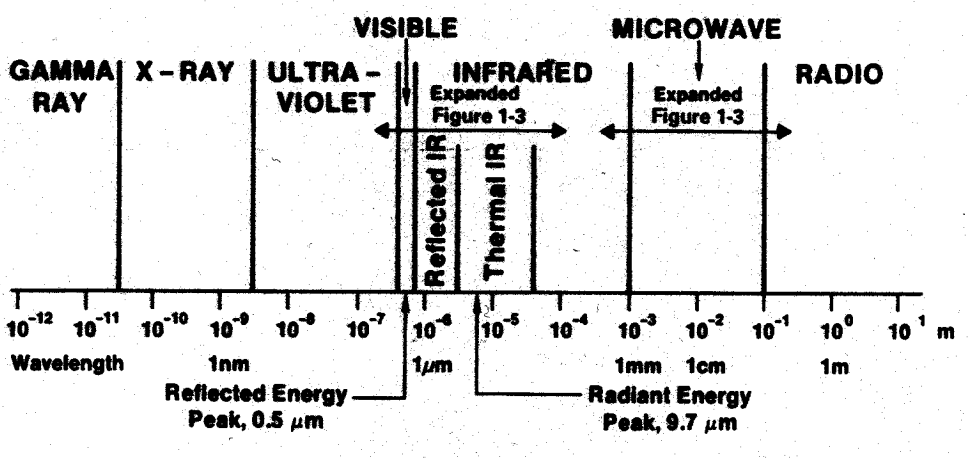


Figure 1-2 Electromagnetic spectrum. Expanded versions of the visible, infrared, and microwave regions are shown in Figure 1-3.

Table 1-3 Electromagnetic spectral regions

Region	*Wavelength*	*Remarks*
Gamma-ray region	< 0.03 nm	Incoming radiation completely absorbed by the upper atmosphere and not available for remote sensing.
X-ray region	0.03 to 30 nm	Completely absorbed by the atmosphere. Not employed in remote sensing.
Ultraviolet region	0.03 to 0.4 μm	Incoming wavelengths less than 0.3 μm completely absorbed by ozone in the upper atmosphere.
Photographic UV band	0.3 to 0.4 μm	Transmitted through the atmosphere. Detectable with film and photodetectors, but atmospheric scattering is severe.
Visible region	0.4 to 0.7 μm	Imaged with film and photodetectors. Includes reflected energy peak of earth at 0.5 μm.
Infrared region	0.7 to 100 μm	Interaction with matter varies with wavelength. Atmospheric transmission windows are separated by absorption bands.
Reflected IR band	0.7 to 3.0 μm	Reflected solar radiation that contains no information about thermal properties of materials. The interval from 0.7 to 0.9 μm is detectable with film and is called the photographic IR band.
Thermal IR band	3 to 5 μm, 8 to 14 μm	Principal atmospheric windows in the thermal region. Images at these wavelengths are acquired by optical-mechanical scanners and special vidicon systems but not by film.
Microwave region	0.1 to 100 cm	Longer wavelengths that can penetrate clouds, fog, and rain. Images may be acquired in the active or passive mode.
Radar	0.1 to 100 cm	Active form of microwave remote sensing. Radar images are acquired at various wavelength bands.
Radio	>100 cm	Longest-wavelength portion of electromagnetic spectrum.

