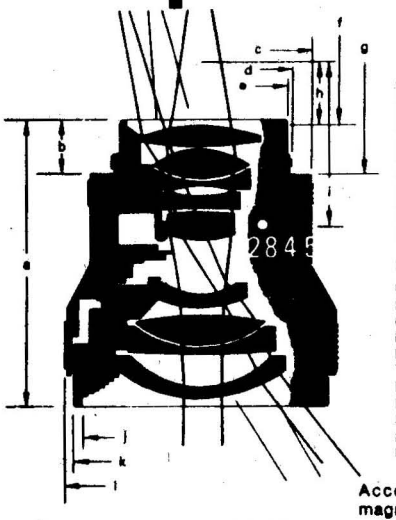
computar dl 2.8/30mm



OPTICAL

Focal Length	30.8mm
Aperture Range	f/2.8-22
Angular Field	72°
Optimum Magnification	16 ×
Color Correction	486-786nm
Back Focus Distance at Infinity – (f)	44.60mm
Flange Focus Distance at Infinity – (g)	54.7mm
Rear Vortex to Rear Nodal Pt. – (h)	13.80mm
Nodal Point Separation – (i)	57.21mm
Vortex to Vortex Length	68.4mm

MECHANICAL

Overall Length – (a)	71.5mm
Seating Surface to Rear of Barrel – (b)	11.5mm
Diameter of Barrel – (c)	46.0mm
Diameter of Mounting Thread – (d)	39 × 1.0
Diameter of Rear Cell – (e)	35.0mm
Filter Screw Thread – (j)	M52 x 0.75
Diameter of Front Cell – (k)	55.0mm
Diameter of Diaphragm Control – (l)	58.5mm

Occasionally, when developing new products it is possible to be too successful, as we were with the 25mm. We wanted the shortest focal length lens possible that would yield excellent performance over the total 35mm format corner to corner, and we got it. But, since no one has had prior darkroom experience with extreme wide angle enlarging lenses, we soon discovered a major problem. The lens was too short. From a practical standpoint it became extremely difficult to perform normal corrective operations such as dodging and burning. Also, in some cases it was virtually impossible to critically focus a negative with a fine grain magnifier because it wouldn't fit under the lens, so we opted for a 30mm focal length instead.

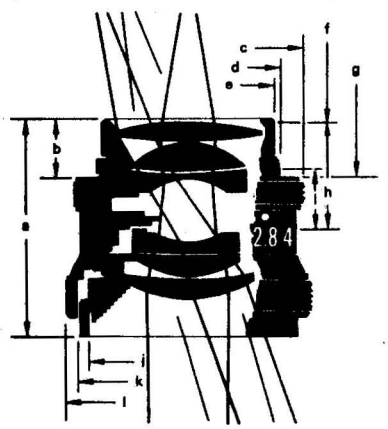
This type of asymmetrical design does not lend itself as an all purpose lens. The intentional improved performance at high magnification necessitates prudent use at the lower end, i.e. about 10X magnification. This translates into an 11 x 14" print from a full 35mm negative or a 5 x 7" print from the 110 format.

Acceptable prints at smaller magnifications are obtainable but only at the expense of reduced apertures. A 4X print requires approximately f:11 aperture, but since the negative to paper distance is only 9+" the exposure times are relatively short.

Even though we increase the focal length of the lens to make it more manageable, the Computar 30mm is the shortest enlarging lens available for the 35mm negative. In comparison with a conventional 50mm lens at the same projection distance, the 30mm will produce an image approximately 40% larger. Also at equivalent projection distances, the Computar 30mm will produce an image about 25% larger than the shortest focal length enlarging lens available to date. As an example, a full frame blow-up to an 11 x 14" print requires a negative to paper distance of just 17½", or a 16 x 20" in less than 24", while a huge 20 x 30" print needing only 28½" can be produced on most conventional 35mm enlargers.

