

NATIONAL MAPPING COUNCIL OF AUSTRALIA

STANDARD DEFINITIONS

OF TERMS USED IN

PHOTOGRAMMETRIC SURVEYING & MAPPING

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PREPARED ON BEHALF OF THE
NATIONAL MAPPING COUNCIL OF AUSTRALIA
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TERMS USED IN PHOTOGRAMMETRIC SURVEYING AND MAPPING

ABERRATION

(Optics) - A defect of an optical image caused by the fact that essentially no lens system can form a perfect image. Astigmatism - An aberration affecting the sharpness of images caused by the fact that for objects off the axis the rays passing through different meridians of the lens come to a focus in different planes. Thus an extra-axial point object is imaged as two mutually perpendicular short lines located at different distances from the lens. Lateral Chromatic Aberration - An aberration which affects the sharpness of images off the axis because different colours produce different magnifications. Longitudinal Chromatic Aberration - An aberration which affects the sharpness of all parts of the image because different colours come to a focus at different distances from the lens. Spherical Aberration - An aberration caused by rays from various zones of a lens coming to focus at different distances along the axis. This results in an object point being imaged as a blur circle. Coma - An aberration affecting the sharpness of images off the axis - caused by the fact that rays from an object point off the axis passing through a given circular zone of the lens come to a focus in a circle rather than a point, and the circles formed by rays through different zones are of different sizes and are located at different distances from the axis. The image of a point object is comet-shaped. Curvature of field - An aberration affecting the longitudinal position of images off the axis in such a manner that objects in a plane perpendicular to the axis are imaged, not on a plane, but on a curved or dish-shaped surface. Distortion - An aberration affecting the position of images off the axis, caused by the fact that objects at different angular distances from the axis, although imaged on a plane, undergo different magnifications; frequently referred to as Lens Distortion. (To avoid confusion with the photogrammetric term Distortion which has a different meaning - see Distortion Photogrammetry)

ABSOLUTE CEILING (Air Navigation) - The height in the standard atmosphere at which the rate of climb of an aircraft is reduced to zero. The maximum height above sea level at which a given airplane can maintain horizontal flight. Not ceiling. (See also Service Ceiling).

ABSOLUTE HUMIDITY - See Humidity

ABSOLUTE STEREOSCOPIC PARALLAX - See Parallax

ACCOMMODATION - The faculty of the human eye to adjust itself to give sharp images for different object distances.

ACHROMATIC LENS - Refers to a lens which has been partly corrected for chromatic aberration. Such a lens is customarily made to bring green and red light rays to approximately the same point focus. Also called an achromat.

ADAPTATION - The faculty of the human eye to adjust its sensitivity to varying intensities of illumination.

AERIAL CAMERA - See Camera

AERIAL MOSAIC - See Mosaic

AERIAL PHOTOGRAMMETRY - See Photogrammetry

AERIAL PHOTOGRAPH - A photograph of a portion of the earth's surface taken by a camera mounted in an aircraft.

AERIAL PHOTOGRAPHY - The art, science or process of taking aerial photographs.

AERIAL SURVEY - See Survey

AEROTRIANGULATION - Any type of triangulation for control extension accomplished by means of aerial photographs. (See also Radial Triangulation and Stereotriangulation.)

AERONAUTICAL CHART - A map especially designed for the aviator, on which, in addition to essential topography, are shown obstructions, aids to navigation, and other information to assist the aviator in navigating.

AIR BASE - (Photogrammetry) - The line joining two air stations or the length of this line. Photo Base - The length of the air base as represented on a photograph. Machine base - The length of the air base, as represented in a Stereo-plotting machine. See Camera Station.

AIR CO-ORDINATES - See Co-ordinates.

AIR SPEED - The velocity of an aircraft relative to the surrounding atmosphere.

level according to the standard atmosphere pressure-height relationship. Radio Altimeter - An instrument for determining aircraft flying height above terrain by time measurement of electromagnetic pulses.

Statoscope - A sensitive form of barometer used in aerial photography for measuring small differences in altitude between successive air stations.

Recording Statoscope - A statoscope equipped with a recording camera whose shutter is synchronized with that of the aerial camera.

ALTITUDE (Aerial Photography) - Vertical distance above the datum, usually mean sea level, to an object or point in space above the earth's surface.

ALTITUDE-CONTOUR RATIO - An empirical ratio between flight altitude and contour interval used to indicate the capability of stereoscopic plotters. The specified contour interval multiplied by the altitude-contour ratio of a given stereoscopic plotter will determine the flight altitude of photography which, when plotted with that instrument, will yield topographic maps fulfilling accepted accuracy standards. Also called C Factor.

AMICI PRISM - A prism which deviates the rays of light through 90° and, because of its shape, inverts the image. An Amici Prism is often called a Roof Prism. (See also definition of Roof Prism).

ANAGLYPH (Photogrammetry) - A picture resulting from the printing or projection of the two images of a stereoscopic pair in complementary colours and nearly in superimposition, so that a stereoscopic image is obtained by viewing it through spectacles having filters of the corresponding complementary colours.

ANALYTIC NADIR POINT TRIANGULATION - See Radial Triangulation.

ANALYTIC RADIAL TRIANGULATION - See Radial Triangulation

ANASTIGMATIC LENS - A lens which has been corrected for astigmatism and curvature of field. See also Aberrations.

ANEROID BAROMETER - See Barometer

ANGLE OF CONVERGENCE - See Parallax

ANGLE OF COVERAGE - The apex angle of the cone of rays passing through the front nodal point of a lens. Normal-angle Lens - A lens having an angle of coverage up to 75° ; Wide-angle Lens - A lens having an angle of coverage between 75° and 100° ; Super-wide-angle Lens - A lens having an angle of coverage greater than 100° . (See also Field of View under Aperture Stop)

ANGLE OF REFLECTION (Optics) - The angle measured from the normal at which a reflected ray of light leaves a surface.

ANGLE OF REFRACTION - See Refraction

ANGSTROM UNIT (Abbreviated A. U. or A) - A unit of measurement commonly used for the wave length of light equal to one ten-millionth of a millimetre; for example, the visible spectrum is said to extend from about 4,000 A to 7,000 A (0.0004 to 0.0007 mm)

ANGULAR CALIBRATION CONSTANTS - In a multiple lens camera, the interior orientation of the principal object axes of the several lens-camera units relative to a common origin of directions.

ANGULAR MAGNIFICATION - See Magnification.

ANGULAR PARALLAX - See Parallax.

ANGULAR PARALLAX DIFFERENCE - See Parallax.

ANGULATOR - An instrument used to convert angles measured on an oblique plane to their projections on a horizontal plane.

ANTIHALATION COATING - (Photogrammetry) - A light-absorbing coating applied to the back side of the support of a film or plate, or between the emulsion and the support, to suppress halation. (See also Halation.)

APERTURE - See Relative Aperture and Aperture Stop.

APERTURE STOP (Optics) - The physical element (such as a stop, diaphragm or a lens periphery) of an optical system which limits the size of the pencil of rays traversing the system. The adjustment of the size of the aperture stop of a given system regulates the brightness of the image without having any necessary effect upon the size of the area covered. Field Stop - The physical element (such as a stop, diaphragm, or lens periphery) of an optical system which limits the field of view covered by the system. Entrance Pupil - The image of the aperture stop formed by all the lens elements on the object side of the aperture stop. Exit Pupil - The image of the aperture stop formed by all the lens elements on the image side of the aperture stop. Entrance window - The image of the field stop formed by all the lens elements on the object side of the field stop. Exit Window - The image of the field stop formed by all the lens elements on the image side of the field stop. Field of View - (1) Optics: The angular coverage of a lens system. It is equal to the angle subtended by the diameter of the entrance window at the object.

is equal to twice the angle whose tangent is one-half the length of the diagonal (or diameter) of the photograph giving satisfactory definition, divided by the calibrated focal length of the camera.

APOCHROMATIC LENS - A lens which has been corrected for chromatic aberration for three colours.

APPARENT HORIZON - See Horizon

ARUNDEL METHOD - A combination of graphical and analytical methods for point by point topographical mapping from aerial photographs based on radial triangulation.

ASPHERICAL LENS - A lens in which the surfaces depart from a true spherical shape. For instance condenser lenses are sometimes ground with a parabolic surface, thus making possible a practical elimination of spherical aberration near the outer zones. With such a condenser it is possible to concentrate the light within a very small aperture. One type of multiplex projector is equipped with a condenser system of this nature.

ASTIGMATISM - See Aberration

ASTROLABE - An optical instrument for measuring altitudes of celestial objects, and generally employing a pool of mercury or a pendulum to determine the direction of the plumb line.

ASTRONOMIC STATION - A point on the earth whose position has been determined by observation on celestial bodies.

ASYMMETRICAL LENS - A lens which is not symmetrical. (See also Symmetrical Lens)

AUTOCOLLIMATOR - See Collimator

AUTOCOLLIMATION POINT - The point in the image plane of a camera which corresponds to that object-space direction which is perpendicular to the image plane. This point can be found directly with good accuracy and its position should always be determined during the calibration of a camera, since it provides a very sensitive test for changes which may have occurred in the camera since its previous calibration. The autocollimation point is often chosen as the principal point of the camera. (See Principal Point)

AUTO POSITIVE FILM and PAPER - A material which gives a positive print from a positive transparency (or a negative from a negative) by direct development. Also called Direct Copy or Direct Positive.

AXIS of HOMOLOGY (Projective Geometry) - The intersection of two projectively related planes. (Photogrammetry) - The intersection of the plane of the photograph (or negative) with the horizontal plane of the map or the plane of reference of the ground. Corresponding lines in the photograph and map planes intersect on the axis of homology. Also called the Axis of Perspective.

AXIS of PERSPECTIVE - See Axis of Homology

AXIS of TILT - See Principal Plane

BACK FOCAL DISTANCE - See Focal Length

BAROMETER - An instrument for measuring the pressure of the atmosphere. Aneroid Barometer - A hollow corrugated metal box from which the air has been partially exhausted and the walls of which are so thin that it will change its form when the air pressure changes. Most aneroids have two scales; one graduated in pressure units and the other in altitude in accordance with a recognized law. Mercury Barometer - Basically a vertical glass tube containing mercury; the upper end of the tube is closed so as to form a vacuum above the mercury and the lower end rests in a suitable cup, the column of mercury being sustained by the pressure of the atmosphere against the mercury in the cup. A suitable scale indicates ambient atmosphere pressure.

BAROMETRIC ELEVATION - An elevation which has been determined with a barometer. (See also Elevation)

BASAL COPLANE - See Coplane

BASAL ORIENTATION - The establishment of the position of both ends of an air base with respect to a ground system of co-ordinates. In all, six elements are required. These are essentially the three dimensional co-ordinates of each end of the base. In practice, however, it is also convenient to express these elements in one of two alternative ways. (1) The ground rectangular co-ordinates of one end of the base and the difference between the ground rectangular co-ordinates of the ends of the base. (2) The ground rectangular co-ordinates of one end of the base, the length of the base and two elements of directions such as Base Direction and Base Tilt. Base Direction - The direction of the vertical plane containing the air base which might be expressed as a bearing or an azimuth. Base Tilt - The inclination of the air base to the horizontal.

BASAL PLANE - See Epipoles

BASE-HEIGHT RATIO - The ratio (B:H) between the air base length and the flight height of a stereoscopic pair of photographs. This ratio commonly varies from 1/3 for normal

BASE LINE (Photogrammetry) - A radial point from the principal point, isocentre, or nadir point of a photograph which represents the direction to a similar point of an adjacent photograph in the same flight line, used extensively in radial triangulation.

BASE MAP - See Map

BASE TILT - See Basal Orientation

BEAM OF LIGHT - See Ray of Light

BETWEEN-THE-LENS SHUTTER - See Shutter

BINOCULAR VISION - See Stereoscopy

BRIDGING (Photogrammetry) - The extension and adjustment of photogrammetric surveys between bands of ground control.

BRIGHTNESS SCALE (Photography) - The ratio of the brightness of high-lights to the deepest shadow in the actual terrain as measured from the camera station in the field of view under consideration.

C FACTOR - See Altitude-contour Ratio

CADASTRAL MAP - See Map

CADASTRAL SURVEY - A survey relating to land boundaries and subdivisions, made to create units suitable for transfer or to define the limitations of title. Derived from "cadastre" meaning register of the real property of a political subdivision with details of area, ownership and value.

CALIBRATED FOCAL LENGTH - See Focal Length

CALIBRATED INTERIOR PERSPECTIVE CENTRE - The point outside the image plane of a camera which is such that if lines are drawn from it to the positions of image points, corrected by the distortions given in the distortion curve, then these lines, when produced beyond the calibrated interior perspective centre, will constitute an array of directions which is identical with the original array of object space directions which correspond to those image points. That is, the distortion free positions of points in the image plane constitute a perspective projection of the object points onto the image plane, the exterior perspective centre being regarded as the centre of projection for the object space, and the calibrated interior perspective centre being regarded as the centre of projection for the image plane. The perpendicular distance from the calibrated interior perspective centre to the image plane is the calibrated

See Calibrated Focal Length under Focal Length and Principal Point.

CALIBRATION - The act or process of determining certain specific measurements in a camera or other instrument or device for comparison with a standard or for purposes of record.

Camera Calibration - The determination of the calibrated focal length, together with a statement of the criterion used to establish it, the location of the autocollimation point with respect to the fiducial centre, the location of the principal point, together with a statement of the criterion used to define it, the resolution of the lens, the degree of flatness of the focal plane, and the lens distortion referred to the particular calibrated focal length and principal point. The setting of the fiducial marks and the positioning of the lens are ordinarily considered as "adjustments" although they are sometimes performed during the calibration process.

CALIBRATION CONSTANTS - The results obtained by calibration, which give the relationship of the principal point to the fiducial marks of a camera, and the calibrated focal length of the lens-camera unit.

CALIBRATION PLATE - A glass negative exposed with the emulsion side in the same position as will be the emulsion on the film at the moment of exposure. Such a plate is a record of the distance between the fiducial marks of the camera, sometimes called Master Glass Negative or Flash Plate.

