THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

SASKATOON CENTRE

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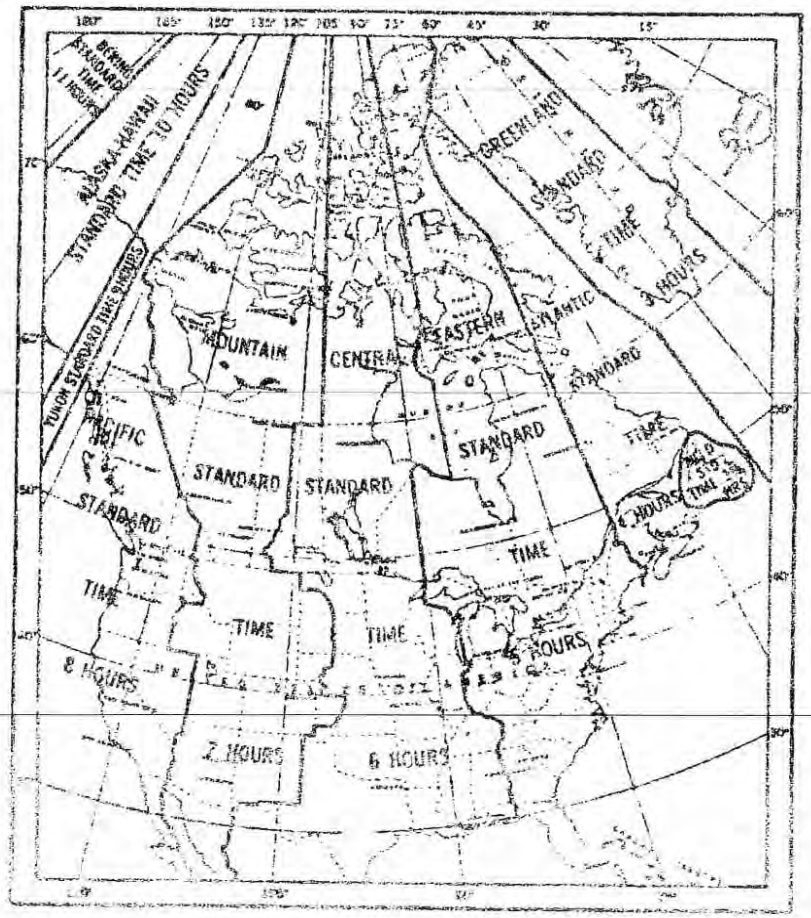
NEWSLETTER

MAP OF STANDARD TIME ZONES



PUBLIC STAR NIGHTS -- JULY 30, 31 (Doug Beck)

DIEFENBAKER PARK

This year, in conjunction with the Centre's annual wiener roast, a public star night was planned. Merlyn Melby suggested the idea in the spring and the observer's group led by Mr. Melby worked through July, mainly at Saturday night meetings at Gordon Patterson's, to plan this outing.

A list of interesting and eyecatching celestial objects was compiled. The evening was to begin with twilight observations of the crescent moon. After the moon had set some twenty-three deep sky objects (including M8, M13, M17, M27, M31 and M57) and interesting stars (β Cygni, 61 Cygni, Barnard's Star and Cygnus X-1) were to be observed with a total of ten telescopes — three Celestron 8's among them. So much for planning.

Friday, July 30 turned out to be one of those days weathermen, for lack of better terms, call unsettled. The public showed up right on time with about 15 cars rolling in at 8:30 (Merlyn, however, had not yet arrived with promised barricades, etc.!). As was to be expected, cloud had settled itself right in front of the moon. Some people left before the sky became dark, but many stayed to watch Vega and Arcturus come out. A tantalizingly thin viel covered the holes in the low cloud for much of the night and so about the best we could do was ε Lyrae and Albireo. Sixty-two people signed the register and many picked up handbills describing the Centre and its activities (courtesy Towstego's Propaganda Inc.). Members began to pack up about midnight without really having shown the public very much, but having answered many questions.

Spirits were higher on Saturday night and it was hoped we could draw as large a crowd as on Friday. About thirty people viewed the crescent moon, however, the same sort of cloud prevailed on this night as the sky darkened. We again gave up about midnight after presenting a few bright deep sky objects such as M10, M11 and M25.

Most members of the public were suitably impressed even though we did not come close to showing them the wide variety of celestial gems we had planned. The R.A.S.C. members who participated (where was everyone else?) enjoyed themselves but certainly would have been more satisfied with Thursday or Sunday's sky on Friday or Saturday — isn't it always that way. Neverthe less, in the optimistic view of the amateur astronomer, someone noted that the outing at Auckland's to be held on August 27 or 28 was bound to be greeted by clear skies (and hopefully a few more members).

