.

We are fitting the smaller sizes of Artar lenses to Rapax shutters for use on one-exposure 3-color cameras.

(For number of shutters adaptable and for prices see current price list)

The "GOERZ AMERICAN"
GOTAR ANASTIGMAT
F:6.8 F:8 F:10

(For Photoengraving and Commercial Photography)

Illustration similar to that of ARTAR on page 23

For black and white work, process work and for copying and enlarging maps or for reproduction of the finest detail in any other flat surface design. Also suitable for photography of furniture, automobiles and machinery.

The barrels for 8¼, 10 and 12" lenses are of the standard iris diaphragm type. The longer focal length lenses have in addition to the iris diaphragm a slot for the insertion of gelatin filters. We make special metal holders for such filters.

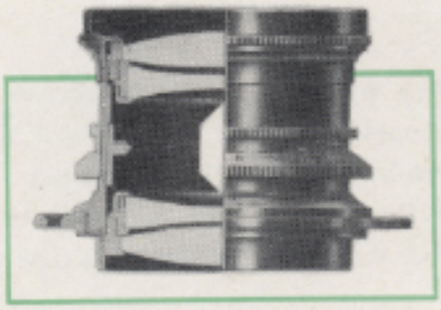
F Value	Focal Length	Plate size for infinity	Plate size for copying Reduction Scale			Diameter of front lens cell for "Slip-over" filter holder or cap
	Inches	Inches	1:5	1:2	1:1	mm.
6.8	8¼	5x7	6½x8½	8x10	10x12	43.
8	10	6½x8½	7x9	10x12	11x14	48.5
8	12*	8x10	10x12	11x14	14x17	51.
8	14	10x12	11x14	14x17	16x20	61.
8	16½*	11x14	12x16	16x20	18x22	69.
8	19*	12x16	14x17	18x22	20x22	75.
10	24*	14x17	16x20	20x24	26x30	75.

*If not in stock, only quantity orders of at least 10 pieces accepted.

Metal holders for gelatin filters—see price list.

For number of shutters adaptable and for prices see current price list.

A new member of the Goerz family:



GOERZ HUEBNER
ARTAR REVERSE LENS

Manufactured under Huebner Patent #2,408,855, it contains a built in *special reversing prism* placed between the nodal points of the lens system.

The image passing through this lens comes out exactly reversed, sharp and without distortion, color separated images are in exact register.

Practical for use in photo *engraving* for direct prints on sensitized metal plate.

It is useful for any branch of the Graphic and Industrial Arts requiring a reversed image.

It supersedes all other image reversers, right angle cameras, striping films, and delayed action operations.

It can be mounted on any camera exactly as any other lens is mounted, the image centers on the ground glass, as with other lenses.

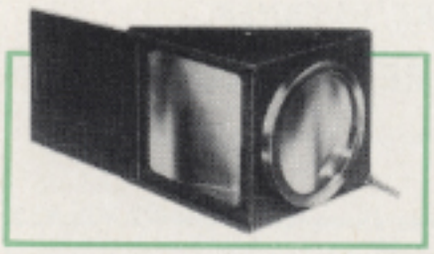
The image can be rotated by hand adjustment to any angle, or by a motor and dark room control (motor mounting may be ordered separately with an adapter plate).

Full coverage up to the lens focus capacity is assured.

Diaphragm Control and a holder for color separation filters are part of the lens equipment.

F Value	Focal Length	Plate Size for copying with built-in Prism Reduction Scale From the listed sizes enlargement to respective scale may also be made—			
	Inches	1:10	1:5	1:2	1:1
11. 12.5	24 30	8x10 10x12	9x12 11x14	11x14 14x17	16x20 18x24

The "GOERZ AMERICAN"
REVERSING PRISM



Certain reproduction processes demand reversed negatives to avoid stripping the film. This reversal is obtained in the negative by placing a right angle prism on the lens, usually at the front. No lens can work to any higher accuracy than the prism with which it is used.