The Computar 30mm performance characteristics are similar enough to the 25mm to allow using the previously published data.

computar dl 2.8/50mm



OPTICAL

Focal Length	52.1mm
Aperture Range	f/2.8-22
Angular Field	46°
Optimum Magnification	10 ×
Color Correction	486-786nm
Back Focus Distance at Infinity – (f)	28.6mm
Flange Focus Distance at Infinity – (g)	40.5mm
Rear Vortex to Rear Nodal Pt. – (h)	23.3mm
Nodal Point Separation – (i)	– 12.9mm
Vortex to Vortex Length	38.4mm

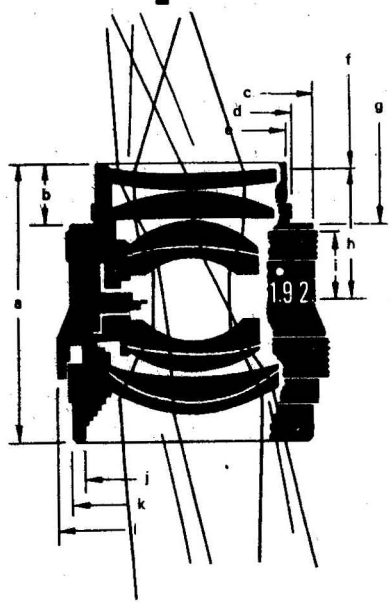
MECHANICAL

Overall Length – (a)	46.2mm
Seating Surface to Rear of Barrel – (b)	12.0mm
Diameter of Barrel – (c)	46.0mm
Diameter of Mounting Thread – (d)	39 × 1.0
Diameter of Rear Cell – (e)	34.7mm
Filter Screw Thread – (j)	M43 x 0.75
Diameter of Front Cell – (k)	47mm
Diameter of Diaphragm Control – (l)	52.5mm

The 50mm focal length has long been considered the standard work horse for the 35mm format. In developing the **Computar** 50, special emphasis was placed on the astigmatism and field curvature. These are two major factors that contribute to the visually apparent zonal problems. These "soft" areas on the print are due to the negative being out of focus. The **Computar** 50 possesses extremely good flat field characteristics.

The most apparent difference in this lens however, is that of relative illumination. At the edge of the format coverage the lens exhibits an aperture efficiency of 72%. In terms of relative illumination this represents a marked improvement over conventional lenses. Combining this increase in relative illumination with its extremely high transmission characteristics produces a general illumination effect that is absolutely startling. Suddenly brilliance has a new meaning.

computar dl 1.9/55mm



OPTICAL

Focal Length	54.8mm
Aperture Range	f/1.9-22
Angular Field	43°
Optimum Magnification	4 × -20 ×
Color Correction	486-786nm
Back Focus Distance at Infinity - (f)	38.8mm
Flange Focus Distance at Infinity - (g)	49.2mm
Rear Vortex to Rear Nodal Pt. - (h)	24.8mm
Nodal Point Separation - (i)	-13.23mm
Vortex to Vortex Length	47.3mm

MECHANICAL

Overall Length - (a)	54.3mm
Seating Surface to Rear of Barrel - (b)	11.8mm
Diameter of Barrel - (c)	48.0mm
Diameter of Mounting Thread - (d)	39 × 1.0
Diameter of Rear Cell - (e)	36.7mm
Filter Screw Thread - (j)	M43 x 0.75
Diameter of Front Cell - (k)	49.0mm
Diameter of Diaphragm Control - (l)	52.5mm

The Computar 55 represents another unique approach by rethinking enlarger lens requirements.

One is providing solutions to some of the vexing problems encountered in color enlarging, of which the most serious is the difficulty of color balance associated with extended exposure periods.

A real need exists for a usable high aperture projection lens. The F/1.9 aperture is the highest aperture realistically obtainable due to the size of the Leica mount, shallow depth of focus and acceptable containment of the aberrations. The **Computar** 55 is one of the very few lenses available that permits using the F/2.8 aperture to obtain professional quality prints.