OBSERVERS' GROUP REPORTS

At least two major projects are being planned by the observers' group for the upcoming year. An album of the 109 cometary imposters catalogued by Charles Messier et al. in the late 18th century is in the works. It will contain a photograph, finder chart, visual description and drawing of each object. Hopefully by next September — one full celestial cycle from now — the album will be nearing completion.

The second project is a photometer which the group hopes to build around an RCA 931A photomultiplier tube (a cheaper version of the more familiar 1P21). Variable star observations as well as UBV photometry are planned to utilize this very valuable piece of new equipment.

We are still looking for a dark site within 15 miles, and preferably to the south of the city in order that we may utilize darker than 'metropolitan' skies. If anyone knows of a good spot, please let the editor know.

ANNUAL OUTING

As is now tradition for this time of year, the Centre will again be holding its annual outing at the farm of Mr. and Mrs. Charlie Auckland (see line map this issue) on Saturday 28 August. All members, their families and friends are invited to attend. It is important that we have enough cars for transportation so anyone who plans to drive out and has passenger room should meet first at the University Observatory at 8:00 pm sharp to assist in driving members out. Those meeting at the Observatory will leave at about 8:30 pm.

Various activities are planned including general observing, meteor counting and astrophotography. The moon sets early that night and will not bother us, so we should have an excellent sky to work with (disregarding cloud!).

Below is a brief checklist of what each person should bring:

Telescopes, Cameras, Binoculars

Flashlight (preferably with red screen)

Warm Clothing

Lunch (Coffee and Hot Dogs may be available at the farm)

Lawn Chair (preferably reclining type)

REMEMBER — Saturday 28 August

8:00 at the Observatory

Greg Towstego, Editor

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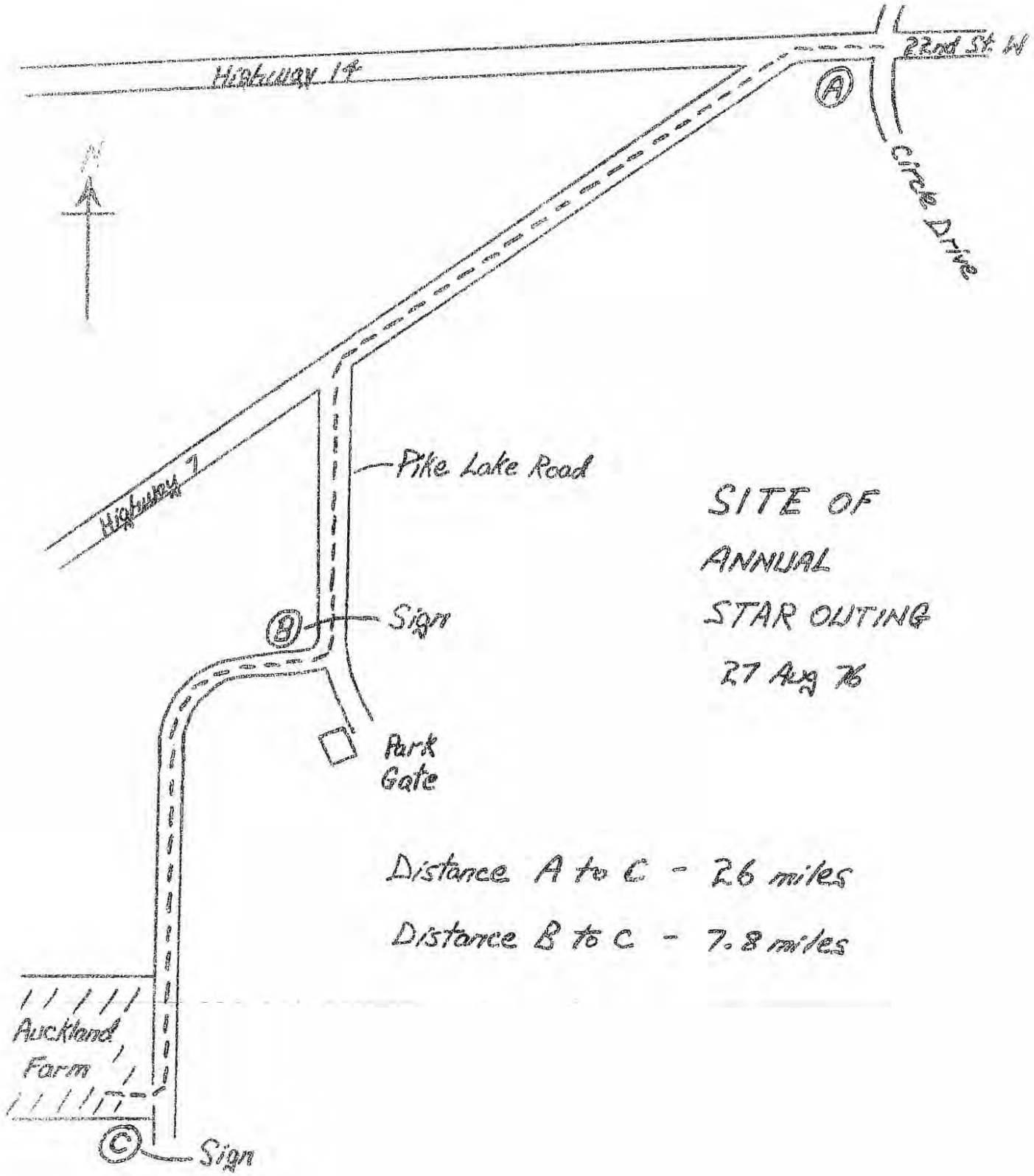
ANNUAL OUTING -- HOW TO GET THERE