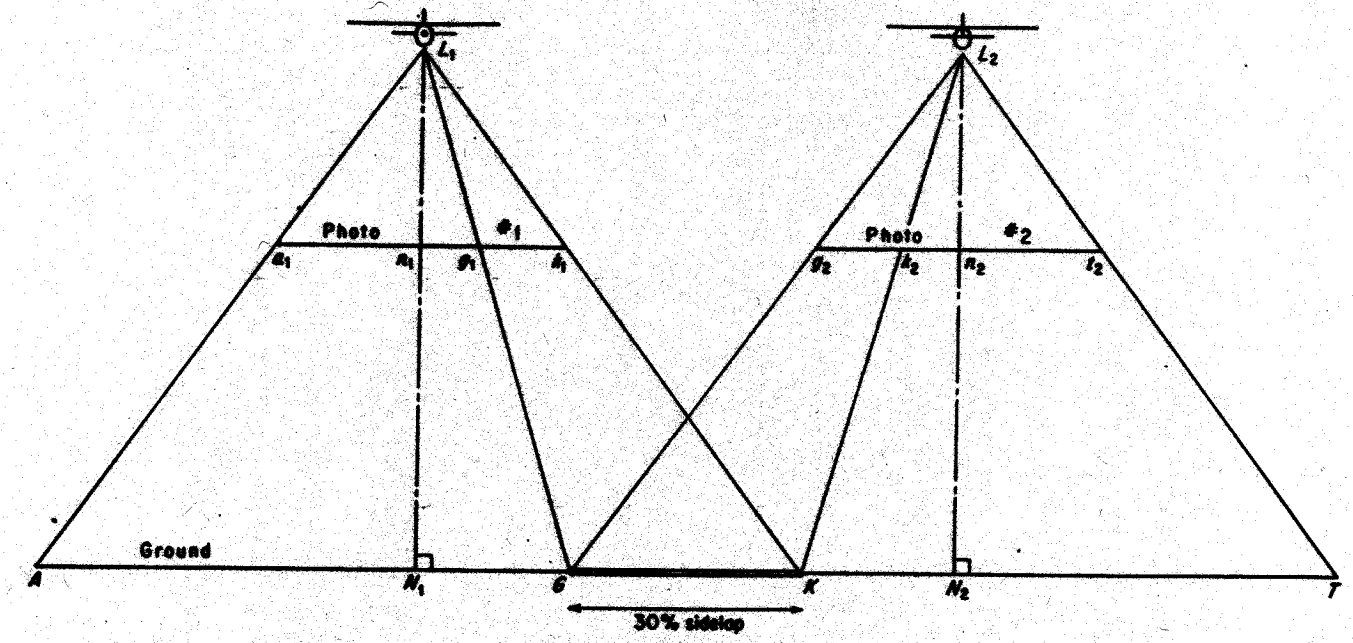


Figure 1-8. The obtaining of *sidelap* photographic coverage. The plane at station L_1, flying toward the reader, photographs ground area AK. At air station L_2, while flying away from the reader, it photographs area GT. The area common to both is area GK, the sidelap area.

Figure 1-9. The obtaining of *overlap* photographic coverage. From station L_1, area AK is photographed; from Station L_2, area GT is photographed. The overlap shown (GK) is 60 per cent. The nadir points N_1 and N_2 are included in the overlap area and appear on both photographs. Locate camera station L_3. By construction, show that part of overlap area GK is included in the coverage of the third photograph.