It should be noted that formerly, when making 4× or 6× prints the F/1.9 aperture was not usable because conventional timers were not fast enough to consistently obtain proper exposure, but with new digital timers accurate to 0.1 sec. this is now possible.

Another area of interest is that of utilizing the floating element concept to optimize the lens for any magnification from 4× to 20×. It is an optical fact that all fixed focal length projection lenses will suffer image degradation when used at any magnification other than its design optimized value. Some designs degrade more rapidly than others. The floating element optimization technique definitely improves the lens performance over the large magnification ranges.

Even though the upper optimization was limited at 20×, higher magnifications will still be substantially improved.

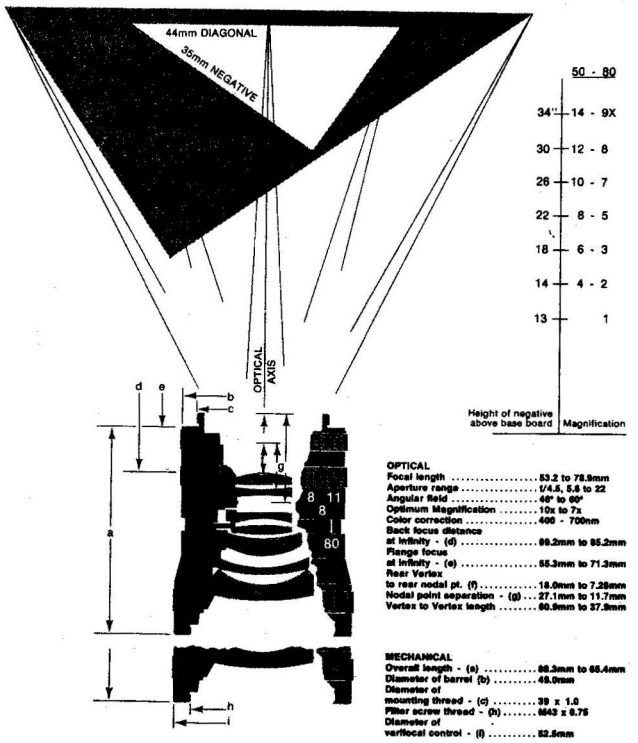
The floating element is also a beautiful device for final "tweaking" of the image; either for bringing it all together or selective zone control, as the various zones can purposely be defocused.

An additional bonus, not often considered, is the short depth of focus of the F/1.9 aperture provides an excellent enlarger alignment tool.

The net result is for the first time a lens is available that can be tuned by the operator to solve his specific problem whether it be ultra fast exposure times, unusual effects, or the capability of producing beautiful mural size color prints directly from the original.

computar varifocal 50-80

4.5/50 to 5.6/80mm
from 35mm to 6x7cm formats



OPTICAL

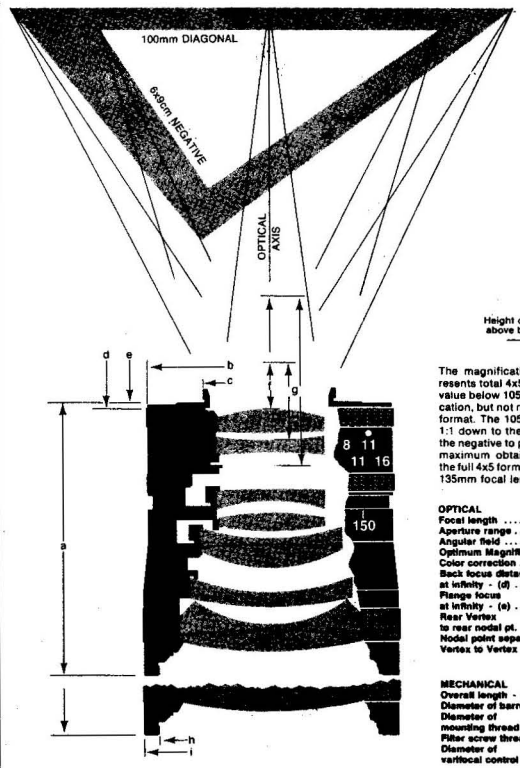
Focal length	53.2 to 78.9mm
Aperture range	f/4.5, 5.6 to 22
Angular field	46° to 60°
Optimum Magnification	10x to 7x
Color correction	400 - 700nm
Back focus distance at infinity - (d)	89.2mm to 85.2mm
Flange focus at infinity - (e)	55.3mm to 71.3mm
Rear Vertex to rear nodal pt. (f)	18.0mm to 7.2mm
Nodal point separation - (g)	27.1mm to 11.7mm
Vertex to Vertex length	80.9mm to 37.9mm