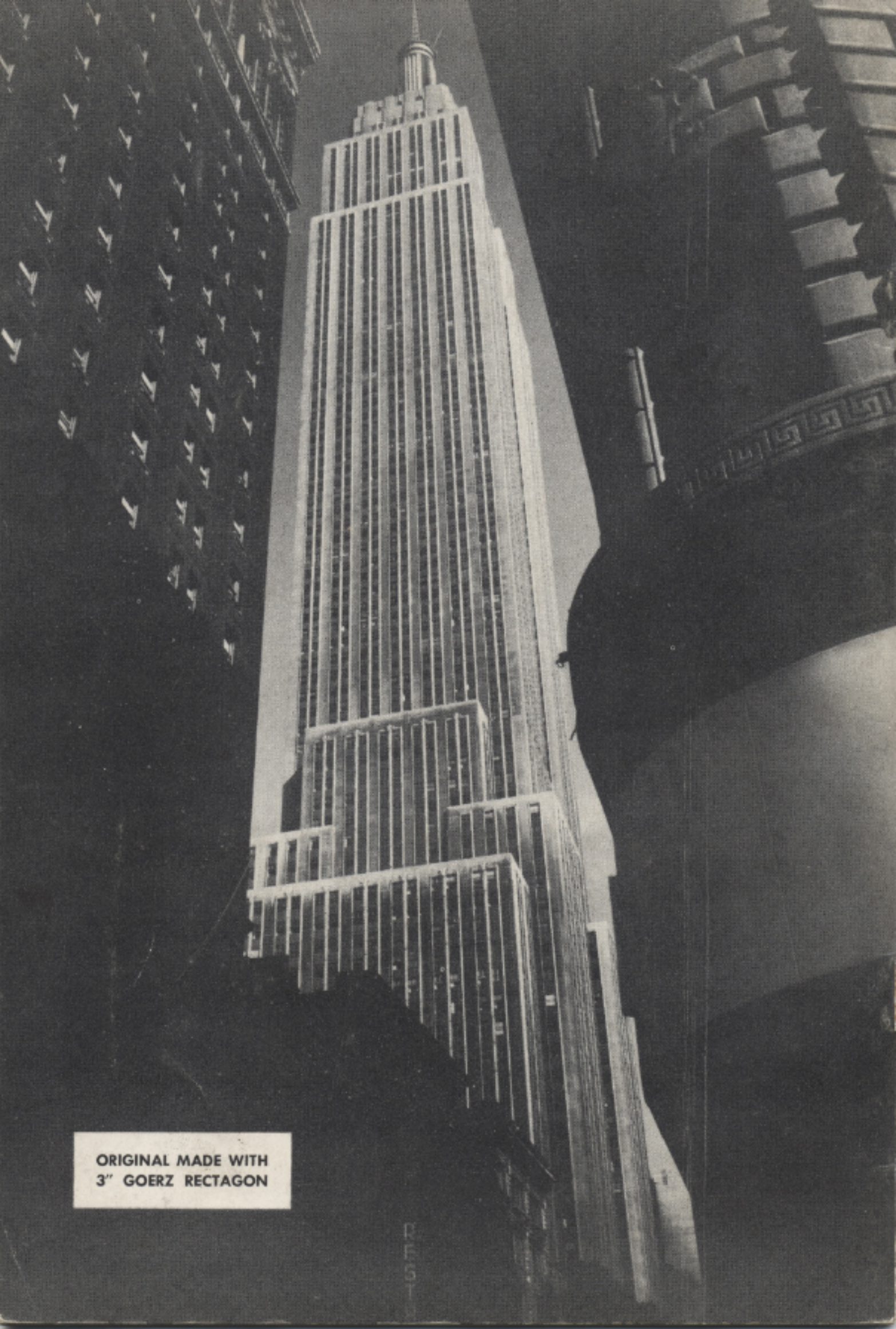
Goerz Prisms are noted for their accuracy, and are of the same high quality as the lenses with which they are to be used. We cannot guarantee the efficiency of Goerz photoengraving lenses if they are used with prisms of inferior quality.

A rotary mounting allows the setting of the face of the prism at any desired position, sideways, downward or upward and the substantial mounting assures a correct 90° deviation of the optical axis. The prism fits the thread on the front cell when the lens hood is unscrewed.

The sizes which we list for our various lenses will take care of the ordinary demands for reproduction work to same size and for reduction. Oversize prisms will not increase the angular field of the lens.