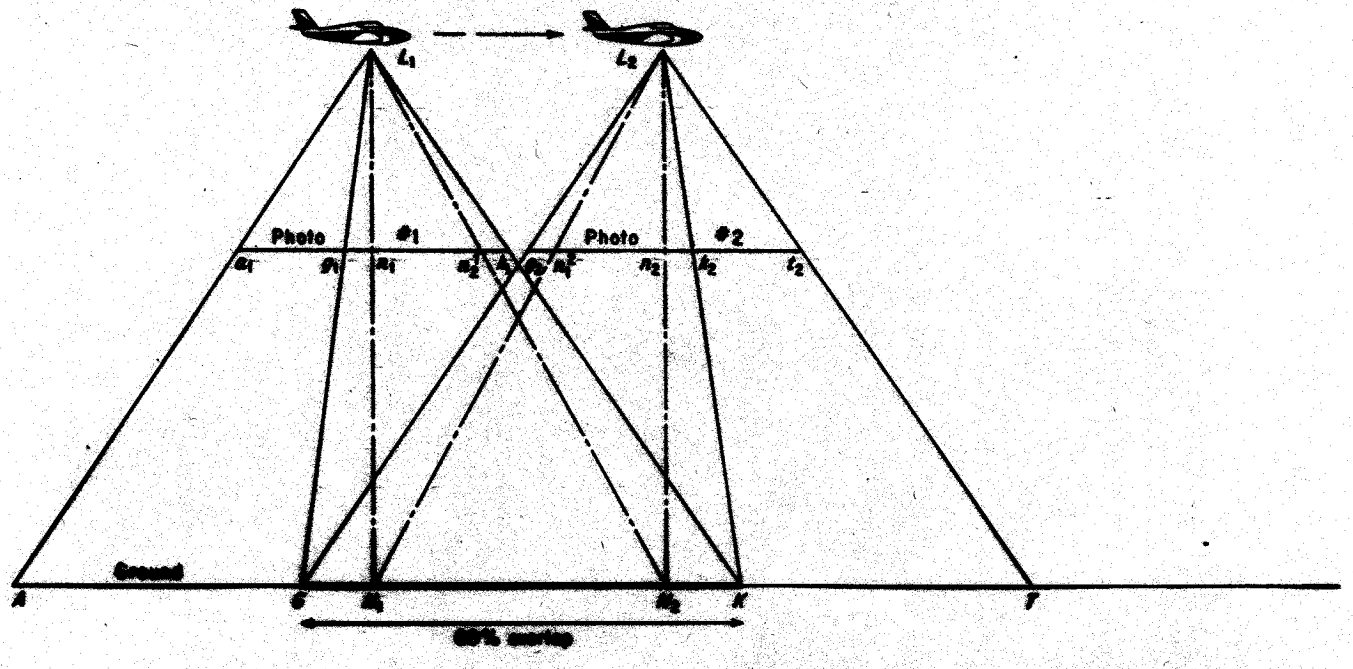


Figure 1-11. (*A*) Overlap photography obtained when camera is oriented parallel to airplane during *crab*. (*B*) Overlap photography obtained when camera orientation is adjusted to compensate for crab.

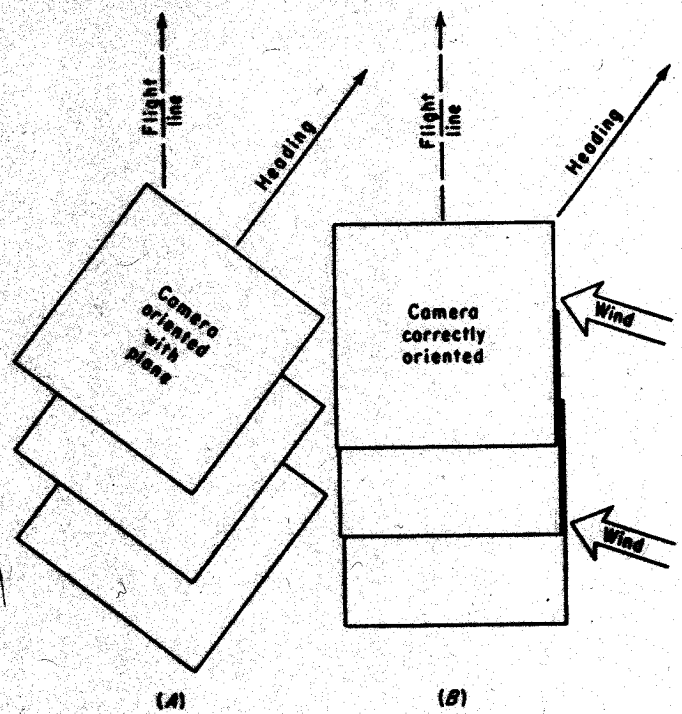


Table 1-1 Metric nomenclature for distance

Unit	*Symbol*	*Equivalent*
Kilometer	km	$1000\ m = 10^{-3}\ m$
Meter[a]	m	$1.0\ m = 10^{0}\ m$
Centimeter	cm	$0.01\ m = 10^{-2}\ m$
Millimeter	mm	$0.001\ m = 10^{-3}\ m$
Micrometer[b]	μm	$0.000001\ m = 10^{-6}\ m$
Nanometer	nm	$10^{-9}\ m$

[a]Basic unit

[b]Formerly called micron (μ).

