

CAMERA CALIBRATION CERTIFICATE

CAMERA TYPE : RC20
LENS TYPE : 15/4 UAGA-F
LENS NO. : 13158

Calibration date: 21.11.2003

LEICA AG, HEERBRUGG

 **swissoptic**
SwissOptic AG
Heinrich-Wild-Strasse
CH-9435 Heerbrugg
Schweiz

FOU *haw*

Aperture: 4.0
 Filter on goniometer: 450 NM
 Filter on camera: --
 C.F.L. : 153.18 mm

Radial distortion (micrometers) referred to principal point of symmetry (PPS)
 (Positive values denote image displacement away from center)

| Radius mm | Half - Sides | | | | Mean |
|--------------|--------------|------|------|------|------|
| | 1 | 3 | 2 | 4 | |
| 10 | 0.8 | 0.2 | 0.6 | 0.4 | 0.5 |
| 20 | 0.9 | 0.5 | 0.9 | 0.9 | 0.8 |
| 30 | 1.1 | 0.6 | 1.4 | 0.9 | 1.0 |
| 40 | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 |
| 50 | 1.4 | 1.2 | 1.2 | 1.7 | 1.3 |
| 60 | 1.0 | 1.5 | 1.8 | 1.5 | 1.4 |
| 70 | 1.7 | 1.6 | 1.0 | 1.7 | 1.5 |
| 80 | 1.7 | 2.1 | 1.1 | 1.7 | 1.6 |
| 90 | 3.2 | 1.9 | 0.7 | 0.9 | 1.6 |
| 100 | 2.7 | 1.5 | 0.5 | 0.3 | 1.2 |
| 110 | 2.2 | 0.6 | 0.8 | -0.9 | 0.6 |
| 120 | 1.5 | -0.1 | -1.8 | -2.2 | -0.6 |
| 130 | 0.0 | -0.5 | -2.5 | -2.8 | -1.4 |
| 140 | -1.2 | 0.0 | -3.1 | -3.0 | -1.8 |
| 148 | -1.5 | 1.3 | -3.2 | -2.0 | -1.3 |

Photographic resolution (line pairs per millimeter)

International 3-line test-chart, contrast (log) : 2.0

Aperture: 4.0
 Filter: 450NM
 Film: KODAK PANATOMIC X 2412
 Developer: KODAK HC110

| Angle (deg) | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|-------------|-----|----|----|----|----|----|----|----|----|----|
| Radial: | 117 | 93 | 92 | 71 | 62 | 75 | 81 | 96 | 71 | 52 |
| Tangential: | 117 | 82 | 72 | 52 | 52 | 61 | 70 | 56 | 55 | 37 |

AWAR (Area weighted average resolution) in lp/mm: 69

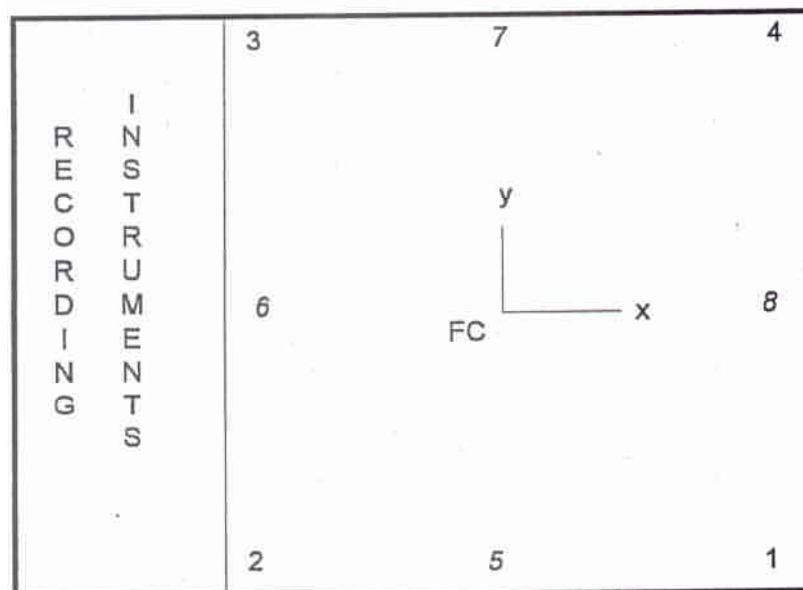
FOOT
hao

Principal point of autocollimation (PPA) and
 principal point of symmetry (PPS)
 referred to central cross (FC), see diagram