Square Face Opening	Size suitable for	
	Artar	Gotar
2⅜	9½", 10¾", 12", 14"	12"
2⅞	16½" and 19"	14"
3¼	24"	16½"
3¾	30" and 35"	19" and 24"
5	42" and 47½"	

We can fit these prisms to other makes of lenses.
(For prices see current price list)



ORIGINAL MADE WITH
3" GOERZ RECTAGON

C. P. GOERZ AMERICAN OPTICAL COMPANY

Manufacturers of LENSES and ACCESSORIES for ALL BRANCHES of PHOTOGRAPHY

OFFICE AND FACTORY: 317 EAST 34th STREET, NEW YORK 16, N. Y. • Phones: MUrray Hill 5-1666-7

DEALER TO CONSUMER PRICES f. o. b.—factory—June 30, 1952

Orders accepted subject to price prevailing at time of shipment.

"GOERZ AMERICAN" LENSES Speed and Focus		Coated Lens in Iris Barrel	Wollensak Regular	Rapax Synchro	ACME Regular	ACME Synchro	ACME Univ.
DAGOR					Prices at End of List		
F6.8	40 mm.	$ 85.00					
	60 mm.	85.00					
	3½ in.	95.00	$108.00	$135.50			
	4⅛ "	100.00	113.00	140.50			
	5 "	105.00	118.00	145.50			
	6 "	110.00	123.00	150.50		$174.00	
	6½ "	120.00	128.00	155.50		179.00	
	7 "	135.00	150.70	173.25		194.00	
	8¼ "	150.00	160.70	183.25	$159.90	192.75	
	9½ "	180.00			189.90	222.75	
	10¾ "	215.00			227.20	257.75	
	12 "	240.00			252.20	282.75	
F7.7	14 "	290.00			292.20	327.75	
	16½ "	370.00					$369.90
	19 "	465.00					464.90
SUPER DAGOR							
F8	100 deg. 3⅜ in.	$115.00	$123.00	$150.50		$174.00	
	4⅜ "	135.00	145.70	168.25		177.75	
	6½ "	145.00	155.70	178.25		187.75	
ARTAR (with slot)		for ARTAR REVERSING LENS see other side					
F9	4 in.*	$ 85.00	$ 93.00	$120.50			
	6 " *	100.00	103.00	130.50			
	8¼ "	130.00	133.00	160.50			
	9½ "	160.00	170.70	193.25	$169.90	$202.75	
	10¾ "	165.00			174.90	207.75	
	12 "	180.00			189.90	222.75	
	14 "	210.00			217.20	247.75	
F9.5	16½ "	220.00			222.20	252.75	
F11	19 "	235.00			237.20	267.75	
	24 "	320.00					$309.90
F12.5	30 "	440.00	Only in Iris Barrel with Slot				
	35 "	621.00					
F14	42 "	732.00					
F15	47½ "	834.00					
F16	70 "	Price upon request			Process Prisms Made for ARTAR 9½" to 47½". Prices on other side.		
GOTAR (no slot)							
F6.8	8¼ in.	$145.00			$159.90	$192.75	
F8	10 "	160.00			172.20	202.75	
	12 "	170.00			182.20	212.75	
	(with slot)						
F8	14 "	205.00			212.20	242.75	
	16½ "	225.00					
	19 "	240.00	Only in Iris Barrel with Slot.				
F10	24 "	270.00			Process Prisms Made for GOTAR 12" to 24". Prices on other side.		
RECTAGON							
F6	90 deg. 3 in.	$100.00			$119.90	$152.75	
DOGMAR							
F4.5	3⅛ in.	$ 65.00	$ 78.00	$105.50			
	4⅛ "	80.00	88.00	115.50		$139.00	
	5¼ "	85.00			$ 99.90	132.75	
	6 "	100.00			114.90	147.75	
	6½ "	125.00			139.90	172.75	
	7½ "	150.00			162.20	194.75	
	8¼ "	170.00			182.20	212.75	
	9½ "	200.00					$204.90
	10¾ "	225.00					224.90
	12 "	245.00					244.90

*4" and 6" for color separation blowups from 35 mm. and larger colorfilm.

20 % EXCISE TAX TO BE ADDED WHEREVER APPLICABLE

(OVER)

MOVIE CAMERA LENSES

APOGOR
for Black & White and Color

			Coated Lens in Iris Barrel	"C" Focusing Mount for 16 mm. Cameras
F2.3	35 mm.	1⅜ in.	$130.00	$30.00
	50 mm.	2 "	150.00	35.00
	75 mm.	3 "	180.00	40.00

HYPERGON
For mapping equipment in focal lengths from 3.5" to 14". Prices on request.