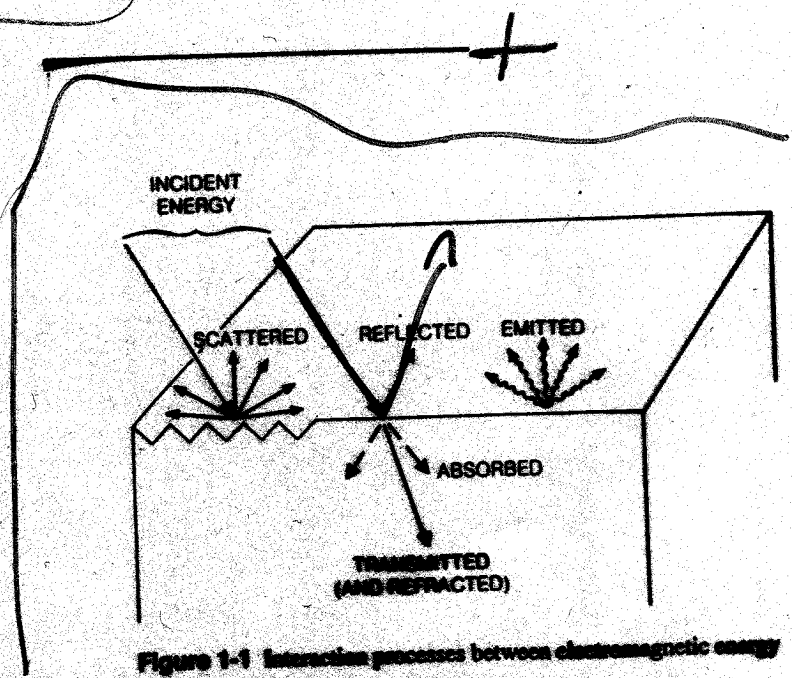
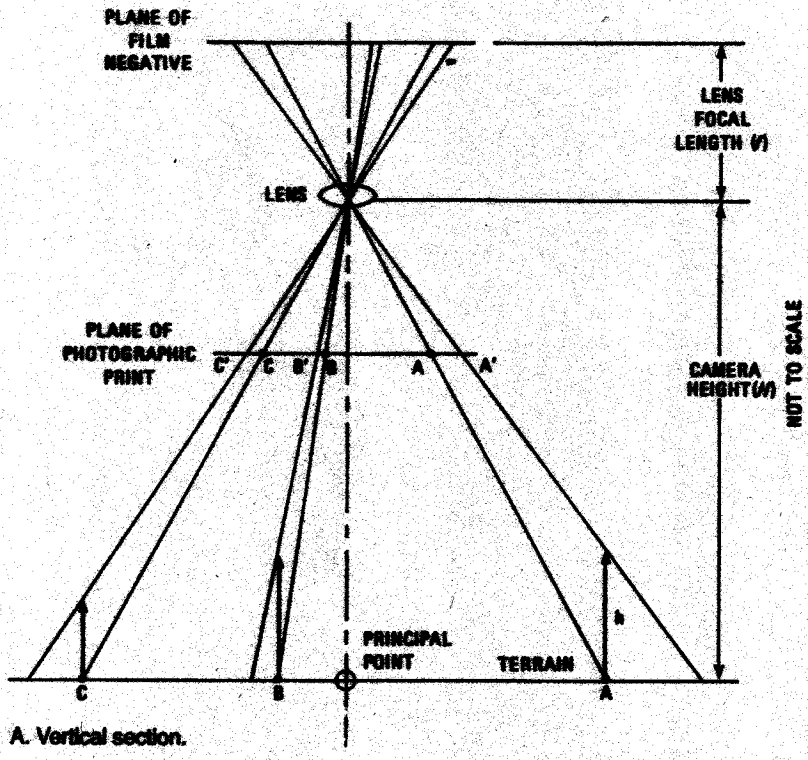
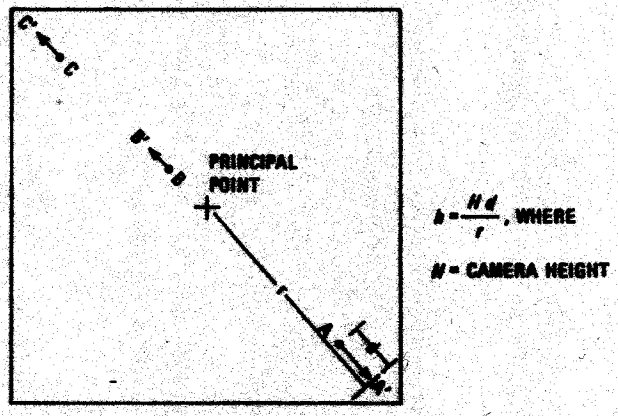