| | x (mm) | y (mm) |
|-----|--------|--------|
| PPA | 0.005 | 0.011 |
| PPS | -0.001 | 0.012 |

Fiducial marks, referred to central cross (FC)

| | x (mm) | y (mm) | | x (mm) | y (mm) |
|---|----------|----------|---|----------|----------|
| 1 | 105.997 | -105.998 | 5 | 0.001 | -109.998 |
| 2 | -106.002 | -106.002 | 6 | -109.999 | -0.001 |
| 3 | -106.000 | 106.001 | 7 | 0.002 | 109.997 |
| 4 | 106.005 | 106.006 | 8 | 109.989 | 0.002 |

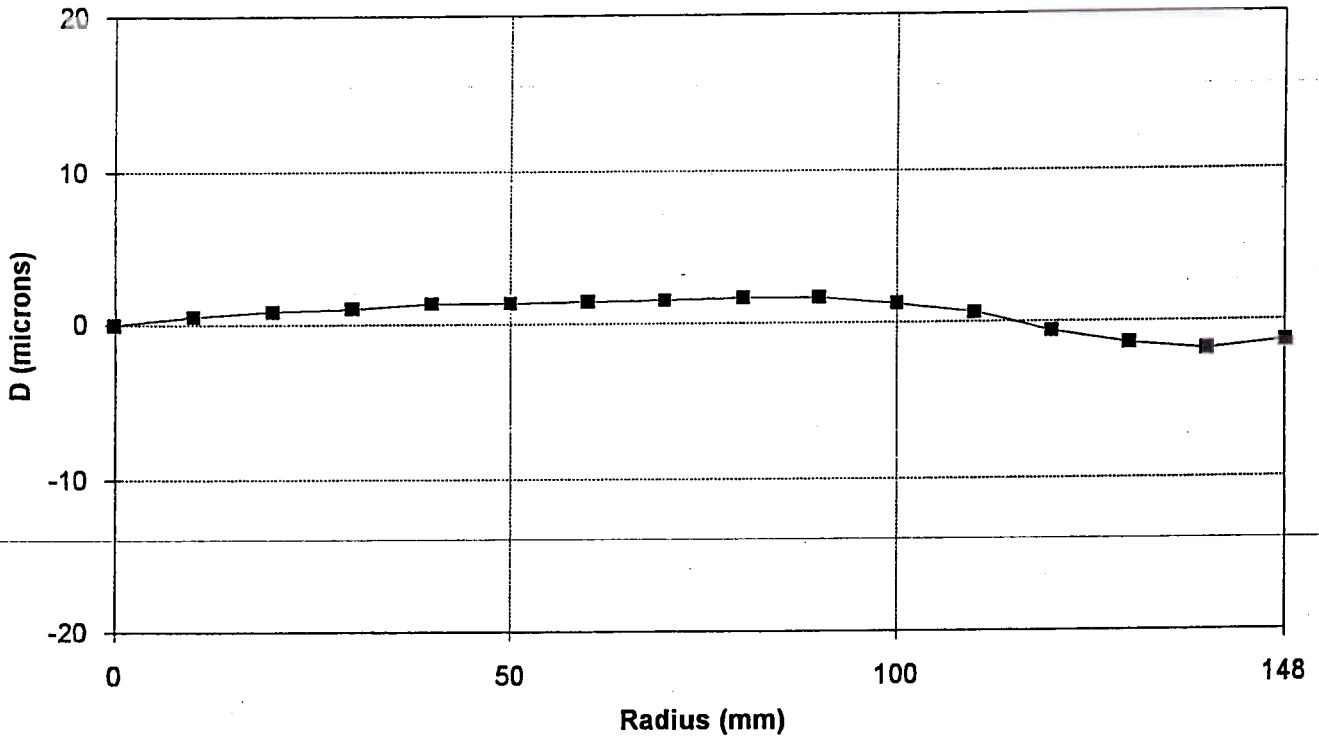


as seen on focal plane frame

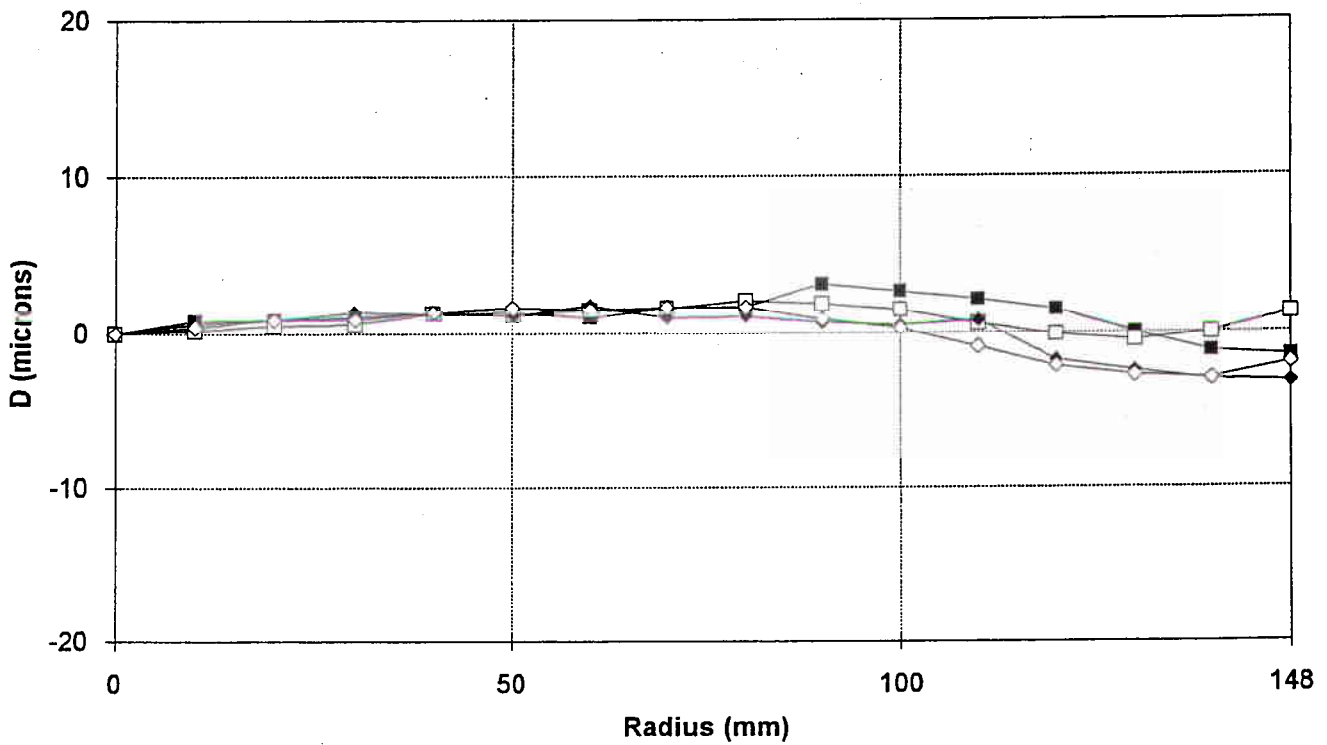
FO 077
Had

Aperture: 4.0
Filter on goniometer: 450 NM
Filter on camera: --
C.F.L. : 153.18 mm

Mean radial distortion



Radial distortion for semi-diagonals referred to PPS



■ 1 □ 3 ◆ 2 ◇ 4

EPH *Haw*