MECHANICAL

Overall length - (a)	88.3mm to 65.4mm
Diameter of barrel (b)	49.0mm
Diameter of mounting thread - (c)	39 x 1.0
Filter screw thread - (h)	M43 x 0.75
Diameter of varifocal control - (i)	52.5mm

computar varifocal 105-150

4.5/105 to 5.6/150mm
from 6x9cm to 4x5" formats



The magnification below 150mm represents total 4x5" format coverage. The value below 105mm represents magnification, but not necessarily the complete format. The 105mm covers the 4x5" at 1:1 down to the 6x9cm at infinity. With the negative to print distance at 48", the maximum obtainable magnification of the full 4x5 format is 7.5x when using the 135mm focal length setting.

OPTICAL

Focal length	104.7mm to 150.2mm
Aperture range	f/4.5, 5.6 to 32
Angular field	46° to 60°
Optimum Magnification	9.7x to 6x
Color correction	400 - 700nm
Back focus distance at infinity - (d)	133.4mm to 161.6mm
Flange focus at infinity - (e)	130.1mm to 158.3mm
Rear Vertex to rear nodal pt. (f)	31.9mm to 13.7mm
Nodal point separation - (g)	48.3mm to 21.9mm
Vertex to Vertex length	111.1mm to 71.7mm

MECHANICAL

Overall length - (a)	119.0mm to 90.9mm
Diameter of barrel (b)	72mm
Diameter of mounting thread - (c)	39 x 1.0
Filter screw thread - (h)	M67 x 0.75
Diameter of varifocal control - (i)	76mm

Varifocal 50-80 What does it do?

The **varifocal 50-80** covers all film formats up to and including the 6x7cm (2¼ X 2¾"). At the 50mm focal length setting the lens is optimized to cover the 35mm format, whereas at the 80mm setting the lens covers the 6x7 negative.

These respective settings yield almost the same print magnification vs. working distance as normal fixed focal length lenses.

The lens is continuously usable throughout the entire range from 50 to 80mm. Example-the complete 6x6cm (2¼ sq.) negative can be projected at between the 60mm and the 70mm setting, dependent upon projected magnification. This capability is equivalent to some of the "wide angle" lenses introduced over the past several years.

By selecting a short focal length, the lens will permit unusually large blowups from the central area of large negatives. Similarly, due to a function of focal length vs. magnification optimization, a long focal length will produce exceptional 4x5"' prints from the 35mm format.

Another possibility-set the enlarger head at the proper height that yields an 8x10" print from the 35mm negative with the 80mm focal length, then by "zooming" up to the 50mm position the image is enlarged to a 13" x 20". This increase is quite sufficient for normal cropping and composing requirements. As long as the negative to paper distance is unchanged, the exposure for any magnification is predictable once it has been established somewhere on the focal length scale.

Once the exposure is "zeroed in" at any one focal length position, then exposure adjustment becomes predictable for the other focal length settings. Assuming similar negative densities, one can now individually crop and print complete rolls of negatives much faster than previously possible.