CALIBRATION TEMPLATE (Photogrammetry) - A template of glass, celluloid, or metal made in accordance with the calibration constants to show the relation of the principal point of a camera to the fiducial marks. Used for the rapid and accurate marking of principal points on a series of photographs. Also in the case of a multiple lens camera, a template prepared from the calibration data used in assembling the individual photographs into one composite photograph.

CAMERA - A chamber or box in which the images of exterior objects are projected upon a sensitized surface. Aerial Camera - A camera specially designed for use in aircraft. The prefix aerial is not essential where the context clearly indicates the use of an aerial camera rather than a ground camera. Continuous Strip Camera - A camera in which a continuous strip exposure is made by rolling the film continuously past a narrow slit opening, at a speed proportional to the speed of the aircraft. Horizon Camera (Aerial Photography) - A camera used in conjunction with an Aerial Surveying Camera in vertical photography, to photograph the horizon simultaneously with the vertical photographs. The horizon photographs indicate the tilts of the vertical photographs. Mapping Camera or Surveying Camera - A camera specially designed for the production of photographs to be used in surveying. The prefix mapping or

orientation of the photographs with sufficient accuracy for surveying purposes. A mapping camera may be an aerial mapping camera or terrestrial mapping camera. Multiple Camera Assembly - An assembly of three or more cameras mounted so as to maintain a fixed angle between their respective optical axes. Multiple Lens Camera - A camera with two or more lenses, the axes of the lenses being systematically arranged at a fixed angle in order to cover a wide field by simultaneous exposures in all chambers. Usually in such cameras the oblique lenses are arranged symmetrically around a central lens. In some multiple lens cameras the axes of all the lenses are vertical and images are projected onto a single film, the obliquity of the side photographs being obtained by mirrors or prisms in front of the side lenses. Several types of multiple lens cameras are the three-, four-, five-, seven-, and nine-lens aerial cameras. Prints are made from the oblique negatives of a multiple lens camera by projection in a transforming printer which projects the oblique images into a common plane. The transforming printer is usually designed specially for a particular multiple lens camera. The transformed photographs are assembled to form one composite photograph equivalent to photograph taken with a single wide angle lens. In some cases both the transformation and assembly of the separate photographs are performed by the transforming printer. Panoramic Camera - A camera which takes partial or complete panorama of the terrain. Some designs utilize a lens which revolves about a vertical axis; in other designs the camera itself is revolved by clock-work to obtain a 360° panoramic field of view. Photogrammetric Camera - A general term applicable to any camera used in any of the several branches of photogrammetry. Precision Camera - A relative term used to designate any camera capable of giving dimensional and definition results of a definite high order of accuracy. Single Lens Camera - A camera having only one lens. Stereometric Camera - A combination of two cameras mounted with parallel axes on a short rigid base, used in terrestrial photogrammetry for making photographs in stereoscopic pairs. Terrestrial Camera - A camera designed for use on the ground. See Phototheodolite. Trimetrogon Camera - An assembly of three cameras equipped with wide angle "Metrogon" lenses, in which one of the cameras is vertical and the other two are 60° obliques.

CAMERA AXIS - See Principal Object Axis

CAMERA CALIBRATION - See Calibration

CAMERA LUCIDA - A monocular instrument using a half-silvered mirror or the optical equivalent thereof to permit superimposition of a rectified virtual image of a photograph over a map manuscript.

CAMERA STATION (Photogrammetry) - The point in space, in the air or on the ground, occupied by the camera lens at the moment of exposure. Also called the Exposure Station.

CARDAN LINK - A universal joint. An optical Cardan Link is a device for universal scanning about a point.

CARTOGRAPHER - One who practices the science or the art of cartography.

CARTOGRAPHIC - Of or pertaining to cartography.

CARTOGRAPHY - The science and art of expressing graphically, by means of maps and charts, the known physical features of the earth's surface, and often including the works of man and his varied activities; specifically, cartography is the art of map construction and the science upon which it rests. It combines the achievements of the astronomer and mathematician with those of the explorer and the surveyor in presenting a picture of the physical characteristics of the earth's surface. It invariably includes assembly, evaluation, selection and rejection of data.

CELLULOID TEMPLATE - See Template

CENTRAL PROJECTION - See Perspective Projection

CENTRE OF PROJECTION - See Perspective Projection

CHARACTERISTIC CURVE (Photography) - The curve showing the relationship between exposure and resulting density in a photographic image. It is usually plotted as the density against the log exposure in candle-metre-seconds. Called also the "H and D. curve" and the "sensitometric curve". Density - A measure of the degree of blackening of an exposed film, plate or paper after development, or of the direct image in the case of a print-out material. It is defined strictly as the logarithm of the optical opacity where the opacity is the ratio of the incident to the transmitted (or reflected) light. It varies with the use of scattered or specular light. Gamma - The tangent of the angle which the straight line part of the characteristic curve makes with the log exposure axis. It indicates the slope of the straight line part, and is a measure of the extent of development and the contrast of the photographic material. Speed (film, plate or paper) - The response or sensitivity of the material to light often expressed numerically according to one of several systems, e.g. H. and D., D.I.N., Scheiner and A.S.A. exposure index. See Relative Aperture. Gradient - The slope of the characteristic curve at any point. Gradient Speed - The speed of a photographic material determined on the basis of the exposure corresponding to a particular gradient of the characteristic curve. (See also Contrast Exposure, Exposure Scale, Brightness Scale)

CHART - See Nautical Chart and Aeronautical Chart

CIRCLE OF CONFUSION (Optics) - The circular image of distant point object as formed in a focal plane by a lens. A distant point object (e.g. a star) is imaged in a focal plane of a lens as a circle of finite size which may be caused by (1) the focal plane not being placed at the point of sharpest focus, (2) the effect of certain aberrations, (3) diffraction at the lens, (4) the grain of a photographic emulsion, or (5) poor workmanship in the manufacture of the lens, etc.

CLINOMETER - A simple field instrument used for evaluation of gradient by angular measurement or directly as a slope ratio.

COATED LENS - A lens whose air-glass surfaces have been coated with a thin transparent film of such thickness and index of refraction as to minimize the light loss by reflection. The reflection loss of uncoated lenses amounts to about 4 per cent per air-glass surface.

COLLIMATE (Physics and Astronomy) - To render parallel to a certain line or direction; to render parallel, as rays of light; to adjust the line of sight or lens axis of an optical instrument so that it is in its proper position relative to the other parts of the instrument. (Photogrammetry) - To adjust the fiducial marks of a camera so that they define the principal point. (See also Calibration).

COLLIMATING MARKS - See Fiducial Marks

COLLIMATOR - An optical device for artificially creating a target at infinite distance (a beam of parallel rays of light) used in testing and adjusting certain optical instruments. It usually consists of a converging lens and a target (a system or arrangement of cross hairs) placed at the principal focus of the lens. Auto Collimator - A collimator provided with a means of viewing and illuminating its cross hairs in such a manner that when a reflecting plane is placed normal to the emergent light beam, the reflected image of the cross hairs will appear to be co-incident with the cross hairs themselves. This device is used in the calibration of optical and mechanical instruments.

COLOUR PHOTOGRAPHY - Photography utilizing either direct-positive or negative-positive colour processes.

COMA - See Aberration

COMMON SCALE STRIP - A term used in Great Britain and Canada in graphical methods of plotting aerial photography to define the plot of a strip of vertical aerial photographs whose scale is adopted as standard for compilation purposes. Plots of adjacent parallel strips are then brought to this standard scale by means of the extreme lateral control points in the common overlap.

COMPARATOR - An optical instrument, usually precise, for measuring rectangular or polar co-ordinates of points on any plane surface, such as a photographic plate.

COMPILATION - The gathering together of source material such as existing maps, photographs, surveys, etc., and the symbolization on a map of the physical and cultural features of the earth or a section thereof as defined by the source materials. (See also Delineation)

COMPLEMENTARY COLOURS (Optics) - Two colours are said to be complementary if when added together, such as by projection, they produce subjective white light.

COMPOSITE PHOTOGRAPH (Aerial Photography) - A photograph made by assembling the separate photographs made by each lens of a multiple-lens camera during the same simultaneous exposure into the equivalent of a photograph taken with a single wide-angle lens. (See also Multiple Lens Camera under Camera)

CONDENSER (Optics) - A lens, mirror, or systems of lenses or mirrors used to concentrate light from a light source upon a limited area. A reflector of ellipsoidal shape having the light source concentrated at one of its foci is optically equivalent to a condenser lens system.

CONIC PROJECTION - See Perspective Projection

CONJUGATE DISTANCES - The corresponding distances of object and image from the nodal points of the lens.

CONJUGATE IMAGE POINT - The images on two (or more) overlapping photographs of a single object point. (See also Corresponding Images)

CONJUGATE IMAGE RAYS - Rays connecting each of a set of conjugate image points with its particular perspective centre.

CONJUGATE PRINCIPAL POINT - See Conjugate Image Point

CONTACT PRINT - See Print

CONTINUOUS STRIP CAMERA - See Camera

CONTOUR (Line) - An imaginary line connecting the points on a land surface that have the same elevation; also the line representing this on a map or chart. Depression Contour - A closed contour inside of which the ground is at a lower elevation than outside. (See also Form Line).

CONTOUR MAP - See Map

CONTRAST (Optics) - A measure of the variation of illumination in an image. It is expressed by the ratio of the variation of the illumination from its average over the field to this average value.

CONTRAST (Photography) - The actual difference in density between the highlights and the shadows on a negative or paper. Contrast is not concerned with the magnitude of density but only with the difference in densities. Also the rating of a photographic material corresponding to the relative density difference which it exhibits. (See also Density under Characteristic Curve).

CONTROL - A system of relatively accurate measurements to determine the distances and directions or differences in elevation between points on the earth, as by astronomic observations, triangulation, traverse, levels or by electronic devices, and upon which depends a system of lesser accuracy. The accuracy of the control is usually described as first-order, second-order, third-order, or fourth-order. Horizontal Control - Control which determines horizontal positions only, as with respect to parallels and meridians, or to other lines of reference. Vertical Control - Control which determines positions with respect to elevations only, specifically levelling. Astronomic Control - Control determined from astronomic observation. Geodetic Control - Control which takes into account the size and shape of the earth. Geodetic Control - implies a reference spheroid and horizontal and vertical control datums. Ground Control - In photogrammetry, control obtained by ground surveys as distinguished from control obtained by photogrammetric methods. As for example, first, second, or third-order triangulation or traverse are used to control the photogrammetric plot which in turn establishes more intensive but less accurate control for the map detailing. Photogrammetric Control - Control established by photogrammetric methods as distinguished from control established by ground methods.

CONTROL POINT (Photogrammetry) - Any station in a horizontal and/or vertical control system that is identified on a photograph and used for correlating the data shown on that photograph, also called Photo Control Point and Ground Control Point.

CONTROL STRIP (Aerial Photography) - A strip of aerial photographs taken to aid in planning and accomplishing later aerial photography, or to serve as control in assembling other strips.

CONTROLLED MOSAIC - See Mosaic

CONVERGENCE - See Angle of Convergence under Parallax

COVERGING LENS - See Positive Lens

CO-ORDINATES (Surveying and Mapping) - Linear or angular quantities which designate the position which a point occupies in a given reference frame or system. Also used as a general term to designate the particular kind of reference frame or system, as Plane Rectangular Co-ordinates, Spherical Co-ordinates etc. Plane-rectangular Co-ordinates (also called simply Plane Co-ordinates) - A system or co-ordinates in a horizontal plane, used to describe the positions of points with respect to an arbitrary origin by means of two distances perpendicular to each other. The two reference lines at right angles to each other passing through the origin are called the co-ordinate axes. The distances parallel to the true, or arbitrarily assigned, north-south axis are called the ordinates, the y co-ordinates, or the total latitudes. The distances parallel to the true, or arbitrarily assigned, east-west axis are called the abscissas, the x co-ordinates or the total departures. A plane-rectangular co-ordinate system is used in mapping areas of such limited extent that the errors introduced by substituting a plane for the curved surface of the earth will be within the required order of accuracy. In mapping, the north and east directions are positive and the south and west directions are negative. In practice, therefore, in order to avoid the use of negative co-ordinates the origin of the system is usually chosen to be a point to the southwest of the area being mapped, or its co-ordinates instead of being zero are assigned large positive numbers. The great merit of a rectangular-co-ordinate system is that computations involving positions of points thereon may be performed by the use of plane trigonometry. Plane-rectangular co-ordinates may or may not be adjusted to a map projection. Grid Co-ordinates - A plane rectangular co-ordinate system based on and mathematically adjusted to a map projection in order that geographic positions (latitudes and longitudes) may be readily transformed into plane co-ordinates and the computations relating to them made by the ordinary methods of plane surveying. The Transverse Mercator Projection is used for zones of predominant north-south extent and of limited east-west extent. Polar Co-ordinates - A system of co-ordinates used to describe the position of a point in space with respect to an arbitrarily chosen origin by means of two directions and one distance, i.e., the vectorial angles and radius vector. Any plane containing the polar axis may be called a meridional plane, and the plane perpendicular to the polar axis containing the origin is called the equatorial plane or equator. As any point must lie on a meridional plane, one co-ordinate of a point in this system is the angle formed by the intersection of its meridional plane with the reference meridional plane. This is called the polar angle or polar bearing. The second co-ordinate of a point is the angle in its meridional plane subtended at the origin between the line to the point and the polar axis. This angle is called the polar distance and its complement, the angle between the line to the point and the equator, is the declination. The third co-ordinate is the distance between the origin and the point. Plane Polar Co-ordinates - A system of polar co-ordinates in which the points

Spherical Co-ordinates - A system of polar co-ordinates in which the origin is the center of a sphere and the points all lie on the surface of the sphere. The polar axis of such a system cuts the sphere at its two poles. In photogrammetry, spherical co-ordinates are useful in defining the relative orientation of perspective rays or axes and make possible the stating and solving in simple forms of many of the problems connected therewith. For example, as used in the determination of the exterior orientation of a single photograph, the origin is the air station and the polar axis is the vertical. The polar bearing is the horizontal bearing (azimuth) of the principal plane and the polar distance is the tilt. In the determination of the relative orientation between pairs of photographs by the method originated by Fourcade, the polar axis of the co-ordinate system is the air base and the origin is one of the air stations. A meridional plane in this case is called a basal or epipolar plane and the reference meridional plane may be arbitrarily chosen but is usually the vertical.

