PANAVISION®

Digital Cinematography

camera system

ULTRA PRECISION EQUIPMENT FOR THE MOTION PICTURE INDUSTRY

In 1997 Sony Corporation asked Panavision to help develop a camera system which would be used by cinematographers to create motion picture quality images from a new 24 frame CCD camera. Panavision's customers had also been asking for a digital camera system tailored to their needs as filmmakers.

Panavision realized that a complete imaging system approach would be imperative for a new digital camera with no motion picture precedents. The basic HDW-F900 was designed to be an ENG style hand held camera intended to support light weight ENG style lenses.

Panavision has ruggedized the camera and developed a lens mount that will support our new series of Primo Digital™ lenses. The camera will also interface with all appropriate existing Panavision accessories.

THE IMPORTANCE OF OPTICS

Historically, 525 and 625 line video systems were constrained in their performance by almost everything but optics. However, with Sony's introduction of the first progressive output 2/3", 2 million pixel (per color) CCD camera it was immediately apparent that optics were going to be critical to maximizing the performance of a Digital Cinematography System.

Panavision has therefore introduced a new series of lenses, designed specifically for prism beam splitters and the small target size of the 2/3" CCD. The Primo Digital™ lens series is designed to provide the maximum image performance for this format while retaining all of the other lens characteristics Panavision's customers have come to expect from Primo lenses for film.

The 2/3" CCD imager is actually only 11mm in diagonal (as compared to the 27.5 mm diagonal of a 35mm motion picture film frame). Therefore, for any given screen size, the 2/3" CCD will require 2.5 times more horizontal magnification than a 35mm film frame. This required that our new Primo Digital™ lens series be designed to have 2.5 times the performance of our best cine lenses (fortunately for a smaller image size). All of the new Primo Digital™ lenses will provide their optimum performance at their maximum aperture, including our two new f1.5 11:1 and wide angle 4:1 Primo Digital™ zoom lenses, which are more than 1 stop faster than any other zoom lens designed for the 2/3" CCD format.

FILM/HD COMPARATIVE LENS RESOLUTION

3 perf. 35mm film aperture

20 cycles/mm

2/3" CCD

50 cycles/mm

On the left side of this graphic is a 16x9 format, 35mm film camera aperture. On the right is the image area of a 2/3" CCD drawn to the same scale. In order to have the same performance as a Primo cine lens, Primo Digital™ lenses must achieve 80% contrast at 50 line pairs per millimeter on the 2/3" CCD (2.5 times better frequency response).

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DEPTH OF FIELD COMPARISON

In addition to requiring 2.5 times the frequency response of its cine counterpart, the smaller target also has 2.5 times greater depth of field for the same angle of view and f-stop as the equivalent cine lens (f4 on 1.85:1 35mm film format is f1.6 in the 2/3" CCD format). In order to provide creative control over depth of field, the Primo Digital™ lenses have been designed to operate two stops faster than the equivalent cine lenses.

1.85:1	2.40:1	2/3 CCD
F-stops		
2	2.8	0.8
2.8	4	1.1
4	5.6	1.6
5.6	8	2.2
8	11	3.2
11	16	4.4
16	22	6.4

PRIMO DIGITAL™ LENS SERIES

Panavision has designed the Primo Digital™ series of lenses in order to address the issues of resolution and depth of field that the 2/3" CCD format creates for the cinematographer. These lenses will provide the same high contrast with low veiling glare as first established by the Primo cine lenses. The first two lenses, available now, are functionally equivalent to the Primo 11:1 and 4:1 wide angle zooms.

Panavision's next offering, will be two lightweight zooms and a series of primes beginning with a low distortion 5mm wide angle (equivalent to a 12.5mm in 1.85:1 Academy format). These lenses will provide the same high performance at fast apertures. Primo Digital™ primes will be T1.6 or better, and weigh less than 6 pounds (or 2.7 Kilos).

As with film, Panavision is committed to continually developing our digital camera system in collaboration with our clients, to ensure that their needs are met.

9.5mm–105mm	T1.6	11:1 zoom
6mm–27mm	T1.6	4.5:1 zoom
5mm	T1.9	wide angle prime
7mm	T1.6	prime
10mm	T1.6	prime
14mm	T1.6	prime
20mm	T1.6	prime
35mm	T1.6	prime
6mm–27mm	T1.8	4.5:1 zoom
25mm–112mm	T1.9	4.5:1 zoom

where, T = measured lens transmission

FILM VS. VIDEO COLORIMETRY

The "film" versus the "video" look is an extremely controversial issue, and is an aesthetic decision based on many factors that include colorimetry, gamma, frame rate, image enhancement, granularity, etc. The Primo Digital™ lenses have a unique internal design which enables interference type spectral modification filters to be incorporated within the lenses. When coupled with other optical pre-filters within the camera beam splitter optics, the "Panavised" camera can achieve a wider color gamut than standard CCD video cameras.

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