Predictable Exposure

CHANGE IN FOCAL LENGTH

50	0	+1/4	+1/2	+2/3
60	−1/4	0	+1/4	+1/2
70	−1/2	−1/4	0	+1/4
80	−2/3	−1/2	−1/4	0

CHANGE IN STOPS FOR CORRECT EXPOSURE- ASSUMES CONSTANT NEGATIVE TO PRINT DISTANCE

Varifocal vs. ZOOM

A high quality zoom projection lens, will theoretically stay in focus as you change the magnification, however, they are designed to cover only one specific format, i.e. 35 or 6x6. Unfortunately, they have a tendency to become physically large, expensive, and not nearly as versatile as a **varifocal.**

Instead of just one format, the **varifocal** has multiple format coverage capability. This type of lens does experience a focus shift as the lens is run through the focal range. If the enlarger is locked at a 24" projection distance (negative to paper) the lens will produce a focus shift of approximately 1" as the lens is changed from 50mm to 80mm. While changing the lens focal length with one hand and refocusing the enlarger with the other, one can closely approximate an auto focusing system.

The focus shift, itself, represents a very desirable feature as it can be utilized for fine focusing. Instead of trying to obtain that critically sharp image with enlarger focus, simply use the lens. It has a smoother, more controllable motion, in addition to being closer to the easel and therefore more comfortable to manipulate.

Varifocal 105-150

A professional quality tool for the custom and exhibition printer.

The 105-150 maintains all the desirable capabilities of the 50-80; however, the most important and far reaching aspect of this lens is that now - photographers have been given "zoom" capability for the 4x5" format - on both the enlarger and the view camera.

Camera mounted

The 105-150 may be mounted on a view camera using available adapters and the #3 shutter. With the addition of a special mounting bracket - the lens is turned into a functional zoom. The limiting factor is the capability of the 105mm focal length to cover the full 4x5" format. Experience has shown that, in most product photography and closeup situations, this is not a serious problem. This is due to the increase in image size as the lens approaches the subject. In terms of perspective and the field of view, the **varifocal** 105-150 on a 4x5" would be equivalent to a 30-50 zoom for the 35mm SLR.

Even if the zoom motion is not a requirement. The quick composing capability when used for product photography eliminates the necessity of excessive tripod shuffling. This saves considerable time, while insuring selection of the best composition.

On the Enlarger

It is now possible to produce "zoom" prints from straight negatives. Older negatives can be used to produce new images. Specialty shots that require telephoto or wide angle objectives can ultimately be presented in motion. And the ultimate - "zoom on zoom" - once in the camera and again in the darkroom.

For Special Effects

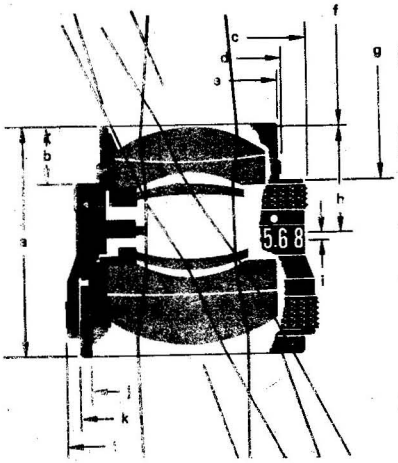
- Add and blend colors.
- Increase the zoom range and accentuate the motion.
- Spiral the image—rotate the negative or easel while zooming.
- Multiple exposures at different magnifications.

The varifocal 105-150 can be a Problem Solver for the pro in--

- **ADVERTISING**—quickly and easily obtain exact magnifications either on negative or print.
- **PORTRAIT**—easily vary print sizes from one negative from 8x10 down to wallets.
- **COMMERCIAL**—short on time—straight shot in field - "zoom" in darkroom.
- **A.V.**—melting of colors produces unusual backgrounds for typography. —exact sizing for multiple "drop in" images on one frame.