Figure 1-1 Interaction processes between electromagnetic energy and matter.



A. Vertical section.



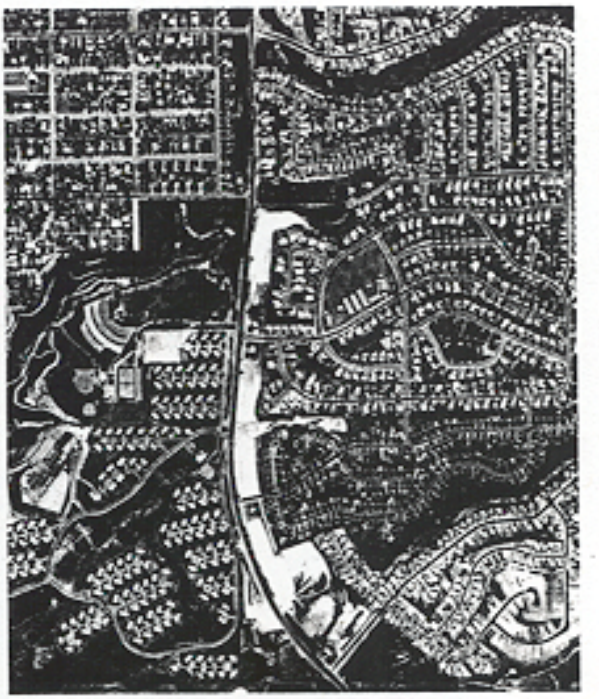
B. Plan view of photographic print.

Figure 2-9 Geometry of relief displacement on a vertical aerial photograph.

PHOTOMOSAICS

Aerial photographs are typically acquired at scales of 1:80,000 or larger and therefore cover relatively small areas. Taking photographs on a series of parallel flight lines provides broader coverage. Along a flight line, successive photographs are acquired with 60 percent forward overlap (Figure 1-11). Flight lines are spaced to provide 30 percent *sidelap*, which is the overlap between adjacent strips of photographs. A *photomosaic* is a composite of these individual photographs that covers an extended area. Figure 2-10A is a photomosaic of the northern Coachella Valley in southern

A. Height 1525 m.



B. Height 3050 m.

C. Height 4575 m.

D. Height 6100 m.

Figure 2-7 Aerial photographs of Palos Verde Peninsula, California, acquired at different camera heights with a 152-mm-focal-length lens. Table 2-1 lists minimum ground separation values for this medium-resolution system. The southeastern corner is common to all photographs.