SOME BASICS OF STELLAR MOTION (Greg Towstego)

The Author - Greg is 17 years old and has recently completed his grade 12 at Mount Royal Collegiate in Saskatoon. He has been interested in astronomy for about five years and joined the Saskatoon Centre in 1972, presently serving as Editor. He does not own a telescope as such but is building an 8 inch Newtonian, which should be completed this fall. He plans to take Engineering Physics at the U of S in Saskatoon.

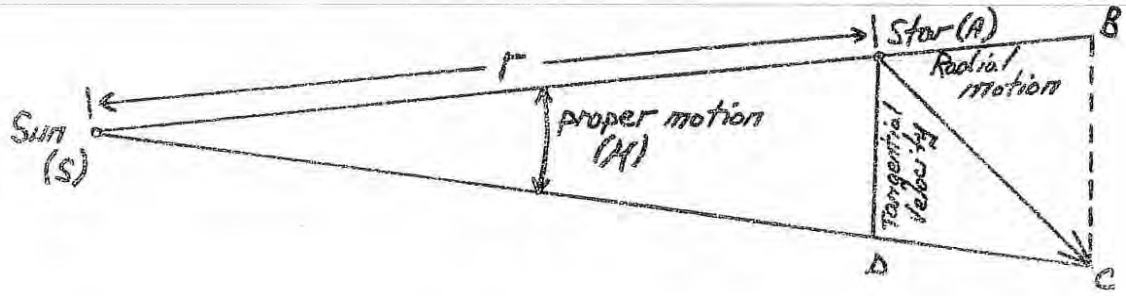
Proper Motion is the rate at which a star's direction in the sky changes. It is expressed in sec. of arc/yr. and must be measured at intervals of 20 to 50 years. A few change by easily detectable amounts but many have very small proper motions. One method is to take photographs of the same area in the sky decades apart and see the differences in the positions of stars.

Barnard's Star has the greatest known proper motion, that being 10.25 sec./yr. There are about 330 other stars with proper motions of 1 sec./yr. or more. (See pages 86 to 96 in The Observer's Handbook for proper motions of brighter stars).

Radial Motion is the line of sight velocity, or the speed at which the star approaches or recedes from the sun. It can be determined by the Doppler Shift using any star whose spectrum can be photographed. Radial motion is usually expressed in kilometers/second, being "+" if the star is moving away from the sun and "-" if the star is approaching the sun.

Tangential Velocity or transverse velocity. Whereas the proper motion does not give a star's velocity across the heavens in relation to us on earth, the tangential velocity does. To find this we must know both its proper motion and distance.

Calculation of Tangential Velocity:



As seen from the sun (s) a star (A) at distance (r) is in direction AC. During one year it moves from A to C. It appears to us to be moving in direction AD at an angle u which is the proper motion. AD is the tangential velocity.