The **computar varifocals** will add new and creative dimensions to enhance existing photographic techniques and capabilities.

computar dl 5.6/135mm



OPTICAL

Focal Length	135.1mm
Aperture Range	f/5.6-22
Angular Field	60°
Optimum Magnification	6 ×
Color Correction	400-700nm
Back Focus Distance at Infinity – (f)	110.6mm
Flange Focus Distance at Infinity – (g)	122.1mm
Rear Vertex to Rear Nodal Pt. – (h)	24.5mm
Nodal Point Separation – (i)	+ 2.3mm
Vertex to Vertex Length	45.7mm

MECHANICAL

Overall Length – (a)	48.5mm
Seating Surface to Rear of Barrel – (b)	12.0mm
Diameter of Barrel – (c)	48mm
Diameter of Mounting Thread – (d)	39 × 1.0
Diameter of Rear Cell – (e)	37.0mm
Filter Screw Thread – (j)	M43 × 0.75
Diameter of Front Cell – (k)	47.0mm
Diameter of Diaphragm Control – (l)	52.5mm

In the interest of maintaining the desirable Leica mount capability, the **Computar** 135 was designed as an f/5.6 aperture. This reduced effective aperture enables the lens to provide excellent relative illumination characteristics while still maintaining manageable clear apertures.

This lens was developed to be the shortest focal length that is practical for the 4″ × 5″ format. The lens is nominally optimized for 6x magnification. This provides the user the capability of making exceptional prints, from 8 × 10 proofs up to wall size murals.

Liberal use of high index low dispersion glass has produced a lens with an exceptionally high degree of color correction.

Also, particular attention was devoted to the field flatness. This is very important from the standpoint of eliminating the necessity of compromise focusing for the difference in field zones. Most typical lenses overcome this deficiency by requiring the use of smaller aperture stops and, consequently, long exposure times.

The third area of importance is that of transmission. The 135mm design approach lends itself very nicely to the **Computar** UV suppression techniques. This capability is essential in providing superior black and white and color prints.

Many lenses will make acceptable 30″ × 40″ prints when viewed at a distance of 4 or 5 feet. The 135mm **Computar** has the capability of making exceptional prints that still stand up under very close inspection.

TECHNICAL INFORMATION AVAILABLE

Our **computar** 24 page color brochure utilizing hundreds of charts and graphs relates concepts like MTF, OTF, Vignetting, etc. on a practical basis so lenses can be selected, analyzed and used with knowledge and confidence.

varifocal enlarging lenses

50-80 for 35 to 6x7
105-150 for 6x9 to 4x5

FOR THE FIRST TIME, AN ENLARGING LENS HAS BEEN DEVELOPED, THAT WILL CHANGE THE CLASSIC VIEW OF DARKROOM OPTICS. THESE LENSES HAVE THE ABILITY TO REPLACE MOST, IF NOT ALL, OF THE NORMAL LENSES BEING USED TODAY.

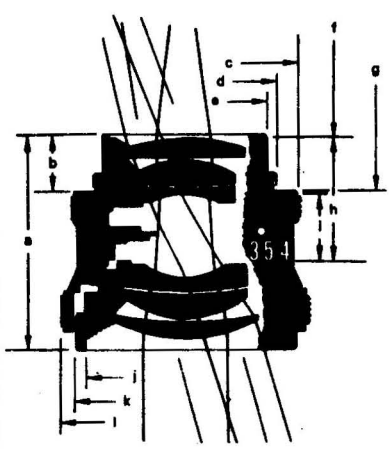
ADVANTAGES

- One lens—instead of many.
- Eliminates changing lenses and condensers.
- Eliminates turret systems.
- Color balance only one lens.
- Easier and faster to visualize cropping possibilities.
- Produce "zoom" prints from straight negatives.

FEATURES

- Variable format coverage.
- Continuously usable throughout total focal length range.
- Large magnification variation immediately available.
- Minimal aperture stop variation throughout total focal length range.
- Smooth and accurate click stops at half step intervals.
- Super critical focusing capability.

computar dl 3.5/65mm



OPTICAL

Focal Length	65.2mm
Aperture Range	f/3.5-22
Angular Field	36°
Optimum Magnification	18x
Color correction	400-700nm
Back Focus Distance at Infinity – (f)	37.9mm
Flange Focus Distance at Infinity – (g)	49.5mm
Rear Vortex to Rear Nodal Pt. – (h)	27.3mm
Nodal Point Separation – (i)	– 16.1mm
Vortex to Vortex Length	43.0mm