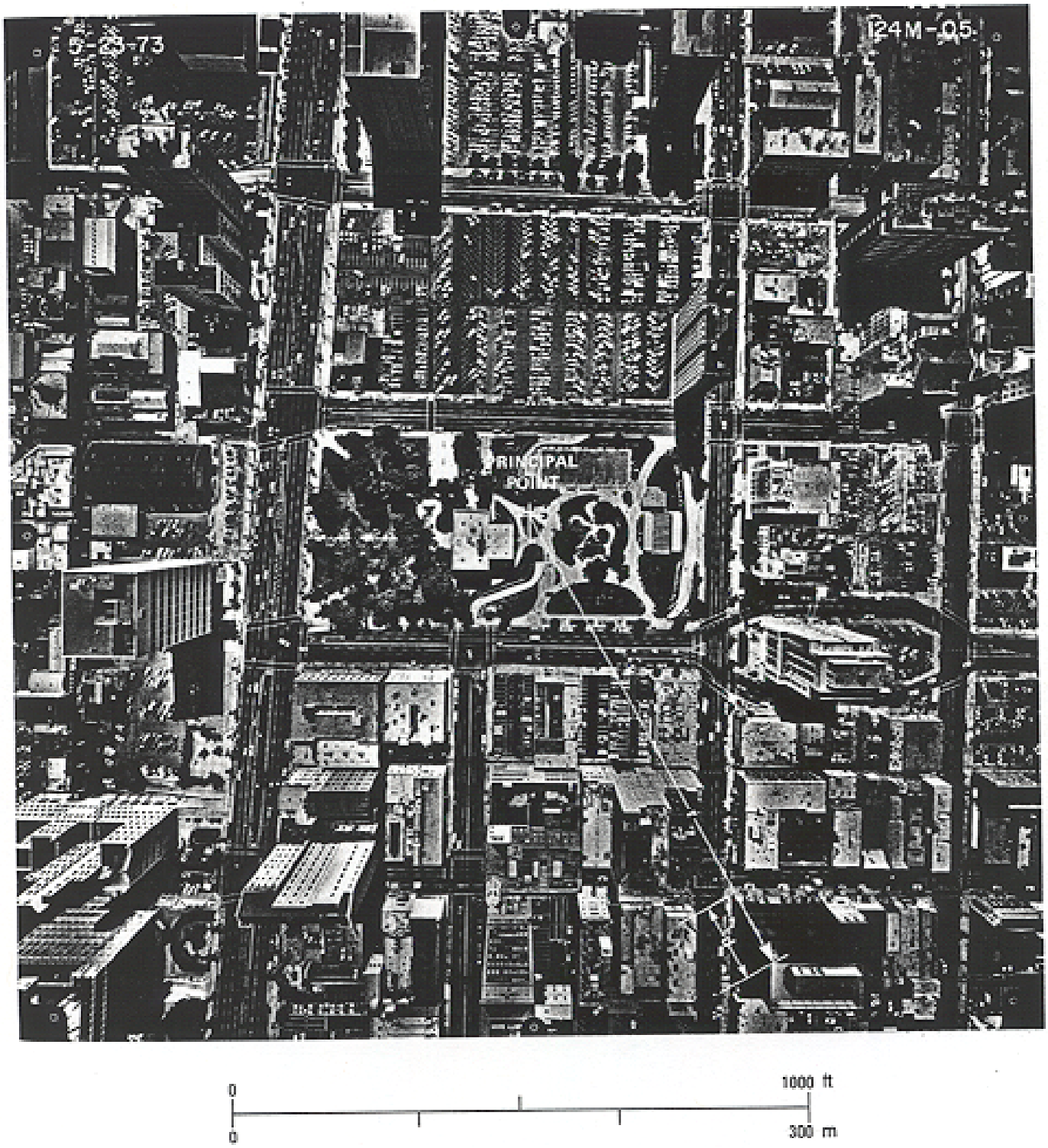


Figure 2-8 Vertical aerial photograph of Long Beach, California, showing relief displacement. Courtesy J. Van Eden.

easured using the scale of the photograph, and the height is
lculated from Equation 2-4 as

$$h = \frac{212\text{ m} \times 40\text{ m}}{260\text{ m}} = 32.6\text{ m}$$

Orthophotographs are aerial photographs that have been scanned into a digital format and computer-processed to remove the radial distortion. These photographs have a consistent scale throughout the image and may be used as maps.

