

Aerial Film and Filters

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Introduction:

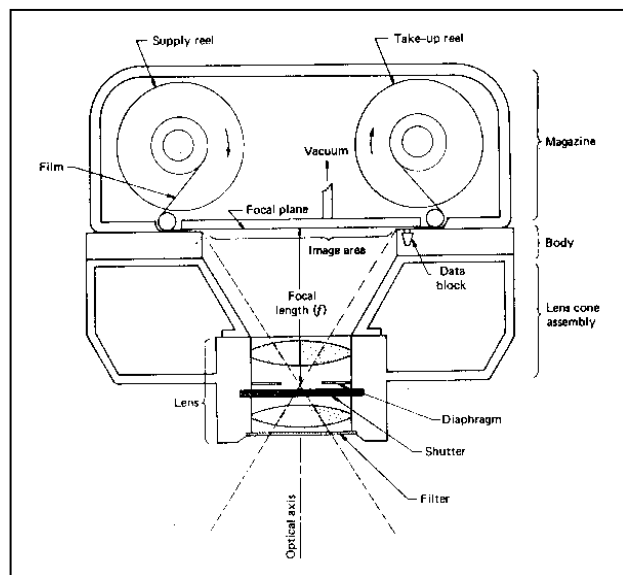
Aerial film is similar in construction to the film popularly used in handheld 35-mm cameras. It comes in rolls that are 10 in. wide and range in length from 200 to 500 ft. Figure 3.1 depicts the basic structure of aerial film.

Types of Film

Although there are a number of aerial films in use, many serve unique situations. Two commonly utilized films employed in planimetric and/or topographic digital mapping are panchromatic and natural color. These two films plus infrared and false color form the basic media used in image analysis procedures.

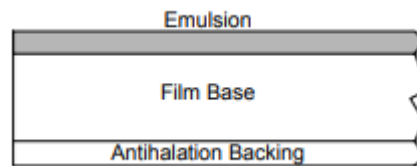
1. Panchromatic

Panchromatic, more often termed black and white, is the most commonly encountered film employed for photogrammetry. The sensitive layer consists of silver salt (bromide, chloride, and halide) crystals suspended in a pure gelatin coating which sits atop a plastic base sheet. Visible light waves react with the silver particles in the emulsion, causing a chemical reaction that creates a gray-scale image. The emulsion is sensitive to the visible (0.4- to 0.7- μm) portion of the electromagnetic spectrum that is detected by the human eye.



2. Color

Natural color film is also called true color or color. The multilayer emulsion is sensitive to the portion of the electromagnetic spectrum that is visible to the human eye. There are three layers of gelatin containing sensitized dyes, one each for blue (0.4–0.5 μm), green (0.5–0.6 μm), and red (0.6–0.7 μm) light. Green and red layers are also sensitive to blue wavelengths. Visible light waves first pass through and react with the blue layer and then pass through a filter layer which halts further passage of the blue rays. Green and red waves pass through this barrier and sensitize their respective dyes, causing a chemical reaction and thus completing the exposure and creating a true color image.



Basic components of panchromatic film

3. Infrared

Current aerial infrared film is offered as two types: black and white infrared and color infrared.

(A) Black and White Infrared

film is also known as black and white infrared. The emulsion is sensitive to green (0.54–0.6 μm), red (0.6–0.7 μm), and part of the near infrared (0.7–1.0 μm) portions of the spectrum and renders a gray-scale image. Positive images appear quite like panchromatic film, except that water and vigorous vegetation tend to register as darker gray to black. The film structure resembles panchromatic with the exception that the emulsion sensitivity range is shifted upward, eliminating blue wavelengths and including a portion of the near infrared. In the past this film was used extensively in vegetation and water studies, but its popularity seems to be declining in favor of color infrared.

(B) Color Infrared

film is commonly termed false color. The multilayer emulsion is sensitive to green (0.5–0.6 μm), red (0.6–0.7 μm), and part of the near infrared (0.7–1.0 μm) portions of the spectrum.

A false color image contains red/pink hues in vegetative areas, with the color depending upon the degree to which the photosynthetic process is active. It also images water in light blue/green to dark blue/black hues, depending on the amount of particulates suspended in the water body. Clean water readily absorbs near infrared radiation. As the amount of foreign particulates

FILM PROCESSING

Aerial film is developed in automatic processing machines, where the exposed film enters one end and the processed negative exits the other. Chemical temperatures and development timing sequences are critical, more with color as compared to panchromatic films. These thermal ranges and temporal periods during which the film is immersed in the various liquid baths should be regulated per specifications established by the manufacturer.

FILTERS

Aerial photographs are usually exposed through a glass filter attached in front of the lens, so as to enhance the image in some fashion. Filters absorb unwanted portions of the spectrum to enhance image quality by reducing problems such as haze or darkening of the image at the edge of the exposure. There are a variety of filters that can be employed depending upon the type of film and the purpose of the imagery