MECHANICAL

Overall Length – (a)	46.6mm
Seating Surface to Rear of Barrel – (b)	12.0mm
Diameter of Barrel – (c)	46.0mm
Diameter of Mounting Thread – (d)	39 x 1.0
Diameter of Rear Cell – (e)	35.0mm
Filter Screw Thread – (j)	43 x 0.75
Diameter of Front Cell – (k)	47.0mm
Diameter of Diaphragm Control – (l)	52.5mm

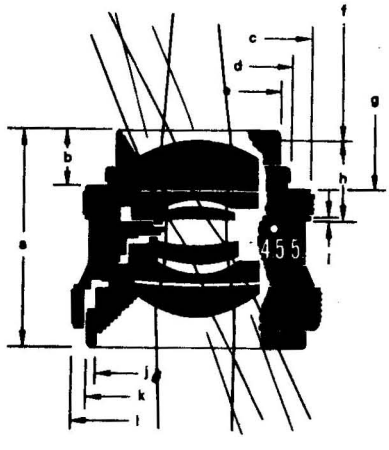
The **Computar** 65 for the 35mm double frame format is quite probably the finest fixed focal length enlarging lens available today.

By utilizing a smaller field of view in a longer focal length lens, the designer has the ability to control the various aberrations to an exceptionally high degree. Spherical aberration is improved to the extent that further reduction in the lens aperture does not appreciably increase the optical performance of the lens. This is one of the few lenses that realistically can be used wide open.

The lens exhibits an unusually superior flat field without any focus shift when the lens is closed down. The special attention devoted to the chromatic characteristics has resulted in the unusually high response in the higher frequency ranges.

We feel we have achieved our goal in creating an extraordinarily high quality lens on a production basis. The 65mm **Computar** is definitely for the perfectionist who requires the ultimate in reproduction capability.

computar dl 4.5/80mm



OPTICAL

Focal Length	80.2mm
Aperture Range	f/4.5-22
Angular Field	60°
Optimum Magnification	6 x
Color Correction	400-700nm
Back Focus Distance at Infinity – (f)	62.7mm
Flange Focus Distance at Infinity – (g)	78.4mm
Rear Vortex to Rear Nodal Pt. – (h)	17.5mm
Nodal Point Separation – (i)	– 8.8mm
Vortex to Vortex Length	37.4mm

MECHANICAL

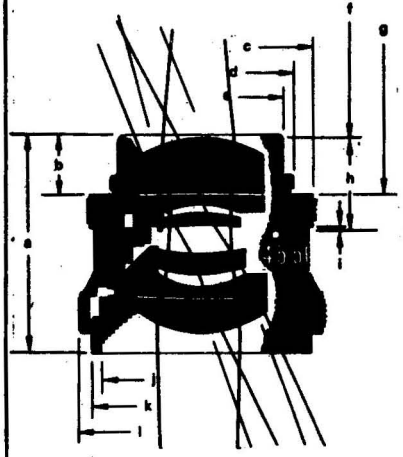
Overall Length – (a)	44.5mm
Seating Surface to Rear of Barrel – (b)	9.3mm
Diameter of Barrel – (c)	43.8mm
Diameter of Mounting Thread – (d)	39 x 1.0
Diameter of Rear Cell – (e)	35.0mm
Filter Screw Thread – (j)	M43 x 0.75
Diameter of Front Cell – (k)	47mm
Diameter of Diaphragm Control – (l)	52.5mm

From the standpoint of optical design, this has been a very interesting lens development. The design form is referred to as a plasmat or a second order gauss which is the conventional design type used in the longer focal length enlarging lenses. The **Computar** approach in solving some of the specific problems are readily apparent.

Comparing the optical schematic against "typical" lenses, will immediately indicate some radical departures. These are in the form of glass thickness, shapes and types. Immediately apparent is the unusual unsymmetrical appearance. This appearance is a result of our efforts in deriving unparalleled color correction for this type of design. Combining this with the drastic reduction of the oblique spherical aberation has resulted in a lens with exceptionally high contrast in the middle spatial frequencies.

