

3.4 COLLIMATORS

3.4.1 WAC COLLIMATOR

Modified version of write-up by D. I. Brown

The WAC collimator is an all-reflective device for high-quality imaging over the complete WAC wavelength region (400-1100 nm), and was developed to compensate for the Fecker collimator's narrow-bandwidth. The Newtonian collimator system is comprised of a 10" diameter, 48" focal length, parabolic primary and an elliptical secondary which feeds it with light from a target. Ten sub-aperture beam directing mirrors, producing to 5 separate beams, collect light from the collimator primary in a place called the pupil distribution box. Each beam allows for a 0.25 ° unvignetted field of view. The beams are projected into the center and four corners of the WAC CCD and have a 73 pixel diameter. The target holder has motorized focus motion accurate to 1 micron for through-focus testing. The visible/IR light source is used as the target illuminator. It illuminates the primary with a pickoff mirror.

The diameter of the primary actually used in the system is a bit larger than 8", with the extra area used to nest the pupil distribution box mirrors and collimator secondary without vignetting.

The MTF, PRF, Navigation, and Lossy Compression calibration tests required wide-band imaging, and therefore used this system for test.

See Table 3.4.1-1 for the WAC Collimator Summary and Figure 3.4.1-1 for the WAC Collimator Layout.

WAC Collimator Element	Value / Description
Mirror Diameter	10 in (8 in + used)
# of Subaperture Beams	5 (projected onto center and four corners of WAC CCD)
Subaperture Sampled	2.25 in diameter
Focal Length	1219 mm (nominal)
Beam F/#	21.3
"Clean" FOV of Beams at WAC	0.25 °
On-Axis Optical Quality (est)	0.025 wave, RMS, @ 633 nm
Airy Disk, 500 nm	26 microns
Depth of Field, 500 nm	450 microns
Wavelength Range	below 380-1100 nm
Coatings	Al/MgF ₂
Light Source (350 - 1100 nm)	9 in white painted Al integrating sphere ; 250 W Qtz lamp, stabilized, filtered

Table 3.4.1-1 - WAC Collimator Summary

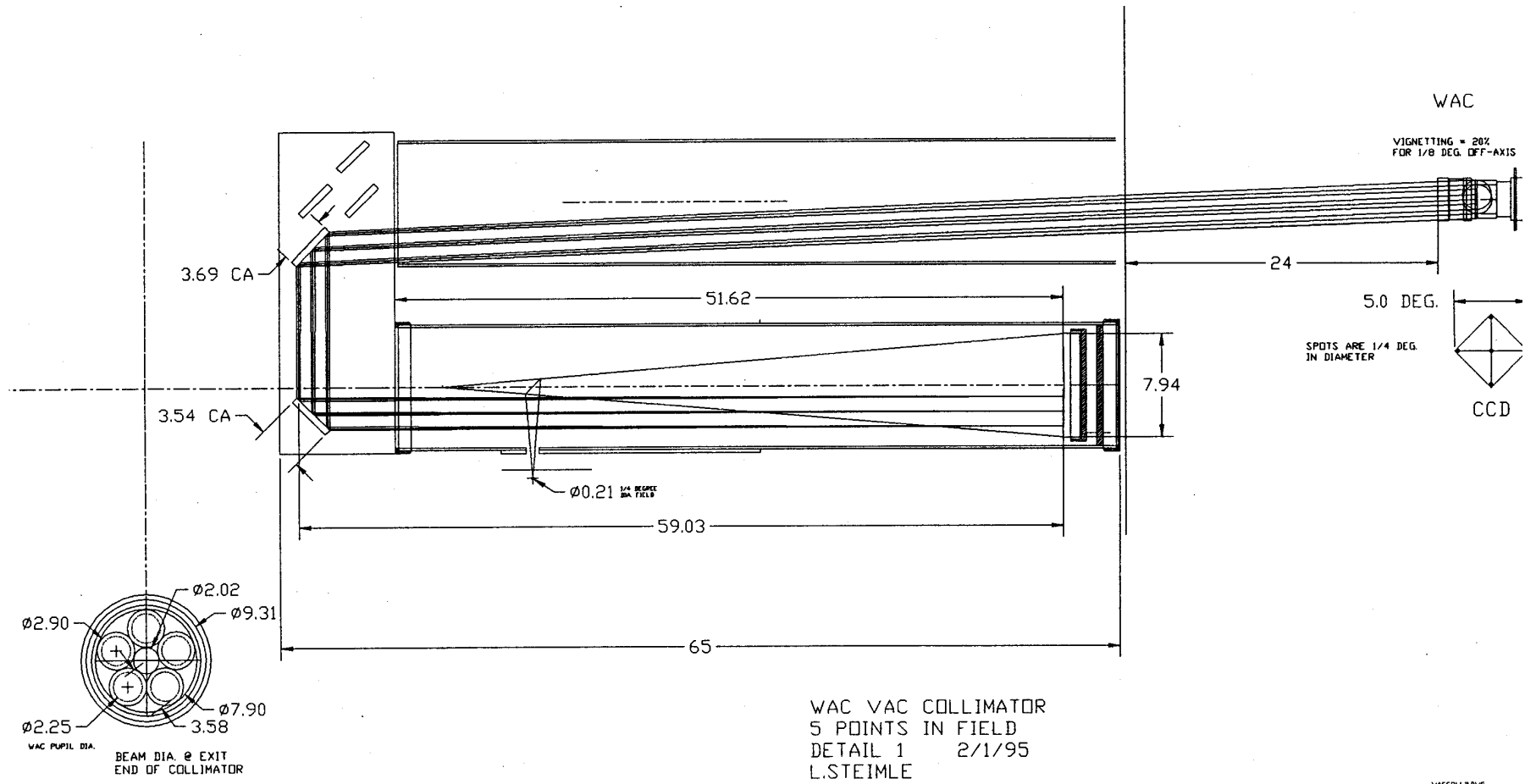


Figure 3.4.1-1 - WAC Collimator Layout