MAIN PARTS OF FRAME AERIAL CAMERA

Three basic components:

1. The magazine
2. Camera body
3. Lens cone assembly

1. Camera magazine

Contains the reels which hold exposed and unexposed film and also contain film advancing and film flattening mechanism. Film flattening is very important because if the film is buckled during exposure image points on the resulting photograph will be incorrect.

Ways of flattening film:

a. By applying tension to the film
b. By pressing film firmly against a flat focal plane glass which lies in front of the film.
c. By applying air pressure into the air tight camera cone thereby forcing the film against a flat plate lying behind the focal plane
d. By drawing the film tightly up against a vacuum plate whose surface lies in the focal plane.

The vacuum system has proved most satisfactory and is most widely used method of film flattening in aerial cameras. A focal plane glass in front of the film is objectionable because image positions are distorted due to refraction of light rays passing through the glass.

2. Camera body

Contain drive mechanism which provides the force to operate the camera through its cycle and the cycle consists of:

a. Advancing the film
b. Flattening the film
c. Cocking the shutter
d. Tripping the shutter

Power for drive mechanism could be either electrical or manual. The camera body also contains carrying handles and electrical connections.

3. Lens cone assembly

Contains the following:

a) Lens
b) Filter
c) Shutter and diaphragm.

In most aerial cameras the lens cone assembly contains an inner cone or spider. The inner cone rigidly supports the lens assembly and focal plane in a fixed relative position. This fixes are called the
elements of interior orientation of the camera. These elements are carefully determined during camera calibration procedures.

**a) Camera lens:** gathers light rays from the object space and brings them to focus in the focal plane behind the lens. Lenses used in aerial cameras are highly corrected compound lenses consisting of several elements e.g. a 90 mm focal length Super Aviogon lens used in the Wild RC-9 Super Wide Angle aerial mapping camera.

**b) Filters:**

   a) reduces the effect of atmospheric haze,
   b) it helps provide uniform light distribution over the entire format,
   c) It protects the lens from damage and dust.

**c) The shutter and diaphragm:** together regulate the amount of light that is allowed to pass through the lens. The shutters control the length of time that light is permitted to pass through the lens. The shutter controls the length of time that light is permitted to pass and the diaphragm controls the size of the opening and hence the size of the bundle of light rays that is allowed to pass through the lens.

**Focal plane:**

The plane in which all incident rays are brought to focus. In aerial photograph object distances are greater as compared to image distance. Aerial cameras therefore have their focus fixed for infinite object distance. This is done by setting the focal plane as exactly as possible at a distance equal to the focal length behind the rear nodal point of the camera lens.

**Fiducial marks:**

Camera fiducial marks are usually four in number and they are located either in the middle of the sides of the focal plane opening or in the corners. These marks are exposed onto the negative when the picture is taken. Lines joining opposite fiducial marks should intersect at the principal point of the photograph. The principal point is defined as the point in the focal plane where a line from the rear nodal point of the camera lens and perpendicular to the focal plane intersects the focal plane.

**Camera mounts:**

The camera mount is a device which is used to attach the camera to the aircraft. It has the device which prevents aircraft vibrations from being transmitted to the camera. The mount is designed so that the camera can be rotated in azimuth to correct for crab. Crab is a deviation in the aircraft's actual travel direction from its direction of heading. It is usually caused by the side winds and may be of variable amounts depending on wind velocity and direction.

**Camera controls:**

Those are devices which are necessary for operating the camera and varying the camera settings according to conditions at the time of photography. The intervalometer is a device which automatically trips the shutter and actuates the camera cycles at desired times. Older types of intervalometers could be set to automatically make exposures at fixed time of intervals of time. The time interval could be calculated and depended upon the focal length and format size, desired
endlap, flying height and aircraft velocity. The disadvantage of this type intervalometer is that variations in end lap occur with variations in terrain elevation, flying height or aircraft velocities. Newer intervalometers make exposures at desired percentages of end lap in spite of variations in terrain, flying height and aircraft velocity. This is done by means of a rotating chain shown in the viewfinder. The viewfinder enables the operator to continually view the terrain beneath the aircraft and to see the ground coverage of each photo. Another aerial camera control device mechanism. This consists of an exposure meter which measures terrain brightness and correlates it with the optimum combination of diaphragm opening and shutter speed.