"C" DOGMAR
(for Telephoto Work)

			Coated Lens in Iris Barrel	"C" Focusing Mount for 16 mm. Cameras
F4.5	150 mm.	6 in.	$110.00	$48.00

HYPAR
(for Wide-angle Work)

			Coated in Foc. Mount for 16 mm. Cam.	
F2.7	15 mm.	0.6 in.	$ 90.00	—

GOERZ PROCESS PRISMS

Length of Square Face	For Artar	For Gotar	GOERZ-HUEBNER REVERSING LENS
2⅜ in.	$220.00	9½", 10¾", 12", 14"	12 in.	
2⅞ "	230.00	16½", 19"	14 in.	
3¼ "	250.00	24"	16½ in.	24" $686.25
3¾ "	340.00	30"	19 in., 24 in.	30" 889.25
3¾ "	360.00	35"	—	
5 "	672.00	42", 47½"	—	

EXTRA CAMERA FLANGES

For Dagor

40 mm., 60 mm., 3½ in., 4⅛ in.	$1.00
5 in., 6 in., 6½ in.	1.25
7 in., 8¼ in.	2.00
9½ in., 10¾ in., 12 in.	2.50
14 in., 16½ in.	3.50
19 in.	4.50

For Super Dagor

3⅝ in.	1.25
4⅜ in., 6½ in.	2.00

For Artar

4 in., 6 in.	1.25
8¼ in., 9½ in., 10¾ in., 12 in.	2.00
14 in., 16½ in., 19 in.	2.50
24 in.	3.00
30 in., 35 in.	4.50
42 in., 47½ in.	5.50

For Gotar

8¼ in., 10 in.	2.00
12 in., 14 in., 16½ in.	2.50
19 in., 24 in.	4.50

For Rectagon

3 in.	2.00

For Dogmar

3⅛ in.	1.00
4⅛ in.	1.25
5¼ in., and 6 in.	2.00
6½ in., 7½ in., 8¼ in.	2.50
9½ in., 10¾ in., 12 in.	3.50

SCREW-IN LIGHT FILTERS
Blue, Green (Light and Dark Shades), Yellow (UV-2X-3X-4X), Orange, Red

For Dagor

40 and 60 mm.	$3.00
3½ in.	3.25
4⅛ in., 5 in.	4.00
6 in., 6½ in.	5.25
7 in.	6.00
8¼ in.	6.50
9½ in.	7.50
10¾ in.	9.75
12 in.	11.50

For Super Dagor

3⅝ in., 4⅜ in.	5.00
6½ in.	6.50

For Rectagon

3 in.	6.50

For Dogmar

3⅛ in.	3.25
4⅛ in.	4.00
5¼ in.	5.00
6 in.	6.50
6½ in.	7.50
7½ in., 8¼ in.	11.50

For Apogor F2.3

1⅜ in., 35 mm.	4.00
2 in., 50 mm.	5.25
3 in., 75 mm.	6.50

For "C" Dogmar F4.5

6 in., 150 mm.	6.50

For Hypar F2.7

0.6 in., 15 mm.	3.75

EXTRA CAPS

32 mm., 38 mm., 43 mm.	$1.30
49 mm., 51.5 mm.	1.70
61.5 mm.	2.00
69.5 mm.	2.20
75 mm.	2.50
106 mm.	3.00

SHUTTERS

	Regular	Synchro
Wollensak Rapax No. 2	$33.00	$60.50
" 3	40.70	63.25
Ilex Acme " 2	—	84.00
" 3	39.90	72.75
" 4	42.20	72.75
Ilex Universal " 5	39.90	—

METAL HOLDERS FOR GELATIN FILTERS

For Artar

4 in., 6 in., 8¼ in.	$2.00
9½ in.	2.75
10¾ in., 12 in., 14 in.	3.00
16½ in., 19 in., 24 in.	5.00
30 in.	6.50
35 in., 42 in., 47½ in.	7.50

For Gotar

14 in., 16½ in.	5.00
19 in., 24 in.	6.50

CABLE RELEASES

Length 12 in.	$1.50