Geographic Co-ordinates - A system of spherical co-ordinates for describing the positions of points on the Earth. The declinations and polar bearings in this system are the latitudes and longitudes, respectively.

Photograph Co-ordinates (Photogrammetry) - A system of co-ordinates either rectangular or polar to describe the position of a point on a photograph. If a two dimensional system is used the origin is usually the principal point but it may be the nadir point, isocentre, one of the fiducial marks, or in high oblique photography the intersection of the horizon and principal line. The co-ordinate axes are usually either the fiducial axes, or the principal line and a photograph parallel. If a three dimensional system is used the origin is either the principal point or the perspective centre.

Space Co-ordinates (Photogrammetry) - A three dimensional system of rectangular co-ordinates in which the x and y co-ordinates lie in a reference plane tangent to the earth at a selected point and the z co-ordinate is perpendicular to that plane. Used in the extension of horizontal and vertical control through a series of overlapping vertical photographs from an initial point which is the point of tangency of the reference plane. When these co-ordinates are corrected to allow for the curvature of the earth they cease theoretically to be true space co-ordinates because the x and y co-ordinates become distances along great circles at right angles to each other and the z co-ordinates are distances perpendicular to the vertical control datum. The use of the term space co-ordinates therefore should be strictly limited to a three dimensional rectangular co-ordinate system which has not been adjusted to the vertical and horizontal control datums.

Air Co-ordinates (Photogrammetry) - The space co-ordinates of any point imaged on an overlapping pair of photographs which define its position with reference to the air base. They correspond in respect to the position of origin and direction of axes to a system of spherical co-ordinates in which an air base is the polar axis. Consequently one such system as suggested by Fourcade can be defined as follows: Origin: the left-hand air station. X-axis: The line of the air base to the right. Z-axis: The line perpendicular to the X-axis, in the basal plane containing the principal point of the left-hand photograph. The ground is considered as being in the negative direction. Y-axis: The line perpendicular to the X and Z

Strip Air Co-ordinates - The air co-ordinates of any point in a strip, whether on the ground or actually an air station, referred to the origin and axes of the air co-ordinate system of the first overlap.

CO-ORDINATOGRAPH - A device usually driven by a stereoscopic plotting instrument which is used to plot in map form the planimetric motions (X and Y) of the floating mark of the plotting instrument. When detached from the driving instrument the co-ordinatograph may be used to plot horizontal control data given in plane co-ordinates.

COPLANAR - Lying in the same plane. Basal Coplane (Photogrammetry) - The condition of exposure of a pair of photographs whereby the two photographs lie in a common plane parallel to the air base. If the air base is horizontal the photographs are said to be exposed in Horizontal Coplane.

CORRESPONDENCE (Stereoscopy) - The condition that exists when corresponding images on a pair of photographs lie in the same epipolar plane; the absence of y-parallax. (See also Want of Correspondence)

CORRESPONDING IMAGES - A point or line in one system of points or lines homologous to a point or line in another similar system; for example, corresponding image points, usually called Conjugate Points, are the images on two or more photographs of the same object point.

COURSE (Air Navigation) - The direction in which a pilot attempts to fly an aircraft; the line drawn on a chart or map as the intended track. Its direction is always measured in degrees from the true meridian and the true course is always meant unless it is otherwise qualified as a magnetic or compass course. (See also Track)

CRAB (Air Navigation) - Any turning of an aeroplane which causes its longitudinal axis to vary from the track of the aeroplane. (Aerial Photography) - The condition caused by failure to orient the camera with respect to the track of the aeroplane as indicated in vertical photography by the edges of the photographs not being parallel to the air base lines.

CRABBED PHOTOGRAPH (Aerial Photography) - See Crab

CRITICAL ANGLE (Optics) - The angle of incidence beyond which total internal reflection of a ray takes place when passing from a medium of higher refraction index to a medium of lower index. The angle is expressed by the equation: $\sin A = N/N'$ where A is the critical angle, N is the higher index of refraction and N' is the lower index of refraction.

CULTURE (Mapping) - Those features of the terrain that have been constructed by man such as roads, tracks, buildings, and

CURVATURE OF FIELD - See Aberration

CYLINDRICAL LENS - A lens in which the surfaces are segments of cylinders.

DARK SLIDE - A thin plate, usually metal or fibre, rigid or flexible, which after insertion in a camera magazine renders it light tight. The employment of dark slides makes it possible to interchange camera magazines in daylight.

DATUM, HORIZONTAL CONTROL DATUM - The position of the spheroid of reference assigned to the horizontal control (Triangulation and Traverse) of an area and defined by (1) the position (Latitude and Longitude) of one selected station in the area, and (2) the azimuth from the selected station to an adjoining station. The horizontal control datum may be for a continent or a small area. A datum for a small area is usually called a Local Datum and is given a proper name. Vertical Control Datum - Any level surface, as for example mean sea level, taken as a surface of reference from which to reckon elevations. Also called the Datum Level. Although a level surface is not a plane, the vertical control datum is frequently referred to as the Datum Plane. See Geoid. Horizontal Plane - A plane perpendicular to the direction of gravity; any plane tangent to the geoid or parallel to such a plane. (See also Ground Plane, Map Plane and Hill Plane)

DATUM LEVEL - See Geoid.

DATUM PLANE - See Geoid

DECLINATION (Geometry) - In a system of polar or spherical coordinates the angle at the origin between a line to a point and the equatorial plane, measured in a plane perpendicular to the equatorial plane. Also the arc between the equator and the point measured on a great circle perpendicular to the equator. (See also Magnetic Declination)

DEFINITION (Optics) A vague term describing the image quality produced by the lens. Strehl definition - A measure of the image quality produced by a lens defined as the value of the illumination at the centre of the (diffraction pattern) image of a point object as given by the lens divided by the corresponding illumination given by a lens free from all aberrations. See also Resolving Power.

DELINEATION (Cartography) - The distinguishing of map worthy-features on various possible source materials by outlining the features on the source material or by visual selection as when operating a stereoscopic plotting instrument; also an advanced step in compilation. Photodelineation - The delineation of features on a photograph. (See also Compilation)

DENSITY - See Characteristic Curve

DEPRESSION ANGLE - The complement of the angle of tilt.

DEPRESSION CONTOUR - See Contour

DETAILS (Mapping) - The small items, or particulars of information shown on the map by lines, symbols, and lettering which when considered together, as a whole, furnish the comprehensive representation of the physical and cultural features. The greater the omission of details the more generalized is the map.

DEVELOP and DEVELOPMENT (Photography) - To subject to the action of chemical agents for the purpose of bringing to view the invisible or latent image produced by the action of light on a sensitized surface; also, to produce or render visible in this way.

DIAPOSITIVE (Photogrammetry) - A positive photographic print on a transparent medium, usually on glass. The term is generally used to refer to a transparent positive on a glass plate used in a plotting instrument, a projector or a comparator.

DIFFERENTIAL SHRINKAGE (Mapping) - The difference in unit contraction along the grain structure of the material as compared to the unit contraction across the grain structure; frequently applied to photographic film and papers and to mapping papers in general.

DIFFRACTION (Optics) - The spreading of light-waves beyond the edges of opaque objects. Due to diffraction a point of light seen or projected through a circular aperture will always be imaged as a bright centre surrounded by light rings of gradually diminishing intensity. Such a pattern is called a diffraction pattern.

DIFFUSE REFLECTION - The type of reflection obtained from a relatively rough surface (such as a matte photographic print) in which the reflected rays are scattered in all directions.

DIOPTRE - A unit of measurement of power of lenses, especially spectacle lenses. The power in diopters equals the reciprocal of the focal length in metres, thus a lens whose focal length is 20 cm, has a power of 5 dioptres.

DIP ANGLE - The vertical angle at the exposure station between the true horizon and a ray to the apparent horizon.

DIRECTION OF FLIGHT - See Course and also Track

DIRECTION OF TILT - The direction (Azimuth) of the principal plane

DIRECT RADIAL TRIANGULATION - See Radial Triangulation

DIRECT RADIAL PLOT - See Radial Triangulation

DISPERSION (Optics) - The variation of the refractive index of a transparent material with the colour of the light measured as the difference between the refractive indices for red and blue light.

DISPLACEMENT - The movement of images on a photograph from their true relative positions. Relief Displacement - Displacement radial from the Nadir Point of the photograph caused by differences in elevation of the corresponding ground objects. Tilt Displacement - Displacement radial from the isocentre of the photograph caused by the tilt of the photograph.

DISTORTION (Optics) - See Aberration

DISTORTION (Photogrammetry) - Departure of the geometry of the image, produced by a camera, from the geometry of a perspective projection of the same object, the centre of projection being the point occupied by the exterior perspective centre of the camera lens. See Perspective Centre. If the camera is free from manufacturing imperfections, i.e. if it possesses perfect axi-symmetry, then the distortion consists of a displacement of the image points radially away from, or towards, the autocollimation point, the magnitude of the displacement being the same for all points at the same radial distance from the autocollimation point. See Autocollimation Point. Thus the distortion, v , is given by

$$v = r - f \tan \alpha$$

where α is the angle between the object-space directions corresponding to the autocollimation point and the image point,

f is the focal length of the camera,

and r is the radial distance of the image point from the autocollimation point, which is thus taken as the principal point in this case. See Principal Point

In general, however, a real camera will not possess perfect axi-symmetry and the displacement will no longer necessarily be radial about the autocollimation point; neither will it necessarily be the same for all points at the same distance from the autocollimation point. Thus the autocollimation point loses its pre-eminence in the geometry of the image, and some other point may be chosen as principal point. The distortion at any point, which must now be regarded as a vector quantity, is often resolved into components along, and perpendicular to, the line joining the given point to the principal point. The latter component is called the Tangential Distortion, while the former is called the Radial Distortion or simply the Distortion. The radial distortion is still given by the above formula where, now, r is the distance from the image point to the principal point, and α is the angle between the object-space directions

DISTORTION CURVE - A curve representing the distortion characteristics of the camera. It is plotted with image radial distance or object space angle as abscissae, and radial distortion as ordinates. The shape of the curve will depend on the point chosen as principal point, (see Principal Point) and the value of f chosen as the focal length of the camera in the equation for distortion, $v = r - f \tan \alpha$. See Distortion. The value of f is often chosen so that the distortion curve satisfies some given condition, in which case it is called the calibrated focal length of the camera. See Calibrated Focal Length under Focal Length. The position of the principal point is often chosen so that the distortion curve for a diagonal of the image plane is symmetrical at some given zone, in which case it is called the point of symmetry. See Point of Symmetry.

DIVERGING LENS - See Negative Lens

DOVE PRISM - A prism which performs a reversion of the image but does not deviate nor displace the beam. A given angular rotation of the prism about its longitudinal axis causes the image to rotate through twice the angle. Also called a Rotating Prism.

DRIIFT - The horizontal displacement of an aircraft under the action of the wind from the track it would have followed in still air.

ELEVATION - Vertical distance from the datum, usually mean sea level, to a point or object on the earth's surface. Not to be confused with altitude which refers to points or objects above the earth's surface.

EMERGENT NODAL POINT - See Nodal Point (Optics)

EMULSION (Photography) - A suspension of a light-sensitive silver salt, especially silver chloride or silver bromide, in a colloidal medium, usually gelatine, used for coating photographic films, plates or papers.

ENLARGING LENS - See Process Lens

ENTRANCE PUPIL - See Aperture Stop

ENTRANCE WINDOW - See Aperture Stop

EPIPOLAR PLANE - See Epipoles

EPIPOLAR RAY - See Epipoles

EPIPOLES - In the perspective setup of two photographs (two perspective projections) the points on the planes of the photographs where they are cut by the air base (extended

Epipolar Plane - Any plane which contains the epipoles; therefore, any plane containing the air base. Also called Basal Plane. Epipolar Ray - The line on the plane of a photograph joining the epipole and the image of an object. Also expressed as the trace of an epipolar plane on a photograph.

EQUATOR (Geometry) - In a system of polar or spherical co-ordinates, the great circle of a sphere cut by a plane which is perpendicular to the polar axis through the centre of the sphere.

EQUATOR TRACE - The trace on a photograph of an equatorial plane passing through the former's perspective centre.

EQUIVALENT FOCAL LENGTH - See Focal Length

EXIT PUPIL - See Aperture Stop

EXIT WINDOW - See Aperture Stop

EXPOSURE (Photography) - The total quantity of light received per unit area which may be expressed as the product of the illumination and exposure time, such as metre-candle-seconds. Also used to mean the act of exposing a section of film, and exposure time.

EXPOSURE INTERVAL - The time permitted to elapse between successive exposures. Exposure Scale (Photography) - The useful exposure scale is the ratio of the maximum exposure to the minimum exposure between which the emulsion yields satisfactory reproduction.

EXPOSURE STATION - See Camera Station

EXTENSION OF CONTROL - See Aerotriangulation

EXTERIOR ORIENTATION - See Orientation

EXTERIOR PERSPECTIVE CENTRE - See Perspective Centre

EYE BASE - The distance between the centres of rotation of the eyeballs of an observer, sometimes called Inter-pupillary Distance or Interocular Distance.

EYEPIECE - In a telescope or microscope, the lens group nearest the eye, with which the image formed by preceding lenses is viewed.

FAIR DRAWING - Final drawings of a map for reproduction.

the line of flight. See also Photograph Co-ordinates under Co-ordinates

FIDUCIAL CENTRE - The point of intersection of the fiducial axes.