This particular design has superb capability over an angular field of 60 degrees. For the **Computar** 80, this translated into a 6 x 7cm coverage. These refinements were possible even though we maintained the f/4.5 aperture. The 4.5/80 is the fastest 6 element large format enlarging lens available. Truly a unique lens.

computar dl 4.5/90mm



OPTICAL

Focal Length	90.1mm
Aperture Range	f/4.5-22
Angular Field	60°
Optimum Magnification	6 x
Color Correction	400-700nm
Back Focus Distance at Infinity – (f)	70.5mm
Flange Focus Distance at Infinity – (g)	82.3mm
Rear Vortex to Rear Nodal Pt. – (h)	19.6mm
Nodal Point Separation – (i)	– 9.8mm
Vortex to Vortex Length	42.0mm

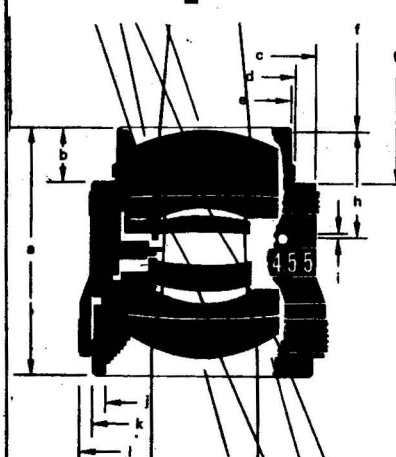
MECHANICAL

Overall Length – (a)	46.2mm
Seating Surface to Rear of Barrel – (b)	12.0mm
Diameter of Barrel – (c)	43.8mm
Diameter of Mounting Thread – (d)	39 x 1.0
Diameter of Rear Cell – (e)	35.0mm
Filter Screw Thread – (j)	M43 x 0.75
Diameter of Front Cell – (k)	47.0mm
Diameter of Diaphragm Control – (l)	52.5mm

The **Computar** 90 is simply a scaled version of the 80mm **Computar** design. Other than reoptimizing the lens at its particular focal length, we discovered that we could not improve upon the 80mm's design performance. This lens retains all of the qualities that make the 80mm exceptional in terms of color correction, field flatness and astigmatism.

The **Computar** 90 can be utilized either as a short focal length lens for the 6 x 9 format, or an excellent 6 x 7 projection lens. Generally, the 90mm lens has been considered a filler between the more popular focal lengths and not really meant to solve any particular requirement. We hope to have changed this concept by supplying a lens with superb optical performance up to and including the 6 x 9 cm format.

computar dl 4.5/105mm



OPTICAL

Focal Length	105.2mm
Aperture Range	f/4.5-22
Angular Field	60°
Optimum Magnification	6 x
Color Correction	400-700nm
Back Focus Distance at Infinity – (f)	82.3mm
Flange Focus Distance at Infinity – (g)	93.3mm
Rear Vortex to Rear Nodal Pt. – (h)	22.9mm
Nodal Point Separation – (i)	– 1.2mm
Vortex to Vortex Length	48.9mm

MECHANICAL

Overall Length – (a)	53.0mm
Seating Surface to Rear of Barrel – (b)	11.5mm
Diameter of Barrel – (c)	43.0mm
Diameter of Mounting Thread – (d)	M39 x 1.0
Diameter of Rear Cell – (e)	37.0mm
Filter Screw Thread – (j)	M43 x 0.75
Diameter of Front Cell – (k)	47.0mm
Diameter of Diaphragm Control – (l)	52.5mm

The **Computar** 105mm is a continuation in the 80, 90 design series. We have maintained the 60 degree field of view, which enables the lens to overcover the 6 x 9cm format by 15%.

Although the design is optimized at 6x magnification, it possesses a great latitude in extending the usable range from 2 to 12x.

The additional advantage of the f/4.5 aperture will become increasingly more important as color enlarging continues to gain in popularity. Unquestionably one of the finest lenses available for the 6 x 9cm format.