The star's radial motion is AB, and it has moved this distance AB farther away during the year. Its tangential motion is AD and the star has moved that

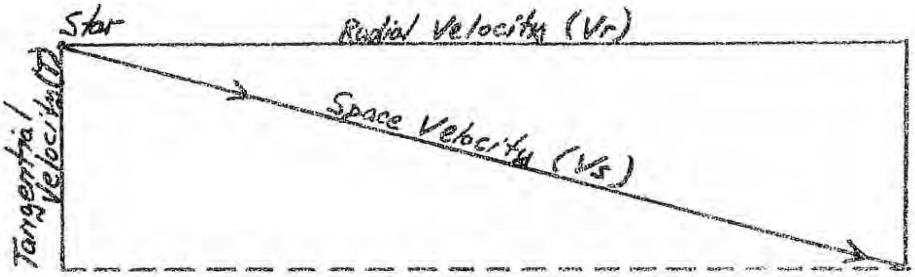
distance across the line of sight.

The tangential motion can be approximated very accurately by a small arc of a circle if radius r is centered on the sun and the tangential motion thought of as a portion of a circle. The arc AD is the same fraction of the circumference of the circle, $2\pi r$, as the proper motion is of 360°. Since the proper motion is expressed in sec. of arc, we have:

$$\frac{\mu}{1,296,000} = \frac{AD}{2\pi r}$$

Space Velocity is the total velocity in respect to the sun. The space velocity can be thought of as the hypotenuse of the right triangle whose sides are the radial and tangential velocities.

The Space Velocity is found by the Pythagorean Theorem; $Vs^2 = Vr^2 + T^2$

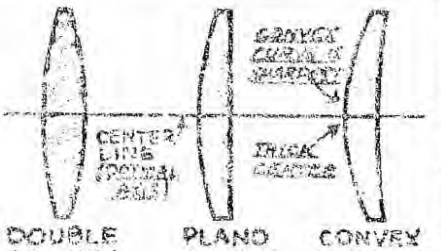


The Local Standard of Rest is a frame of reference by which we can look at a star's motion. The stars in our "neighborhood", within a hundred parsecs or so, appear on the average to be at rest in this system. This is the local standard of rest. This "system" is not actually at rest, but shares the same motion as the sun and neighboring stars.

The Peculiar Velocity of a star is its motion in relation to the local standard of rest. Since the space velocity of a star is made up of the peculiar velocity and a component due to solar motion, and knowing the solar motion, the peculiar velocity can be found if the space velocity is known. A star which does not move with respect to the local standard of rest is said to have a peculiar velocity of "0".

NOTICE: As the July General Meeting was replaced by the Star Night at Diefenbaker Park, no minutes are available for publication. Also note that the Annual Outing at the Auckland farm will take the place of the August General Meeting.

A Lens Primer

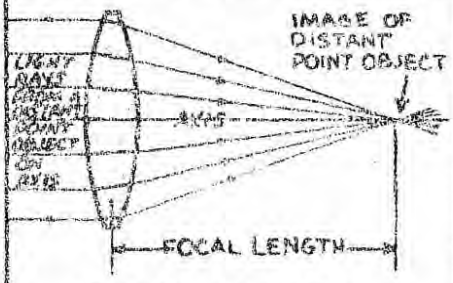


POSITIVE LENSES

A LENS IS POSITIVE IF IT CAN CONVERGE PARALLEL LIGHT TO FORM AN IMAGE. IF THE LENS IS A SINGLE PIECE OF GLASS, IT IS A SIMPLE LENS

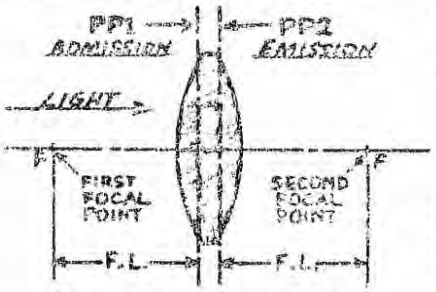
NEGATIVE LENSES

NEGATIVE LENSES CAUSE PARALLEL LIGHT RAYS TO DIVERGE — NO IMAGE IS FORMED. USED ALONE AT EYE, A NEGATIVE LENS REDUCES



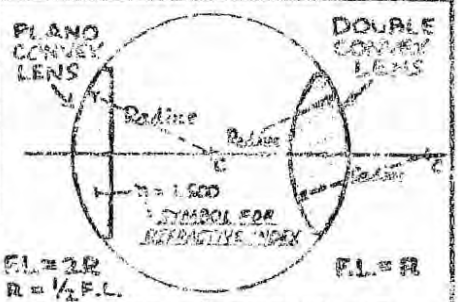
FOCAL LENGTH

DISTANCE FROM A LENS TO POINT WHERE IT FORMS AN IMAGE OF A DISTANT OBJECT. USUALLY MEASURED FROM CENTER OF LENS WITH NOT EXACT