FIDUCIAL MARKS (Photogrammetry) - Index marks, usually four, rigidly connected to the camera lens through the camera body, and forming images on the negative; the images so formed. The fiducial marks define the fiducial axes with reference to which the positions of the autocollimation point, point of symmetry, etc., are given. Also, those marks, usually four in number, in any instrument which define the axes whose intersection fixes the principal point of a photograph or negative placed therein, and fulfil the requirements of interior orientation. (see also Collimating Marks).

FIELD INSPECTION (Photogrammetry) - The process of comparing aerial photographs with conditions as they exist on the ground and of obtaining information to supplement or clarify that not readily discernible on the photographs themselves.

FIELD OF VIEW - See Aperture Stop

FIELD STOP - See Aperture Stop

FILM BASE (Photography) - A thin, flexible, transparent sheet of cellulose nitrate or acetate or similar material which is coated with a light-sensitive emulsion and used for taking photographs.

FILM PRESSURE PLATE - See Pressure Plate

FILTER - Any transparent material which absorbs a range of wavelengths in the spectrum, such as for use in the optical path of a camera lens to prevent certain portions of the spectrum from reaching the sensitized negative.

FIX OR FIXATION (Photography) - To render a photographic emulsion permanent by removing the unaffected light-sensitive material. Ground Surveying - A position established on the ground by astronomical observation or other means which may serve as a control point.

FLAT - See Optical Flat

FLICKER METHOD - The alternate projection of conjugate photographic images onto the screen of a plotter or into the eye-piece of a comparator.

FLIGHT ALTITUDE - The vertical distance above a given datum of an

FLIGHT CEILING - See Service Ceiling

FLIGHT LINE - A line drawn on a map or chart to represent the track of the aircraft.

FLIGHT MAP - The map on which are indicated the desired lines of flight and/or the positions of exposure previous to the taking of air photographs, or the map on which are plotted, after photography, selected air stations and the tracks between them.

FLIGHT STRIP - A succession of overlapping aerial photos taken along a single course.

FLOATING MARK (Photogrammetry) - A mark seen as occupying a position in the three dimensional space formed by the stereoscopic fusion of a pair of photographs and used as a reference mark in examining or measuring the stereoscopic model. The mark may be formed (1) by one real mark lying in the projected object space; (2) by two real marks lying in the projected or virtually projected object spaces of the two photographs; (3) by two real marks lying in the planes of the photographs themselves; (4) by two virtual marks lying in the image planes of the binocular viewing apparatus. Index Mark (Photogrammetry) - A real mark such as a cross or dot lying in the plane or the object space of a photograph and used singly as a reference mark in certain types of monocular instruments or as one of a pair to form a floating mark as in certain types of stereoscopes.

FLYING HEIGHT - See Flight Altitude

FOCAL LENGTH - Equivalent Focal Length. - The perpendicular distance from the interior perspective centre to the image plane when the camera is focussed for best average definition over the entire field. Calibrated Focal Length. - The perpendicular distance from the calibrated interior perspective centre to the image plane, the calibrated interior perspective centre being selected so as to cause the distortion curves to satisfy some given condition. See Calibrated Interior Perspective Centre. Back Focal Distance. - The perpendicular distance from the rear vertex of the lens (i.e. the rearmost point of the rear lens surface) to the plane of best average definition. This value is used in setting the lens in the aerial camera. Principal Distance. - A geometrical property of a particular finished negative or print. This distance is equal to the calibrated focal length of the aerial camera used corrected for both the enlargement or reduction ratio and the film or paper shrinkage or expansion, and maintains the same perspective angles at the interior perspective centre, to points on the finished negative or print, as existed in the taking camera at the calibrated interior perspective centre at the moment of exposure.

FOCAL PLANE (Aerial Photography) - See Image Plane Focal Plane

the film in the focal plane when the film is mechanically pressed into contact with the glass plate. Also known as Register Glass.

FOCAL PLANE PLATE - See Focal Plane

FOCAL PLANE SHUTTER - See Shutter

FOCAL POINT - The point toward which rays of light converge to form an image after passing through a lens.

FORM LINES - Lines having the same appearance as contour lines but which show the shape of the terrain rather than the elevation. (See also Contour).

FORWARD LAP - See Overlap

FRONT NODAL POINT - See Nodal Point (Optics)

FUSION - See Stereoscopic Fusion under Stereoscopy

GAMMA - See Characteristic Curve

GAP - (Aerial Photography) - Any space where aerial photographs fail to meet minimum coverage requirements. This might be a space not covered by any photograph or a space where the minimum specified overlap was not obtained.

GEODESY - The science which treats of the determination of the size and figure of the earth (geoid) by direct measurements as triangulation, levelling, gravimetric observations. The applied science of geodesy is called geodetic surveying, i.e. surveying which takes account of the figure and size of the earth.

GEODETTIC CONTROL - See Control

GEODETTIC SURVEYING - See Geodesy

GEOGRAPHIC CO-ORDINATES - See Co-ordinates

GEOID - The figure of the earth considered as a sea-level surface extended continuously through the continents. The actual geoid is an equi-potential surface to which, at every point, the plumb line (direction in which gravity acts) is perpendicular. It is the geoid which is obtained from observed deflections of the vertical and is the surface of reference for astronomical observations and for geodetic levelling. Reference Spheroid - A spheroid determined by revolving an ellipse about its shorter (polar) axis and used as a base for geodesy.

various considerations of the section of the earth's surface concerned. Level Surface - A surface which is at every point perpendicular to the direction of gravity; the geoid, or in general, any surface parallel thereto. The surface of the sea, if changes in elevation due to tides, winds, etc., are neglected, is a level surface. A level surface is not a plane surface but is sometimes so regarded in surveys of limited areas. (See also Vertical Control under Control).

GONIOMETER - An instrument for measuring angles. Photogoniometer - An instrument for measuring angles to any point on a photograph from the true perspective centre.

GRADIENT - See Characteristic Curve

GRADIENT SPEED - See Characteristic Curve

GRAIN (Photography) - One of the discrete silver particles resulting from the development of an exposed light sensitive material. Granularity - The graininess of a developed photographic image evident particularly on enlargement, and due to agglomerations of developed grains, or to an overlapping pattern of grains.

GRANULARITY - See Grain

GRATICULE - (Photogrammetry) A mark such as a cross or system of lines lying in the image plane of a viewing apparatus and used singly as a reference mark in certain types of monocular instruments or as one of a pair to form a floating mark as in certain types of stereoscopes. See also Parallactic Grids

GRID - See Map Grid

GRID CO-ORDINATES - See Co-ordinates

GRID METHOD (Photogrammetry) - A method of plotting detail from oblique photographs by superimposing a perspective of a map grid on a photograph and transferring the detail by eye, the latter being guided by the corresponding lines of the map grid and its perspective. (See also Perspective Grid)

GRID PLATE - A glass plate on which is etched an accurately ruled grid. Sometimes used as a Focal Plane Plate to provide a means of calibrating film distortion. Also called a Reseau. Used also for calibration of plotting instruments.

GROUND CONTROL - See Control

GROUND CONTROL POINT - See Control Point

GROUND PARALLEL - See Principal Plane

GROUND PHOTOGRAMMETRY - See Photogrammetry

GROUND PHOTOGRAPH - Terrestrial Photograph, the preferred term.

GROUND PLANE (Photogrammetry) - The horizontal plane passing through the ground nadir of a camera station.

GROUND PLUMB POINT - Ground Nadir is preferred. See Nadir

GROUND SPEED (Air Navigation) - The velocity of an aircraft along its track with relation to the ground; the resultant of the heading and air speed of an aircraft and the direction and velocity of the wind. See also Air Speed

GROUND SURVEY - See Survey

GROUND TRACE - Not preferred. See Ground Parallel under Principal Plane

GYROSCOPIC STABILIZATION - Equilibrium obtained in a ship or aeroplane by the use of gyroscopes. The maintenance by the use of gyroscopes, of an aeroplane on constant course in a horizontal position; the maintenance, by the use of gyroscopes, of a camera in a desired position within an aircraft.

HALATION (Photography) - A spreading of a photographic image beyond its proper boundaries, particularly due to reflection from the side of the film or plate support opposite to that on which the emulsion is coated. Particularly noticed in photographs of bright objects against a darker background.

HAND TEMPLATE - See Template

HAND TEMPLATE METHOD - See Template and Radial Triangulation

HAND TEMPLATE PLOT - See Radial Triangulation

HAND TEMPLATE TRIANGULATION - See Template and also Radial Triangulation

HAZE - The presence of foreign matter in the atmosphere to an extent sufficient to reduce even slightly its transparency.

HEADING (Air Navigation) - The angular direction of the longitudinal axis of the aircraft with respect to the true meridian. In other words it is the course with drift correction applied. It is the true heading unless otherwise designated.

HIGH-OBLIQUE PHOTOGRAPH - See Oblique Photograph

HORIZON - In general, the apparent or visible junction of earth and sky, as seen from any specific position. Also called the Apparent, Visible, or Local Horizon.
True Horizon - A horizontal plane passing through a point of vision or perspective centre. The Apparent or Visible Horizon approximates the True Horizon only when the point of vision is very close to sea level.

HORIZON CAMERA - See Camera

HORIZON PHOTOGRAPH (Aerial Photography) - A photograph of the horizon taken simultaneously with a vertical photograph for the purpose of determining the relative tilt between adjacent vertical photographs.

HORIZON TRACE - See Principal Plane

HORIZONTAL CONTROL - See Control

HORIZONTAL CONTROL DATUM - See Datum

HORIZONTAL COPLANE - See Coplanar

HORIZONTAL PARALLAX - See Parallax

HORIZONTAL PHOTOGRAPH - A photograph taken with the camera axis horizontal.

HORIZONTAL PLANE - See Datum

HUMIDITY - Degree of wetness, especially of the atmosphere.
Relative Humidity - Ratio of aqueous vapor present in a space at a given temperature, as compared with the greatest amount it could possibly contain, at that temperature. Absolute Humidity - The weight of water vapor contained in a given volume of air as grains per cubic foot. Specific Humidity - The weight of water vapor per unit weight of the moist air.

HYDROGRAPHIC MAP - See Map

HYP SOGRAPH - An instrument of the slide rule type used to compute elevations from vertical angles and horizontal distances.

HYP SOGRAPHY - See Topography

HYP SOMETRY - In general, the determination of elevations above sea level. In particular the determination of such elevations by observing the boiling point of water.

IMAGE PLANE - That plane in a camera in which it is intended that the emulsion should lie at the instant of exposure. Also called the Focal Plane. Focal Plane Plate - A glass plate set in the camera so that the surface away from the lens coincides with the image plane, for the purpose of locating the emulsion of the film in the image plane when the film is mechanically pressed into contact with the glass plate. Also known as Contact Glass or Contact Plate or Register Glass.

INCIDENT NODAL POINT - See Nodal Point (Optics)

INDEX MAP (Photogrammetry) - A map showing the location and numbers of the flight strips and photographs. Also called Key Diagram. Photo Index - An index map made by assembling the individual photographs into their proper relative positions and copying the assembly photographically.

INDEX MARK - See Floating Mark

INDEX OF REFRACTION - See Refraction

INFRARED (Photography) - Pertaining to or designating those rays of light just beyond the red end of the visible spectrum, such as are emitted by a hot body. They are invisible and are detected by their thermal and photographic effects. Their wave lengths are longer than those of visible light and shorter than those of radio waves.

INTERIOR ORIENTATION - See Orientation

INTERIOR PERSPECTIVE CENTRE - See Perspective Centres

INTEROCULAR DISTANCE - Synonymous with Eye Base

INTERPOLATION - Determination of an intermediate value between fixed values from some known or assumed rate or system of change.

INTERPRETATION OF PHOTOGRAPHS - See Photographic Interpretation

INTERPUPILLARY DISTANCE - Synonymous with Eye Base.

INTERVALOMETER - A timing device for automatically operating the shutter of a camera at any predetermined interval.

INVERSOR (Photography) - A mechanical device used to maintain true Conjugate Distances in instruments such as enlarging and copy cameras. The Inversor provides a mechanical solution of mathematical relationships such as Newton's Law. (See also Conjugate Distance).

IRIS DIAPHRAGM - A continuously variable circular aperture in a lens which makes it possible to control the amount of

station and having an equal principal distance. (2) the point of intersection on a photograph of the principal line and the isometric parallel.

(3) The point on a photograph intersected by the bisector of the angle between the plumb line and the photograph perpendicular. The isocentre is significant because it is the centre of radiation for displacements of images due to tilt.

ISOCENTRE PLOT - See Radial Triangulation

ISOCENTRE TRIANGULATION - See Radial Triangulation

ISOLINE - A line representing the intersection of the plane of a vertical photograph with the plane of an overlapping oblique photograph. If the vertical photograph were tilt free, the isoline would be the Isometric Parallel of the oblique photograph.

ISOMETRIC PARALLEL - See Principal Plane

ISORADIAL - See Radial

LATENT IMAGE (Photography) - An invisible image produced by a physical or chemical effect of light upon matter (usually silver halide or halides) which can be rendered visible by the subsequent chemical process of photographic development.

LATERAL CHROMATIC ABERRATION - See Aberration (Optics)

LATERAL MAGNIFICATION - See Magnification

LATERAL OBLIQUE PHOTOGRAPH - An oblique aerial photograph taken with the camera axis as nearly as possible normal to the flight line. Also called Lateral Oblique.

LATERAL TILT - See Omega (ω) under Tilt.

LEGEND - A description, explanation, table of symbols and other information, which is printed on a map or chart, for a better understanding and interpretation of it. The title of a map or chart was formerly considered as part of the legend but this usage is obsolete. The title should be considered as separate and not a part of the legend.

LENS (Optics) - A piece, or combination of pieces, of glass or other transparent material shaped to form an image by means of refraction. Normal-angle Lens - See Angle of Coverage; Wide-angle Lens; See Angle of Coverage; Narrow-angle lens - See Angle of Coverage

LENS ELEMENT - One lens of a complex lens system. In a photographic lens, the terms front and rear elements are often used.

LENS SPEED - See Relative Aperture.