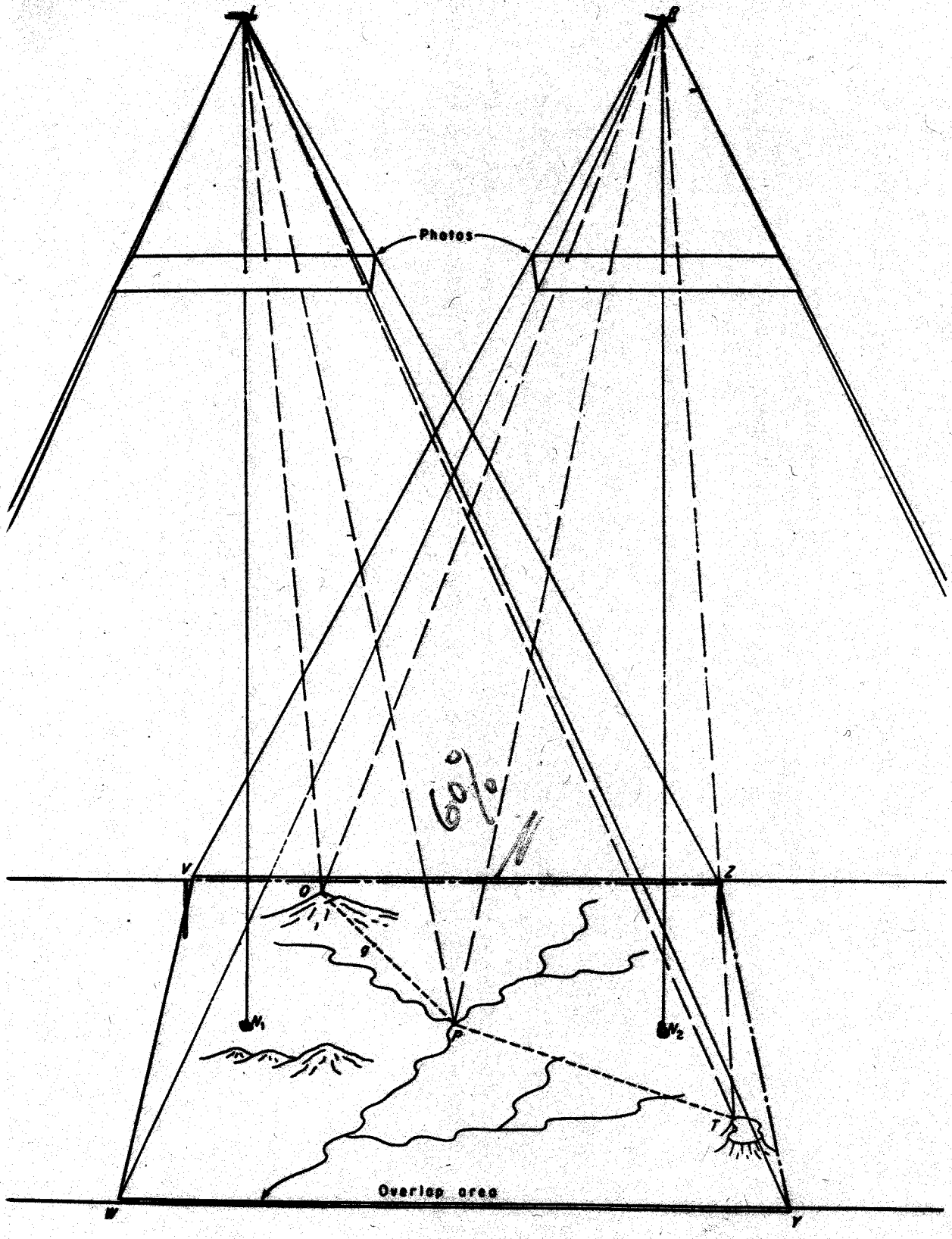


Figure 2-24. The overlap photography of area *VWYZ*. Ground points N_1 and N_2 are the *nadir points* of the two photographs. Ground point *P*, midway between points N_1 and N_2, is the *stereoscopic perspective center*. Stereoscopic model distortions are radial from this point (i.e., along lines *PQ* and *PT*).