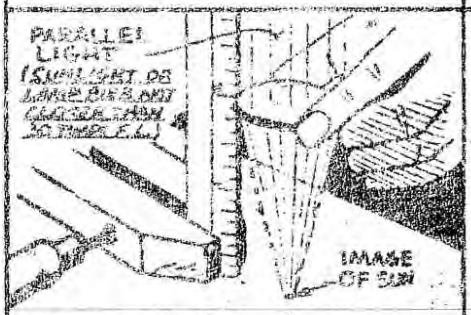
PRINCIPAL PLANES

IMAGINARY PLANES FROM WHICH EXACT FOCAL LENGTH MEASUREMENTS ARE TAKEN. IF THE LENS IS SYMMETRICAL, THE PP's ARE SYMMETRICAL



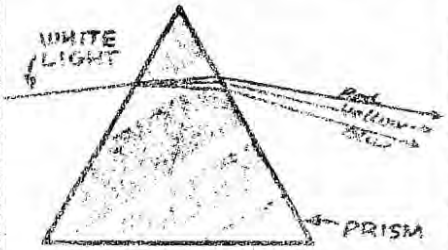
RADIUS of CURVATURE

ALL SIMPLE LENSES HAVE SPHERICAL CURVES. THE RADII DETERMINE THE FOCAL LENGTH. FORMULAS ARE APPROX. AND EXACT ONLY FOR THIN LENS, INDEX 1.5



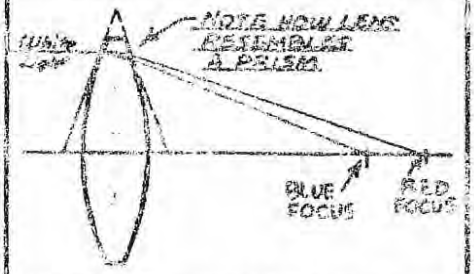
FINDING F.L. of a LENS

HOLD THE LENS IN SUNLIGHT AND ALONGSIDE A RULER. MOVE LENS UP AND DOWN TO FORM SMALLEST IMAGE OF SUN. READ THE F.L. ON RULER



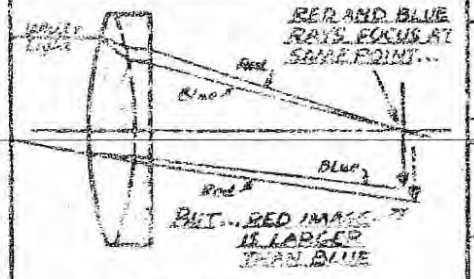
WHITE LIGHT

WHITE LIGHT IS COMPOSED OF ALL THE COLORS. A NARROW BEAM OF SUNLIGHT DIRECTED THRU A PRISM WILL EMERGE AS A COLORED BAND - THE SPECTRUM



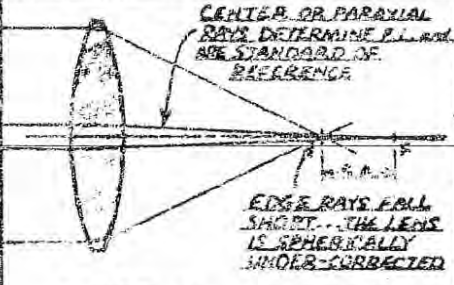
LONGITUDINAL COLOR

SIMPLE LENS BREAKS UP WHITE LIGHT JUST LIKE A PRISM. BLUE RAYS FOCUS CLOSER THAN RED. THE FAULT IS CONSTANT OVER WHOLE FIELD



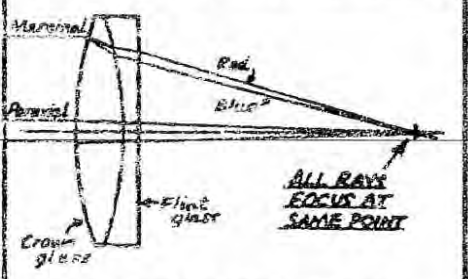
LATERAL COLOR

FAILURE OF THE LENS TO FORM SAME IMAGE SIZE IN ALL COLORS. THIS FAULT INCREASES WITH FIELD ANGLE... IS NOT PRESENT ON AXIS



SPHERICAL ABERRATION

AS SHOWN, A POSITIVE LENS IS SPHERICALLY UNDER-CORRECTED. S.A. VARIES WITH ⅓ VALUE OF LENS AND IS LESS FOR A SMALL APERTURE



ACHROMATIC LENS

ACHROMATS ARE TWO-ELEMENT LENSES CORRECTED FOR LONGITUDINAL COLOR AND SPHERICAL ABERRATION FOR AN AXIAL OBJECT