LEVEL SURFACE - See Geoid

LIGHT RAY - See Ray of Light (Optics)

LINEAR MAGNIFICATION - See Magnification

LINE OF CONSTANT SCALE - Also called Line of Equal Scale. Any line on a photograph which is parallel to the True Horizon or to the Isometric Parallel

LOCAL HORIZON - See Horizon

LOCATING BACK (Aerial Photography) - A plane surface in an aerial camera which is behind the focal plane by an amount equal to the thickness of the film used and against which the film is held by vacuum, or pressed by air pressure, in order to maintain the emulsion surface of the film in the focal plane at the instant of exposure. Locating backs are usually of metal and in both above cases are perforated or slotted to allow for the building up of a differential pressure or for the removal of air in the formation of a vacuum. A locating back which utilizes vacuum is known as Vacuum Back.

LONGITUDINAL CHROMATIC ABERRATION - See Aberration

LONGITUDINAL MAGNIFICATION - See Magnification

LONGITUDINAL TILT - See $\Phi(\phi)$ under Tilt

LORAN - A method of applying pulse techniques to navigation. The term is a contraction of the phrase "Long Range Navigation". A pulsed transmitter (known as the master station) triggers one or more other pulsed transmitters (known as slave stations) which may be as much as several hundred miles away. A mobile receiver is provided which can accurately measure the difference in time of arrival of the coded signals or pulses from the master and slave stations. If such a receiver is moved in a manner to keep a constant time difference it would follow a hyperbolic path. A number of such paths may be drawn on a chart for each set or pair of the high power, permanent, land-based stations used. Several sets of stations make possible a chart containing many intersecting families of such hyperbolas. A ship or aeroplane equipped with the proper receiver can locate his position on a

LOUVRE SHUTTER - See Shutter

LOW-OBLIQUE - See under Oblique Photograph

MAGAZINE (Photography) - A container for rolled film or photographic plates attached to the camera body and usually equipped with automatic mechanisms to advance and position the photographic material for exposure.

MAGNETIC DECLINATION - The angle between the true (geographical) north and magnetic north (direction of the compass needle). The magnetic declination varies for different places and changes continuously with respect to time. Magnetic Variation - Optional term.

MAGNIFICATION (Optics) - The ratio of the size of an image to the size of the object. Linear Magnification - The ratio of the linear size of the image to the linear quantity in the object. It may be Lateral Magnification or Longitudinal (or Axial) Magnification. Lateral Magnification - The ratio of a length in the image, perpendicular to the lens axis, to a corresponding length in the object. Longitudinal (or Axial) Magnification - The ratio of a length in the image along the axis, to a corresponding length in the object. Angular Magnification or (Magnifying Power) - The ratio of the angle subtended at the eye by the image formed by an optical device, to the angle subtended at the eye by the object itself without the optical device. (For telescope systems this is the angle actually subtended by the object while for microscopes and similar systems it is the angle which the object would subtend at the shortest distance to which the normal eye can focus) This term only applies to optical systems used direct in conjunction of the eye.

MANUSCRIPT MAP - The original drawing of a map as compiled or constructed from various data as ground surveys, photographs, etc.

MAP - A representation on a plane surface, at an established scale, of the physical features (natural, artificial, or both) of a part or the whole of the earth's surface, by means of signs and symbols, and with the means of orientation indicated. Also a similar representation of the celestial bodies. A map may emphasize, generalize, or omit the representation of certain features to satisfy specific requirements. The type of information which a map is designed primarily to convey is frequently used in adjective form, to distinguish it from maps of other types. A map should carry a record of the projection upon which it is constructed. Topographic Map - A map which presents the horizontal and vertical positions of the features represented; distinguished from a planimetric map by the addition of relief in measurable form. A topographic map usually shows the same features as a planimetric map, but uses contours or comparable symbols to show mountains, valleys, and plains; and in the case of hydro-

which portrays relief by means of contour lines. The term "contoured" is not approved. Planimetric Map - A map which presents the horizontal positions only for the features represented; distinguished from a topographic map by the omission of relief in measurable form. The natural features usually shown on a planimetric map include rivers, lakes and seas; mountains, valleys and plains; forests, prairies, marshes and deserts. The cultural features include cities, farms, transportation routes, and public utility facilities; political and private boundary lines. A planimetric map intended for special use may present only those features which are essential to the purpose to be served. Base Map - (1) A map showing certain fundamental information, copies of which are used to compile additional data of specialized nature. Often used to define a large scale planimetric map compiled from aerial photographs, copies of which are used for the addition of contours and other data by means of the planetable and/or photogrammetric methods. (2) A map showing all of the information from which maps showing specialized information can be prepared; a master map. Cadastral Map - A map showing the boundaries of subdivisions of land, usually with the bearings and lengths thereof and the areas of individual tracts, for purposes of describing and recording ownership. A cadastral map may also show culture, drainage, and other features relating to the value and use of land. Hydrographic Map - A map showing a portion of the waters of the earth, including shore lines, the topography along the shores and of the submerged portions, and as much of the topography of the surrounding country as is necessary for the purpose intended. (See also Nautical Chart) Special Purpose Map - Any map designed primarily to meet specific requirements. Usually the map information portrayed on a special-purpose map is emphasized by omitting or subordinating other information of a general character which is not essential or is of less importance to the purpose to be served. The special purpose for which maps are designed and used are numerous and are increasing with the trend toward the graphic portrayal of factual information in relation to the areas of origin or application. The map, in most cases, serves as a base on which special information is correlated. A word or phrase is usually employed to describe the type of information which is designed to present, as route-, tax-, index-maps, etc. Compilation Sheet - A mapping sheet showing ground and photogrammetric control on which topographic detail is assembled and adjusted. (See also Fair Drawing)

MECHANICAL TEMPLATE - See Template

MECHANICAL TEMPLATE PLOT - See Radial Triangulation

MECHANICAL TEMPLATE TRIANGULATION - See Radial Triangulation

MENISCUS LENS (Optics) - A lens, concave on one side and convex on the other. In photography this refers to a single or cemented lens of this type with a small stop on the concave side and is frequently referred to as a

MERCURY BAROMETER - See Barometer

MERIDIONAL PLANE - See Polar Bearing

METAL TEMPLATE - See Spider Template under Template

MINOR CONTROL POINT - See under Pass Point

MINOR CONTROL PLOT - See under Radial Triangulation

MOSAIC - See Photomap

MULTIPLE LENS CAMERA - See Camera

MULTIPLE LENS PHOTOGRAPH - A photograph made with a multiple lens camera. (See also Multiple Lens Camera under Camera)

NADIR - That point on the celestial sphere directly beneath the observer, and directly opposite to the zenith. Photograph Nadir (Photogrammetry) - That point at which a vertical line through the perspective centre of the camera lens pierces the plane of the photograph. Also referred to as the Nadir Point. Ground Nadir - The point on the ground vertically beneath the perspective centre of the camera lens. Map Nadir - The point on the map vertically beneath the perspective centre of the camera lens.

NADIR POINT - See Nadir

NADIR POINT PLOT - See Radial Triangulation

NADIR POINT SLOTTED TEMPLATE PLOT - See Radial Triangulation

NADIR POINT TRIANGULATION - See Radial Triangulation

NADIR RADIAL - See Radial

NAUTICAL CHART - A hydrographic or marine map. A map of a portion of the earth's surface which includes navigable waters and the adjacent or included land, if any, and on which are indicated depths of the water, marine obstructions, aids to navigation, and other information to aid the mariner in navigating.

NEGATIVE (Photography) - A sensitized plate or film which has been exposed in a camera and which has the lights and shades in inverse order to those of the original subject. The plate or film does not become a negative until it is exposed, after which it may be an undeveloped or a developed negative.

NEGATIVE LENS - A lens which will diverge a beam of parallel light rays, so that they appear to have emerged from a point focus behind the lens. Also called Diverging Lens.

NINE LENS CAMERA - See Camera

NODAL PLANE - See Nodal Point

NODAL POINT - (Optics) - One of two points on the optical axis of a lens (or a system of lenses) such that a ray emergent from the second point is parallel to the corresponding ray incident at the first. The first nodal point is also referred to as the Front Nodal Point or Incident Nodal Point and the second point as the Rear Nodal Point, or Emergent Nodal Point. Also called simply Node, as Front Node. Nodal Plane - A plane perpendicular to the optical axis at a nodal point.

NODE - See Nodal Point

NORMAL-ANGLE LENS - See Angle of Coverage

OBJECT SPACE ANGLE - The angle between an object-space direction and the principal object axis of a camera.

OBJECT SPACE DIRECTION - The direction of the ray from the exterior perspective centre of a camera to the object point. The direction, in object space, defined by the almost parallel beam of rays approaching the entrance pupil of an aerial camera lens from an object point.

OBJECTIVE - The lens in a microscope or telescope which is nearest the object. Also the lens used in a camera

OBLIQUE PHOTOGRAPH - A photograph taken with the camera axis directed intentionally between the horizontal and the vertical. High-Oblique - An oblique photograph in which the apparent horizon is shown. Low-Oblique - An oblique photograph in which the apparent horizon is not shown.

OBLIQUE PLOTTING INSTRUMENT - An instrument (usually monocular) for plotting from oblique photographs.

OCCUPY (Surveying) - To set a surveying instrument over a point for the purpose of making observations, said of a station e.g. "occupy Greylock station" or "occupy Station B 16".

OPACITY - See Characteristic Curve

OPTICAL AXIS - The optical axis of a lens element is a straight line which passes through the centres of curvature of the lens surfaces. In a compound lens, if the centres of curvature of all the components were to lie in one straight line, this line would define the optical axis of such a lens. This exact condition is rarely obtained in practice and so a uniquely defined optical axis seldom exists for a real lens. See Principal Object Axis.

OPTICAL FLAT - A piece of optical glass (usually a disc with parallel surfaces) the surfaces of which have been ground and polished plane to within a fraction of a wave-length of light. Such a flat is used for testing the planeness of prism faces, mirrors, etc. Also called Optical Plane.

OPTICAL PLANE - See Optical Flat

OPTICALLY FLAT - A surface is said to be optically flat when it has been ground and polished to within a fraction of a wave-length of visible light.

ORIENTATION (Photogrammetry) Exterior Orientation - A set of quantities which fixes the position of the camera station and the angular orientation of the photograph. Such a set consists of three elements of position and elements of angular orientation. The position is usually expressed in terms of three spatial co-ordinate distances, X, Y, and Z. The elements of angular orientation are the tilt of the photograph perpendicular and the azimuth of the principal plane. Interior Orientation - The setting of the principal distance and the position of the principal point of a photograph with respect to the fiducial marks of the plotting camera. Interior orientation is an attempt to duplicate in the plotting camera, the cone of rays in the object space which was captured by the aerial camera lens at the instant of exposure. Relative Orientation - The reconstruction of the same perspective conditions between a pair of photographs which existed when the photographs were taken. In a stereoscopic pair this is achieved when each pair of conjugate image rays lies in an epipolar plane. Absolute Orientation - Following relative orientation which establishes the model, absolute orientation fixes the scale, position and orientation of the model with reference to the ground co-ordinates.

ORIGIN (Surveying) - The reference position from which angles or distances are reckoned. (See also Co-ordinates).

ORTHOCHROMATIC (Photography) - (1) Of, or pertaining to, or producing tone values (of light or shade) in a photograph, corresponding to the tones of nature. (2) Incorrectly, designating a film made sensitive to blue and green, but not red, light.

ORTHOGONAL - At right angles; rectangularly; meeting crossing.

ORTHOGRAPHIC PROJECTION - See Perspective Projection

OVERLAP (Photography) - Amount by which one photograph overlaps the area covered by another, customarily expressed as a percentage. The overlap between aerial photographs in the same flight is distinguished as the Forward Lap, and the overlap between photographs in adjacent parallel flights is called the Side Lap.

OVERLAPPING PAIR (Photogrammetry) - Two photographs taken at different exposure stations in such a manner that a portion of one photograph shows the same terrain as shown on a portion of the other photograph. This term covers the general case and does not imply that the photographs were taken for stereoscopic examination. (See also Stereoscopic Pair under Stereoscopy)

OVERLAY (Mapping) - A record on a transparent medium to be superimposed on another record; Example - maps showing original land grants (or patents) prepared as tracing cloth overlays in order that they may be correlated with the maps showing present ownership, also the names overlay for a manuscript map.

PANCHROMATIC (Photography) - Sensitive, as a film or plate emulsion, to light of all colours.

PARALLACTIC ANGLE - See Parallax

PARALLACTIC GRIDS (Photogrammetry) - A uniform pattern of rectangular lines drawn or engraved on some transparent material, usually glass, and placed either over the photographs of a stereoscopic pair, or in the optical system of a stereoscope, to provide a continuous floating mark system.

PARALLAX - The apparent displacement of the position of a body with respect to a reference point or system caused by a shift in the point of observation. Absolute Stereoscopic Parallax (Photogrammetry) - Considering a pair of truly vertical photographs of equal principal distances, taken from equal flight heights, or a pair of rectified photographs; the absolute stereoscopic parallax of a point is the algebraic difference, parallel to the air base, of the distances of the two images from their respective principal points. In photogrammetry the term Parallax is generally used to denote absolute stereoscopic parallax and also to denote similar measurements when the above theoretical conditions are not strictly attained, as for example, when measuring parallax on unrectified aerial photographs. Linear Parallax, x-Parallax and Horizontal Parallax are synonymous with absolute stereoscopic parallax but are not preferred. Parallax difference - The difference in the absolute stereoscopic parallaxes of two points imaged on a pair of photographs. Customarily used in the determination of the difference in elevations of the objects. v-Parallax (Photogrammetry) - The v-parallax of a

ing the air base. The existence of y -parallax is an indication of tilt in either or both photographs and/or a difference in flying height and will interfere with stereoscopic examination of the pair. Also called Want of Correspondence K and Vertical Parallax though the latter is not preferred. Angular Parallax - The angle subtended by the eye base of the observer at the object viewed. Also called Parallactic Angle or Angle of Convergence.

PARALLAX BAR - See Stereometer

PARALLAX DIFFERENCE - See Parallax

PARAXIAL RAY - A paraxial ray is one whose path lies very near the axis of a lens and which intersects the lens surface at a point very close to its vertex and at nearly normal incidence.

