

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

NATIONAL BUREAU OF STANDARDS

REPORT OF TEST

212.12/185644

on
ONE AEROVIEW AERIAL CAMERA NO. 63803
Equipped with
C. P. Goerz Aerotar Lens No. 757623

Submitted by

Keystone Aerial Surveys, Inc.
325 N. Easton Road
Glenside, Pa. 19038

The lens contained in this camera has a nominal focal length of 8 1/4 inches and maximum aperture of f/6.8. All measurements were made at aperture f/11. These measurements were made with collimated incident light, using a K-3 filter, a tungsten source and Eastman Kodak infrared spectroscopic emulsion Type IV-N on micro flat glass plates. Development was in D-19 at 68°F for three minutes with continuous agitation.

I. Focal Lengths for Infrared

Equivalent focal length 210.72 mm
Calibrated focal length 210.70 mm

The probable errors of these determinations of focal length do not exceed ± 0.10 mm. (This lens is set for an optimum focus at aperture f/11).

II. Distortion

β	\bar{D}_e	\bar{D}_c	\bar{D}_c for Azimuth Angle			
			0°	90°	180°	270°
degrees	μ	μ	μ	μ	μ	μ
0	0	0	0	0	0	0
7.5	0	3	3	3	3	3
15	-12	-5	-7	-5	-2	-8
22.5	-18	-8	-2	-14	-10	-6
30	-6	8	20	-3	-2	15

Values of the distortion are measured for each of four radii of the focal plane separated by 90° in azimuth. Values of the distortion based upon the equivalent focal length, \bar{D}_e , are determined for points separated by 7.5° from the axis for each of the four radii. The average value of \bar{D}_e is reported and

from these values a calibrated focal length is derived to minimize the average value of distortion over the entire field. The average value of the distortion referred to the calibrated focal length is given under the heading D_c . Values of the distortion D_c based on the calibrated focal length determined for each of the four radii are listed under the azimuth angles 0, 90, 180, and 270 degrees. The values of the distortion are given in microns and indicate the displacement of the image from its distortion-free position. A positive value indicates a displacement from the center of the plate. The probable error does not exceed ± 10 microns.

III. Resolving Power for Infrared

<u>Emulsion</u>	<u>0°</u>	<u>7.5°</u>	<u>15°</u>	<u>22.5°</u>	<u>30°</u>
IV-N					
Tangential	24	24	24	24	20
Radial	24	29	24	24	20

The values of the resolving power are given at 7.5° intervals from the center of the field and are obtained by photographing suitable test charts comprised of patterns of parallel lines. The series of patterns of the test chart are imaged on the negative with the lines spaced in a geometric series of the fourth root of two lines to the millimeter. The row marked "tangential" gives the number of lines per millimeter in the image on the negative of the finest pattern of the test chart that is distinctly resolved into separate lines when the lines lie perpendicular to the radius drawn from the center of the field. The row marked "radial" gives similar values for the pattern of test lines lying parallel to the radius.

IV. Principal Point of Autocollimation

The lines joining opposite pairs of collimation index markers intersect at an angle of 90° ± 1 minute, and their intersection indicates the location of the principal point of autocollimation with a probable error not exceeding ± 0.03 mm.

V. Collimation Marker Separation

A - B	222.38 mm
C - D	222.32 mm

Markers A and B lie in the line of flight. The probable errors in these separations do not exceed ± 0.02 mm.

VI. Tangential Distortion

<u>0°</u>	<u>$\pm 7.5^\circ$</u>	<u>$\pm 15^\circ$</u>	<u>$\pm 22.5^\circ$</u>	<u>$\pm 30^\circ$</u>
0	0	4	7	6

The values of the tangential distortion are measured in microns and indicate the displacement of the image from its distortion-free position. These

values represent a displacement of the central image from a straight line connecting corresponding image points at equal but opposite angular separations from the axis. The probable error does not exceed ± 5 microns.

The two surfaces of the Goerz filter No. 2024 accompanying this camera are parallel to within ten seconds of arc.

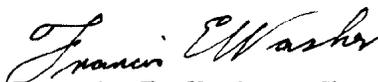
VII. Film Platen

The film platen mounted in Aero magazine No. 63M825 submitted with this camera does not depart from a true plane by more than ± 0.0005 inches.

In mechanical and optical characteristics this camera and film platen comply with the U. S. Department of Agriculture Forest Service Specification Revision No. 1 for a precision aerial camera dated February 1, 1965.

This report supersedes the previous calibration of this camera contained in NBS Report No. 175527-1, dated April 5, 1963.

For the Director,



Francis E. Washer, Chief
Refractometry Section
Metrology Division
Institute for Basic Standards

Report No. 212.12/185644
July 8, 1965