PASS POINT - A point whose horizontal and/or vertical position is determined from photographs by photogrammetric methods and which is intended for use after the manner of a ground control point. Also called Minor Control Point for the plotting of detail.

PENCIL OF LIGHT - See Ray of Light

PERSPECTIVE CENTRE - An alternative name for the centre of projection in a perspective projection. See Perspective Projection. Exterior Perspective Centre - The centre of the entrance pupil of a camera lens. Interior Perspective Centre - The centre of the exit pupil of a camera lens. These two points are so named because all object points lying on a given straight line through the entrance pupil centre will give rise to image points lying on one straight line through the exit pupil centre. The intersection of this line with the image plane will give the image point if the object point lies within the depth of field of the camera. Otherwise a larger blur circle will result but it will still be distributed around the point of intersection of the straight line through the exit pupil centre, with the image plane. Thus these pupil centres must be regarded as the points from which the object space and the image plane, respectively, are viewed. If the camera happens to be such that corresponding straight lines through them are parallel to each other, then the camera is distortion-free (see Distortion) since the geometry of a photograph made with it will be identical with that of a perspective projection of the object, where the exterior perspective is taken as the centre of projection for the object space, and the interior perspective centre is taken as the centre of projection for the image space. In a precision camera used in aerial surveying the image is always recorded in one and the same plane so that it is not essential that the photograph be viewed from the interior perspective centre for correct interpretation, i.e. for avoiding errors due to parallax. A Calibrated Interior Perspective

PERSPECTIVE GRID (Photogrammetry) - A network of lines drawn or superimposed on a photograph which represents the perspective of a systematic network of lines on the ground or datum plane. (See also Grid Method)

PERSPECTIVE PLANE - Any plane containing the perspective centre. Since the intersection of two planes is a straight line, it follows that the intersection of a perspective plane and the ground will always appear as a straight line on the photograph. It also follows that any straight line in the object space will appear as a straight line on the photograph.

PERSPECTIVE PROJECTION - The image of an object produced on a plane by joining, with a straight line, each point of the object to a single point lying outside of both object and plane, and allowing the resulting straight lines to intersect the plane; the process of producing such an image. The terms Central Projection and Conic Projection are sometimes used.

Plane of Projection - The plane upon which the image is formed.

Centre of Projection - The point through which the straight lines are drawn from the object to its image. Also called Perspective Centre.

Orthographic Projection - A perspective projection in which the centre of projection is at an infinite distance from the plane of projection. It is regularly used in mechanical drawing.

PERSPECTIVE RAY - A line joining a perspective centre and a point object.

PHOTOALIDADE - A photogrammetric instrument having a telescopic alidade, a plate holder and a hinged ruling arm mounted on a tripod frame. It is used for plotting lines of direction and measuring vertical angles to selected features appearing on oblique and terrestrial photographs.

PHOTOANGULATOR - See Rectification

PHOTO BASE - See Air Base

PHOTO CONTROL POINT - See Control Point

PHOTO INDEX - See Index Map

PHOTOGONIOMETER - See Goniometer

PHOTOGRAMMETRIC CAMERA - See Camera

PHOTOGRAMMETRIC CONTROL - See Control

PHOTOGRAMMETRY - The science or art of obtaining reliable measurements by means of photography. Aerial Photogrammetry - Photogrammetry utilizing aerial photographs. Terrestrial Photogrammetry - Photogrammetry utilizing ground photographs. Also called Ground Photogrammetry though this term is not preferred. Stereophotogrammetry - Photogrammetry with the aid of stereoscopic equipment and methods.

PHOTOGRAPH - A general term for a positive or negative picture made with a camera on sensitized material, or prints from such a camera original. For specific types of photographs, see under the proper name as: Aerial Photograph, Multiple Lens Photograph etc.

PHOTOGRAPH AXIS - See Fiducial Axes which is preferred.

PHOTOGRAPH CENTRE - The centre of a photograph as indicated by the images of the fiducial mark or marks of the camera. In a perfectly adjusted camera the photograph centre and the principal point are identical. (See also Fiducial Centre)

PHOTOGRAPH CO-ORDINATES - See Co-ordinates

PHOTOGRAPH MERIDIAN - See Principal Plane (Photogrammetry)

PHOTOGRAPH NADIR - See Nadir

PHOTOGRAPH PARALLEL - See Principal Plane (Photogrammetry)

PHOTOGRAPH PERPENDICULAR - The perpendicular to the plane of the photograph through the principal point. (See also Principal Distance under Focal Length)

PHOTOGRAPH PLUMB POINT - Photograph Nadir preferred. See Nadir.

PHOTOGRAPH PYRAMID - A pyramid whose base is a triangle formed by three point images, on a photograph and whose apex is the perspective centre of the photograph.

PHOTOGRAPHIC INTERPRETATION - The determination of the nature and description of objects that are imaged on a photograph.

PHOTOMAP (Photogrammetry) - An assemblage of aerial photographs matched to form a continuous photographic representation of a portion of the earth's surface. Controlled Photomap - A photomap laid on ground control to improve the accuracy of representation as regards distances and directions. Also called Mosaic.

PHOTOTHEODOLITE - A ground surveying instrument combining a the-

PHOTOTOPOGRAPHY - The science of surveying in which the detail is plotted entirely from photographs taken at suitable ground stations. See Terrestrial Photogrammetry under Photogrammetry.

PICTURE CONTROL POINT - See Control Point

PICTUREPLANE - A plane upon which is conceived to be projected a system of lines or rays from an object to form an image or picture. In perspective drawing, the system of rays is understood to converge to a single point. In photogrammetry the photograph is the picture plane.

PLANE CONTROL - See Control

PLANE CO-ORDINATES - See Co-ordinates

PLANE OF PROJECTION - See Perspective Projection

PLANE POLAR CO-ORDINATES - See Co-ordinates

PLANE RECTANGULAR CO-ORDINATES - See Co-ordinates

PLANIMETRIC MAP - See Map

PLAN - A diagram drawn to scale showing land boundaries and subdivision, together with all the data essential to the description of the several units. A plan differs from a map in that it does not show additional cultural, drainage and relief features. (See also Map)

PLATE PARALLEL - See Principal Plane

PLUMB POINT - Synonymous with Nadir Point which is preferred - See Nadir.

POINT OF SYMMETRY - That point in the image plane of a camera which, if taken as principal point, will give distortion curves which are symmetrical at some zone, i.e. the curve for one semi-diagonal of the image plane will show the same distortion, at some given zone, as the curve for the other half of that diagonal. This will be approximately true also for all other zones, depending on the degree to which the camera departs from axisymmetry. In the case of perfect axisymmetry, the point of symmetry will coincide with the autocollimation point.

POLAR AXIS - In a system of polar or spherical co-ordinates, the primary axis of direction.

POLAR BEARING - In a system of polar or spherical co-ordinates the angle formed by the intersection of the reference meridional plane and the meridional plane containing the point. A Meridional Plane is defined as any plane containing the polar axis.

POLAR CO-ORDINATES - See Co-ordinates

POLAR DISTANCE - In a system of polar or spherical co-ordinates the angle at the origin between a line to a point and the pole. Also the arc of the great circle between the point and the pole.

POLARIZATION (Optics) - Considered as a wave, ordinary light (unpolarized) vibrates randomly in all planes perpendicular to the direction of propagation. On passing through certain polarizing mediums (see Polaroid) ordinary light becomes plane polarized, that is, the vibrations are limited to a single plane; this process is known as polarization.

POLAROID - The proprietary name of a manufactured plastic polarizing screen. Ordinary light on passing through such a screen becomes plane polarized.

PORRO-KOPPE PRINCIPLE - The principle applied in photogrammetric instruments to eliminate the effect of camera lens distortion. The photographic positive or negative is observed through a lens identical to the camera objective which made the original exposure. In effect this method of observation is a reverse use of the camera with the focal plane becoming the object which is imaged at infinity by parallel bundles of rays emerging from the lens. The chief ray of each bundle assumes its correct direction and the cone of rays is identical to that whose vertex was the exterior perspective centre of the camera lens at the instant of exposure. Observation of the parallel bundles may be accomplished by a telescopic system focused at infinity and made rotatable about the incident node of the lens. This method of eliminating lens distortion is utilized in photogrammetric instruments of both the monoscopic type such as the photogoniometer and the stereoscopic type used for map plotting.

PORRO PRISM - This prism deviates the axis 180° and inverts the image in the plane in which the reflection takes place. It may be considered to be two right angle prisms cemented together.

POSITION - Data which define the location of a point with respect to a reference system. The place occupied by a point on the surface of the earth. The co-ordinates which define the location of a point on the geoid or spheroid.

POSITIVE LENS - A lens which will converge a beam of parallel light

POSITIVE (Photography) - A photograph having approximately the same rendition of light and shade as the original subject.

POWER OF A LENS - See Diopetre and also Magnification

PRECISION CAMERA - See Camera

PRESSURE BACK - See Locating Back

PRESSURE PLATE (Photography) - A flat plate, usually of metal but frequently of glass or other substance which, by means of mechanical force, presses the film into contact with the focal plane plate of the camera.

PRINCIPAL DISTANCE - See Focal Length

PRINCIPAL LINE - See Principal Plane

PRINCIPAL MERIDIAN - See Principal Plane

PRINCIPAL OBJECT AXIS - The ray in object space which passes through the exterior perspective centre and which corresponds to the principal point. See Principal Point and Perspective Centre.

PRINCIPAL PARALLEL - See Principal Plane

PRINCIPAL PLANE (Optics) - See Nodal Point

PRINCIPAL PLANE (Photogrammetry) - The vertical plane through the internal perspective centre containing the photograph perpendicular of a tilted photograph. In Figure 1 the plane of the paper. In the case of a truly vertical photograph the principal plane and the other planes and lines discussed below have no meaning.

Principal Line - The trace of the principal plane upon the photograph (i.e. the line connecting the principal point and the nadir point). Horizon Trace - An imaginary line on the plane of the negative or positive of a photograph which represents the image of the true horizon. It corresponds to the intersection of the plane of the photograph and the horizontal plane containing the internal perspective centre or rear nodal point of the lens. In Figure 1, the line through the point v perpendicular to the plane of the paper.

Vanishing Point - The image on the plane of the photograph of the point towards which a system of parallel lines in the object space converge. Since any system of parallel lines in the object space will meet at infinity, the image of the meeting point will be formed by the ray through the perspective centre, O in Figure 1, parallel to the system. Vanishing Line - The straight line on the photograph upon which the vanishing points of all systems of parallel lines

Photograph Meridian - The image on the photograph of any horizontal line in the object space which is parallel to the principal plane. Since all such lines meet at infinity, the image of the meeting point is at the intersection of the principal line and the horizon trace, the point v in Figure 1, and all photograph meridians pass through that point. The principal line, sometimes called the Principal Meridian, is the only photograph meridian which is a perpendicular to the photograph parallels, or lines of constant scale.

Plate Parallel - The image on the photograph of any horizontal line in the object space which is perpendicular to the principal plane. All photograph parallels are perpendicular to the principal line. The photograph parallel passing through the principal point is the Principal Point Parallel and that passing through the isocentre is the Isometric Parallel. Thus the isometric parallel is the intersecting line between the plane of the photograph and a horizontal plane having an equal perpendicular distance from the same perspective centre. Axis of Tilt - A line through the perspective centre perpendicular to the principal plane. The term is usually restricted to this definition. The axis of tilt could be any of several lines in space, as for example the Isometric Parallel or the Ground Line but the present definition is the only one which permits the concept of tilting the photograph without upsetting the positional elements of exterior orientation. Map Parallel - The intersection of the plane of the photograph with the plane of the map. (See also Axis of Homology) Ground Parallel - The intersection of the plane of the photograph with the plane of reference of the ground. (See also Axis of Homology).

PRINCIPAL POINT (Photogrammetry) - The point in a photograph or camera focal plane which is chosen as the centre of the image for relating the geometry of the image to the geometry of the object space. If the camera is distortion-free so that the geometry of the image is the same as that of a perspective projection of the object, then the principal point is the foot of the perpendicular to the image plane from the centre of projection. In general, however, a real camera will exhibit distortion which may or may not be symmetrical and the principal point must be regarded merely as the foot of the perpendicular from the Calibrated Interior Perspective Centre, the latter being chosen according to some criterion. For example the autocollimation point, and the point giving symmetry of radial distortion at some zone, are often chosen as the principal point. See Calibrated Interior Perspective Centre, Autocollimation Point, and Point of Symmetry. The geometry of the image is related to the geometry of the object by the equation for distortion, $v = r - f \tan \alpha$, (see Distortion), r being the distance of the image point from the principal point.

PRINCIPAL POINT ASSUMPTION - See Radial Triangulation

PRINCIPAL POINT METHOD - Not approved. See Radial Triangulation

PRINCIPAL POINT (Photogrammetry) - The foot of the perpendicular from the interior perspective centre to the plane of the photograph, i.e., the foot of the photograph perpendicular.

PRINCIPAL POINT RADIAL - See Radial

PRINCIPAL POINT TRIANGULATION - See Radial Triangulation

PRINT (Photography) - A photographic copy made by projection or contact printing from a photographic negative or from a transparent drawing as in blue printing.
Contact Print - A print made with the negative or transparent drawing in contact with the sensitized surface.
Ratio Print - A print, the scale of which has been changed from that of the negative by enlargement or reduction.

PROCESS LENS - A lens for photo-mechanical enlarging or projection purposes; usually of low aperture and of symmetrical construction.

PROJECTION - See Perspective Projection

PSEUDOSCOPIC IMAGE - See Stereoscopy

RADAR - The science of locating and/or identifying distant objects by means of radio techniques. Radar depends on two processes, one, the scattering of radio waves by material bodies, and the other, the use of short pulses of high frequency energy to make possible the accurate measurement of distance.

RADAR MAP - A map produced through the application of radar techniques. A radar set in an aeroplane or on a high point scans the area to be mapped with pulses of energy. The reflections from the area are presented on the screen of a cathode ray tube which is arranged to present a plan view of the region. Due to the difference in scattering of radio waves by different kinds of materials, variations in received energy are obtained. This causes differences in the intensity of the image on the cathode ray tube, thus giving the effect of a relief map.

RADIAL (Photogrammetry) - A line or direction from the radial centre to any point on a photograph. The radial centre is assumed to be the principal point unless otherwise designated as for example Nadir Radial. - A radial from the nadir point or Isoradial from the isocentre.

RADIAL CENTRE - The selected point on a photograph from which radials (directions) to various image points are drawn or measured, i.e., the origin of radials. The radial centre is either the principal point, the nadir

RADIAL TRIANGULATION (Photogrammetry) - A method of triangulation either analytic or graphic, utilizing overlapping vertical, nearly vertical, or oblique aerial photographs for the location of points, imaged on the photographs, in their correct relative position to one another. The centre of each vertical photograph (radial centre) or the approximate nadir point of each oblique, serves as a station from which directions to points imaged on the photograph are traced, or measured, and used to extend the triangulation by intersection and by resection. A radial triangulation is also correctly called a Radial Plot or a Minor Control Plot. If made by analytic methods it is called an Analytic Radial Triangulation. A radial triangulation is assumed to be graphic unless prefixed by the word analytic. A Graphic Radial Triangulation is usually laid out directly onto ground control plotted on a map, map projection, or map grid, but may be first laid out independently of such control and later adjusted to it as a unit. In the latter case the scale and azimuth of the radial triangulation unit are not known until it is adjusted to the ground control. The radial centre for near vertical photographs may be the principal point, the nadir point, or the isocentre. A radial triangulation is assumed to be made with the principal points as radial centres unless the definitive term designates otherwise, as for example Nadir Point Triangulation or Nadir Point Plot and Isocentre Triangulation or Isocentre Plot. The adjective "radial" is not necessary in the preceding four terms. The adjective "analytic" is required to designate that the triangulation is by analytic and not graphic methods as Analytic Nadir Point Triangulation. A Graphic Radial Triangulation may be made by several methods as follows: Slotted Template Triangulation or Slotted Template Plot - A graphic radial triangulation using slotted templates. Spider Template Triangulation, Spider Template Plot, Mechanical Template Triangulation or Mechanical Template Plot - A graphic radial triangulation using spider templates. Hand Template Triangulation or Hand Template Plot - A graphic radial triangulation using any form of hand templates. In the preceding eight terms it is assumed that the radial centre is the principal point unless the term includes the words Nadir Point or Isocentre as Nadir Point Slotted Template Plot or unless the context states that a radial centre other than the principal point was used. For definitions of various templates see Template. Direct Radial Triangulation or Direct Radial Plot - A graphic radial triangulation made by tracing the directions from successive radial centres directly onto a transparent plotting sheet rather than laying the triangulation by the template method. Strip Radial Triangulation or Strip Radial Plot - A Direct Radial Triangulation in which the photographs are plotted in flight strips without reference to ground control and the strips later adjusted together and adjusted to the ground control. Principal Point Assumption - The assumption with respect to near vertical photographs that radial directions are correct if measured from the Principal Point.

RANDOM ACCELERATION (Air Navigation) - Unintentional acceleration, or deceleration, usually of short duration, of an aircraft in flight caused by uncontrollable changes in speed or direction while attempting to maintain constant horizontal flight.

RATIO PRINT - See Print

RAY OF LIGHT - The geometrical conception of a single element of light propagated in a straight line and of infinitesimal cross section used in tracing analytically the path of light through an optical system. Pencil of Light - A bundle of rays originating at, or directed to, a single point. Beam of Light - A group of pencils of light, as those originating at the many points of an illuminated surface. A beam of parallel light rays is a special case in which each pencil is of such a small cross section that it may be regarded as a ray.

RAY TRACING (Optics) - A calculation of the path of a light ray through an optical system.

REAR NODAL POINT - See Nodal Point

RECONNAISSANCE - A general examination or survey of a region with reference to its main features, usually as a preliminary to a more detailed survey.

RECORDING STATOSCOPE - See Altimeter

RECTIFICATION (Photogrammetry) - The process of projecting a tilted or oblique photograph onto a horizontal plane. This projection may be by graphics or by photography in a special camera called a rectifier or rectifying camera which produces rectified prints from a tilted original. The special process of rectifying the oblique images from a multiple lens camera to equivalent vertical images by projection into a plane perpendicular to the centre axis is called Transformation. In this case the projection is into a plane determined by the angular relations of the camera axes and not necessarily into a horizontal plane. Transforming Printer - A specially designed projection printer for use with a particular multiple lens camera for transformation of the oblique (wing) negatives taken by that camera. A rectified virtual image can be produced by a monocular instrument such as a Sketchmaster or Camera Lucida. Rectification of individual rays on tilted or oblique photographs may be made by analytical or graphical methods or by mechanical devices such as the Rectoblique Plotter and Photoangulator.

RECTOBLIQUE PLOTTER - See Rectification

REFERENCE SPHEROID - See Geoid

Practically all prisms used in photogrammetric instruments are of this type.

REFRACTING PRISM - A prism which deviates a beam of light by refraction. The angular deviation caused by this type of prism is a function of the wavelength of light, therefore, if the beam being deviated is composed of white light, the prism will disperse the beam into a spectrum. Refracting prisms are satisfactory only for small deviations. (See also Wedge)

REFRACTION - The bending of light rays when light passes from one transparent medium into another having a different index of refraction. The Angle of Refraction is the angle the refracted ray makes with the normal to the surface separating the two media. See also Snell's Law.

REFRACTIVE INDEX - The ratio of velocity of light in a transparent medium to that in air.

RELATIVE APERTURE - The relative aperture of a photographic or telescopic lens is defined as the ratio of the equivalent focal length to the diameter of the entrance pupil. Expressed as - $f:4.5$, etc. Also called f-number or Speed.

RELATIVE HUMIDITY - See Humidity

RELATIVE ORIENTATION - See Orientation

RELATIVE TILT - In near vertical photography, the tilt of a photograph with reference to an arbitrary plane, not necessarily a horizontal plane, such as the preceding or subsequent photograph in a strip. Also defined as the tilt of the photograph with respect to a polar axis parallel to the photograph perpendicular to another photograph such as the preceding or subsequent photograph in a strip.

RELIEF DISPLACEMENT - See Displacement

REPRODUCTION (Mapping) - (1) The summation of all of the processes involved in printing copies from an original drawing. The principal processes are photography, lithography, or engraving, and printing. (2) A printed copy of an original drawing made by the processes of reproduction.

RESEAU - See Grid Plate

RESECTION - The graphical or analytical determination of a position as the intersection of at least three lines of known direction to corresponding points of known position. Space Resection - The analytical determination of the

RESOLVING POWER - A measure of the finest detail that a lens can reproduce with detectable contrast. It is usually stated as the maximum number of lines per millimetre that can be resolved (that is, seen as separate lines) in the image.

RETICLE (Photogrammetry) - See Graticule

REVERT OR INVERT (Optics) - To interchange the right and left sides of an image without altering the relative positions of the top and bottom or vice versa by certain prisms and mirrors. Reversion (Optics) - The act of reverting.

RHOMBOIDAL PRISM - A prism which only displaces the axis of the beam of light laterally.

RIGHT ANGLE PRISM - A prism which deviates the axis of the beam 90° and reverts the image.

ROOF PRISM - Any type of prism in which reflection is produced at two internal surfaces inclined at 90° to each other so as to form a little "roof". The term is often used to refer particularly to Amici Prism.

ROTATING PRISM - See Dove Prism

SCALE (Photogrammetry) - The ratio of a distance on a photograph to a corresponding distance on the ground. The scale of a photograph varies from point to point because of displacements caused by tilt and relief. Approximately it is f/H where f is the principal distance of the camera and H is the altitude of the camera station above mean ground elevation.

SCHEIMPFLUG CONDITION - The requirement that object, lens and image planes be collinear for sharp focus in any direct projection system. Sharp focus is achieved in the rectifier when the Scheimpflug condition is fulfilled and when the negative to lens and lens to easel distances satisfy the conjugate distance formula. (See also Conjugate Distance). These conditions may be fulfilled automatically by the use of inversors. See Inversor.

SERVICE CEILING (Air Navigation) - The height in the standard atmosphere above which the maximum rate of climb of an aircraft is less than a given value. The highest altitude at which an aeroplane will perform, with working load, without excessive loss in efficiency. Not Flight Ceiling.

SHORAN - An electronic measuring system for indicating distance from an airborne station to each of two ground stations. The term is a contraction of the phrase "short range navigation". Shoran Straight Line Indicator - A Shoran device for assisting the pilot

Shoran Control - The control of aerial photography by registration of the distance of the exposure station from two ground stations. Shoran Line Crossing - A method of determining distance between two points by flying across the joining line.

SHUTTER (Photography) - The mechanism of a camera which, when set in motion, permits light to reach the sensitized surface of the film or plate for predetermined length of time. Focal Plane Shutter - A shutter located near the focal plane and consisting of a curtain with a slot which is pulled across the focal plane to make the exposure. Between-the-lens-shutter - A shutter located between the lens elements of a camera and usually consisting of thin metal leaves which open and close or revolve to make the exposure. Louvre Shutter - A shutter consisting of a number of thin metal strips or louvres which operate like a Venetian blind to make the exposure. Usually located just in front of or just behind the lens.

SIDE LAP - See Overlap

SINGLE LENS CAMERA - See Camera.

SLOTTED TEMPLATE PLOT - See Radial Triangulation

SLOTTED TEMPLATE - See Template

SLOTTED TEMPLATE METHOD - See Template and Radial Triangulation

SLOTTED TEMPLATE TRIANGULATION - See Radial Triangulation

SNELL'S LAW OF REFRACTION - This law states that the sine of the angle of incidence divided by the sine of the angle of refraction equals a constant which is the ratio of the refractive indices of the 2 media.

SOLARIZATION (Photography) - A reversal of gradation sequence in the (usually very dense) image obtained on the normal development of films, plates, and papers after giving a very intense or long continued exposure. A greater exposure than this appears to restore the original sequence of gradation.

SPACE CO-ORDINATES - See Co-ordinates

SPACE RESECTION - See Resection

SPECIAL PURPOSE MAP - See Map

SPECIFIC HUMIDITY - Humidity

SPECULAR REFLECTION (Optics) - The type of reflection such as obtained from a highly polished plane surface in which all rays are reflected in approximately the same direction, rather than be scattered as in diffuse reflection.

SPEED (Photography) - See Characteristic Curve

SPEED OF LENS - See Relative Aperture

SPHERICAL ABERRATION - See Aberration

SPHERICAL CO-ORDINATES - See Co-ordinates

SPHERICAL LENS - A lens in which the surfaces are segments of spheres. Practically all photographic lenses belong in this class. (See also Aspherical Lens)

SPHEROID OF REFERENCE - See Geoid

SPIDER TEMPLATE - See Template

SPIDER TEMPLATE PLOT - See Radial Triangulation

SPIDER TEMPLATE TRIANGULATION - See Radial Triangulation

STATE PLANE CO-ORDINATE SYSTEMS - See Co-ordinates

STATION (Surveying) - (1) A point whose position has been or is to be determined. A station may be a marked station, i.e. a point more or less permanently marked for recovery, or an unmarked station, one which is not recoverable. (2) Any point on a straight, or curved line, whose position is indicated by its total distance from a starting point, or zero point; as station 4+47.2 meaning 447.2 feet from zero. (See also Camera Station)

STATOSCOPE - See Altimeter

STEREOCOMPARATOR (Photogrammetry) - A stereoscopic instrument for measuring parallax and sometimes including a means of measuring photograph co-ordinates of image points.

STEREOGRAM - See Stereoscopy

STEREOMETER - A measuring device comprising a micrometer movement by which the separation of two index marks can be changed in order to measure parallax difference on a stereoscopic pair of photographs. Also

STEREOMETRIC CAMERA - See Camera

STEREOPHOTOGRAMMETRY - See Photogrammetry

STEREOSCOPE - See Stereoscopy

STEREOSCOPIIC BASE - See Photo Base under Air Base

STEREOSCOPIIC CORRESPONDENCE - See Correspondence

STEREOSCOPIIC FUSION - See Stereoscopy

STEREOSCOPIIC IMAGE - See Stereoscopy

STEREOSCOPIIC MODEL - See Stereoscopy

STEREOSCOPIIC PAIR - See Stereoscopy

STEREOSCOPIIC PLOTTING INSTRUMENT - Any instrument permitting an operator to plot a map by observation and measurement of the stereoscopic model formed by a single stereoscopic pair of photographs. The accuracy of model orientation may range from poor to precise depending upon recoverability of inner orientation, extent of aerial camera lens distortion compensation and degrees of freedom available to recover the elements of relative orientation. The resulting stereoscopic image may be real or virtual depending on optical design. Map plotting accuracy will be a function of optical and mechanical design and may range from an approximate plot having the perspective characteristics of a photograph to a true map in orthographic projection. Also design will determine versatility which may vary from the limited use of tilt-free vertical photographs to complete utilization of all types of exposures, i.e. vertical, low and high oblique, and terrestrial photographs.

STEREOSCOPIIC VISION - See Stereoscopy

STEREOSCOPY - The science and art which deals with stereoscopic effects and the methods by which they are produced. Stereoscope - An optical instrument for assisting the observer to view two properly prepared photographs, or diagrams to obtain the mental impression of a three dimensional model. Binocular Vision - Simultaneous vision with both eyes. Stereoscopic Vision - That particular application of binocular vision which enables the observer to view an object or two different perspectives of an object (as two photographs taken from different camera stations) so as to obtain therefrom the mental impression of a three dimensional model. Stereoscopic fusion - That mental process which combines the two perspective images on the retinas of the eyes in such a manner as to give a mental impression

which results from stereoscopic fusion. Also called Stereoscopic Model. When the photos of a stereoscopic pair are reversed from their normal position a Pseudoscopic Image is formed in which the ground relief appears to be inverted. Stereoscopic Pair (Photogrammetry) - Two photographs of the same area taken from different camera stations in such a manner as to afford stereoscopic vision. Stereogram - A stereoscopic pair of photographs or drawings correctly oriented and mounted for stereoscopic viewing.

STEREOTEMPLATE - See Template

STOP - See Iris Diaphragm and also Aperture Stop

STRIAE (Optics) - Threadlike filaments within a piece of glass caused by improper mixing of the molten glass during manufacture. Actually these filaments are composed of material of a different index of refraction than the surrounding glass. The extreme fineness of striae often makes their detection difficult.

STRIP AIR CO-ORDINATES - See Co-ordinates

STRIP RADIAL TRIANGULATION - See Radial Triangulation

SUBSTITUTE CENTRE - A point which because of its ease of identification on overlapping photographs is used as a radial centre in lieu of the principal point.

SURVEY - The act or operation of making measurements for determining the relative positions of points on or beneath the earth's surface; also the results of such operations; also an organization for making surveys. Photogrammetric Survey - Utilizing either ground photographs or aerial photographs. Aerial Surveys - A survey utilizing aerial photographs as part of the surveying operations; also the taking of aerial for surveying purposes; also the photographs taken of an area for surveying purposes. Ground Survey - A ground survey made by ground methods as distinguished from an Aerial Survey.

SURVEYING CAMERA - See Camera

SWING (Photogrammetry) - The rotation of a photograph in its own plane around the photograph perpendicular. Also, the angle at the principal point of a photograph measured clockwise from the positive y-axis to the principal line at the nadir point. In the use of certain stereoscopic plotting instruments, Kappa; the angle of rotation of a photograph about its own plane measured relative to the axis of flight.

SYMBOL - A diagram, design, letter or abbreviation, placed on maps and charts, which by convention, usage, or reference to a legend, is understood to stand for or represent

group of elements correspond in every detail, i.e., radii of curvature, thickness, spacings, diameters, indices of refraction, dispersive powers, focal lengths, and respective positions on opposite sides of the lens diaphragm.

TARGET - See Test Chart

TELEPHOTO LENS (Optics) - A lens comprised of a positive front element and a negative rear element, the focal length of the combination being greater than the distance from the front lens surface to the focal plane. This construction is used to make relatively compact long-focus cameras.

TEMPLATE (Photogrammetry) - A template used in radial triangulation to represent the aerial photograph; the template is a record of the directions or radials taken from the photograph. Hand Template - A template made by tracing the radials from the photograph onto a transparent medium, as on celluloid; hand templates are laid out and adjusted by hand to form the radial triangulation. Celluloid Templates - A hand template made on celluloid. Slotted Template - A template on which the radials are represented as a slot cut in a sheet of cardboard, metal or other material. Spider Template - A Mechanical Template which is fabricated by attaching slotted steel arms representing radials to a centre hub. The spider template is characterized by the fact that it can be disassembled and the parts used again. Stereotemplate - A composite slotted template adjustable in scale and representative of the horizontal plot of a stereoscopic model. An assembly of stereotemplates provides a means of bridging for horizontal position with a stereoscopic plotting instrument of non-bridging design.

TEMPLATE METHOD - See general description under Radial Triangulation, and also Template.

TERRAIN - An area of ground considered as to its extent and topography.

TERRESTRIAL CAMERA - See Camera

TERRESTRIAL PHOTOGRAMMETRY - See Photogrammetry

TERRESTRIAL PHOTOGRAPH - A photograph of a portion of the earth's surface taken by a camera located on the ground. Also called Ground Photograph; not preferred.

TEST CHART - A chart for testing the performance of optical systems. The design usually consists of ruled lines, squares or circles of various sizes so arranged that by examining the image of such a chart the resolving power of the lens for various parts of the field may be determined. Also called a Target. (See also

TEST PLATE - An optical element used for checking the curvature of lens surfaces during the final polishing operation. The test glass has a curvature equal and opposite to that desired on the lens. When the two surfaces are placed in contact, interference fringes are formed. This fringe pattern (also called Newton's rings) is really a contour map of the air film between the two glasses, the contour interval being one-half a wave length of light (about 0.00001 inch).

THICK LENS - A term used in geometrical optics to indicate that the thickness of a lens is considered, all distances being measured from the nodal points instead of the lens centres.

THIN LENS - A term used in geometrical optics to indicate that the thickness of a lens is ignored, all distances being measured from the lens centre. Used for approximate computations.

TILT (Photogrammetry) - The angle at the perspective centre between the photograph perpendicular and the plumb line. Consequently, also the dihedral angle between the plane of the photograph and the horizontal plane normal to the plumb line. Tilt is the resultant tilt angle as differentiated from a component of tilt. The direction of tilt is expressed by the swing angle. See Swing x-tilt, also called Lateral Tilt. The component of tilt about the x-axis, which angle is consequently the vertical angle between the y-axis and the horizontal plane and which is also the component tilt angle that causes the nadir point to be displaced along the y-axis. The axes are defined by the fiducial marks, the + x-axis being the one more nearly in the direction of flight. A + x-tilt is that which is due to the left wing of the aircraft being lowered displacing the nadir point in the + y-direction. y-tilt, also called Forward Tilt, Longitudinal Tilt or Tip - The component angle of tilt about the y-axis, where the axes are defined in the same manner as for x-tilt. A + y-tilt is that which is due to the nose of the aircraft being lowered, displacing the nadir point in the + x-direction. In the use of certain stereoscopic plotting instruments and in Continental terminology, the symbols Omega (ω) and Phi (ϕ) are used. Omega (ω), also called Lateral Tilt - The component angle of tilt about the adopted x-axis for a strip of photographs, which axis is independent of the fiducial axes of the photograph. Phi (ϕ), also called Longitudinal Tilt - The component angle of tilt about the horizontal y-axis which is perpendicular to the adopted x-axis for a strip of photographs.

TILT DISPLACEMENT - See Displacement

TIP - See y-Tilt under Tilt

TOLERANCE - The allowable variation from a standard or from specified conditions.

TOPOGRAPHIC FEATURE - See Topography

TOPOGRAPHIC MAP - See Map

TOPOGRAPHY - The features of the actual surface of the earth considered collectively as to form. A single feature as a mountain or valley is called a Topographic Feature. Topography is subdivided into Hypsography (the relief features), Hydrography (the water and drainage features), and Culture (man-made features).

TRACK (Air Navigation) - The actual path of an aircraft over the surface of the earth. The angle contained between a meridian and a line representing the actual path of an aircraft relative to the earth. It is referred to the true meridian unless otherwise stated.

TRANSFORMATION - See Rectification

TRANSFORMED PRINT - A photographic print made by projection in a transforming printer. (See also Multiple Lens Camera under Camera and Transforming Printer under Rectification).

TRANSFORMING PRINTER - See Rectification

TRAVERSE - A method of surveying whereby the lengths and directions of lines connecting a series of stations are measured. A traverse may be closed or open according to whether it does or does not return to the starting point or end on a known position. Traverses may be of many kinds such as stadia, compass, theodolite, etc.

TRIANGULATION - A method of surveying in which the stations are points on the ground at the vertices of a chain or network of triangles, whose angles are observed instrumentally and whose sides are derived by computation from selected triangle sides called base lines, the lengths of which are obtained from direct measurements on the ground. Stereotriangulation - The use of a stereoscopic plotting instrument to establish both horizontal and/or vertical control data by means of the successive orientation of the stereoscopic pairs of photographs in a continuous strip. Orientation of the initial model is by reference to ground control established by survey methods. The stereotriangulation may be of the Cantilever type with ground control confined to the initial model or of the Bridging type with control available in both initial and terminal models. Bridging to determine horizontal positions and elevations is the principal application of stereotriangulation.

TRIMETROGON - See Trimetrogon Camera under Camera

photograph should be corrected in order to obtain in effect, a photograph made by a single lens. The information is given in the form of distances referred to the fiducial marks on the photograph, and is the result of the calibration test for the particular camera used.

TRUE HORIZON - See Horizon

VACUUM BACK - See Locating Back

VANISHING LINE - See Principal Plane

VANISHING POINT - See Principal Plane

VECTOGRAPH - A stereoscopic photograph composed of two superimposed images which polarize light in planes 90° apart. When viewed through polaroid spectacles with the lens axes at right angles, a three-dimensional model is seen.

VERTICAL CONTROL - See Control

VERTICAL CONTROL DATUM - See Datum

VERTICAL PARALLAX - See y-parallax under Parallax

VERTICAL PHOTOGRAPH (Aerial Photography) - An aerial photograph made with the camera axis vertical or as nearly vertical as practicable in an aircraft.

VIEW FINDER (Aerial Photography) - An auxiliary camera with ground glass and index lines by which the time interval between exposures for the desired overlap of vertical aerial photographs may be determined.

VIGNETTING (Photography) - A gradual reduction in density of parts of the photographic image due to the stopping of some of rays entering the lens. Thus a lens mounting may interfere with the extreme oblique rays. A vignetting filter is one that gradually decreases in density from the centre toward the edges. It is used with certain between-the-lens shutters to produce a photograph of uniform density by cutting down the over-exposure of the centre of the photograph.

VISIBLE HORIZON - See Horizon

WANT OF CORRESPONDENCE - See Parallax

WEDGE (Optics) - (1) A refracting prism of very small deviation,

is often used as a "comparison wedge" in determining the density of negatives.

WIDE-ANGLE-LENS - See Angle of Coverage

WING PHOTOGRAPH - A photograph taken by one of the side or wing lenses of a multiple lens camera. (See also Multiple Lens Camera under Camera).

X-AXIS - See Fiducial Axis

X-PARALLAX - See Parallax

X-TILT - See Tilt

Y-AXIS - See Fiducial Axis

Y-PARALLAX - See Parallax

Y-TILT - See Tilt

ZENITH CAMERA - A special camera designed so that its optical axis may be accurately pointed toward the zenith. It is used for the determination of astronomical control by photographing the position of the stars.

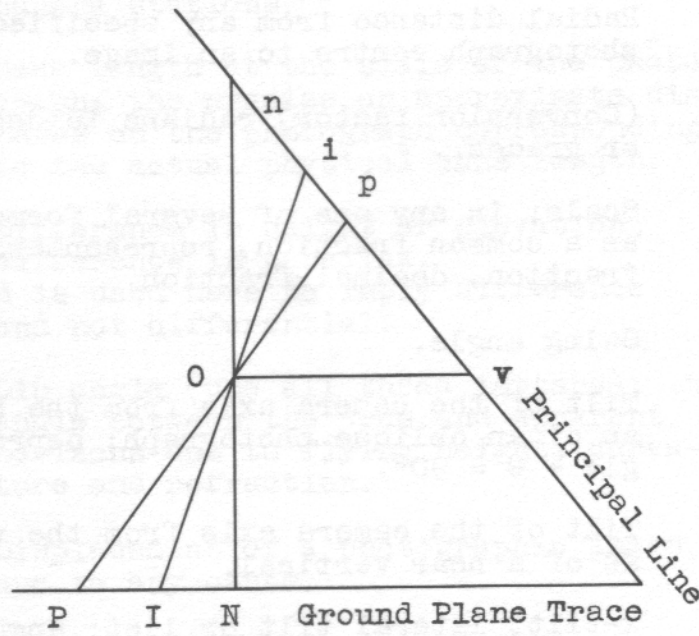
STANDARD PHOTOGRAMMETRIC SYMBOLS

<u>Symbols</u>	<u>Definition</u>
$\alpha \beta \gamma$	Any angles.
α	Azimuth angle.
B	Base length; physical distance between camera stations.
b	Base length at the scale of the photograph; the precise or approximate distance on the photograph corresponding to the actual physical base length.
dh, dP	Difference in height or elevation, difference in parallax. d is used here to imply difference and not differential.
Dip	Dip angle (use all three letters); the angle between the true and apparent horizons due to flying height, curvature and refraction.
d	Displacement of a photographic image due to any cause.
f	Focal length of the air camera.
A B C	Ground stations or objects.
a b c	Photograph image points corresponding to the respective ground stations.
H	Height or elevation of the camera stations above sea level datum unless specified otherwise.
h	Height or elevation of a ground station or object above sea level datum, unless specified otherwise.
I	Apparent ground position of the isocentre.
i	Isocentre on the photograph.
κ	Kappa: angle of rotation of a photograph in its own plane measured relative to the adopted x-axis for a strip of photographs.
m	Magnification: a factor which denotes the ratio of a dimension on a photographic enlargement to the corresponding dimension on the negative.
N	Nadir point, apparent ground positions; ground nadir.
n	Nadir point, on the photograph.
O	Origin point of perspective, lens point, camera station; origin of a system of space

<u>Symbols</u>	<u>Definition</u>
p	Photograph principal point.
P_x	x-parallax corresponding to elevation difference.
P_y	y-parallax, want of correspondence.
r	Radial distance from any specified photograph centre to an image.
ρ	(Conversion factor) radians to degrees or grades.
S	Scale: in any one of several forms such as a common fraction, representative fraction, decimal fraction.
s	Swing angle.
τ	Tilt of the camera axis from the horizontal as of an oblique photograph; depression angle + $\theta = 90^\circ$.
θ	Tilt of the camera axis from the vertical as of a near vertical.
θ_x	x-tilt, lateral tilt or list; angular component of the resultant tilt measured about the x-axis.
θ_y	y-tilt, longitudinal tilt or tip; angular component of the resultant tilt measured about the y-axis.
$X Y Z$	Axes for a ground system of rectangular space co-ordinates.
$x y z$	Axes for a system of rectangular co-ordinates in stereoscopic models.
ω	Omega or lateral tilt; component angle of tilt about the adopted x-axis for a strip of photographs.
ϕ	Phi or longitudinal tilt; component angle of tilt about the horizontal y-axis which is perpendicular to the adopted x-axis for a strip of photographs.

Fig.1

GEOMETRY OF THE TILTED PHOTOGRAPH IN THE PRINCIPAL PLANE



θ = tilt

n = nadir point

i = isocentre

p = principal point

v = point of intersection
of the principal line
and the horizon trace

O = perspective centre

The plane of the paper corresponds to the principal plane.