



MATILI TECHNICAL TRAINING INSTITUTE

P.O. BOX 76 — 50204, KIMILILI

TEL: 0707747007

E-mail: matilitechnicalcollege@yahoo.co.uk Website: www.matilitechnical.ac.ke



BUILDING AND CIVIL ENG DEPARTMENT- SURVEY 2023

PHOTOGRAMMETRY

TWORDS SHOTS EMPIRE

*BY GATHIGIRA STEPHEN
TVET/CDACC TRAINER*

Introduction

This course unit is intended to introduce trainees in surveying to relevant knowledge and skills of photogrammetry and remote sensing on terms of photographic and satellite-image interpretation which they will require to apply in their trade

General objectives

At the end of this course unit the trainee should be able to:

- a) Understand the process of acquisition of aerial photographs.
- b) Understand the criteria for interpretation of photographic images
- c) Understand the process of producing various photogrammetric outputs
- d) Appreciate the application of Mapping

SUBJECT SUMMARY

TOPIC	SUBTOPIC
INTRODUCTION TO PHOTOGRAMMETRY	<ul style="list-style-type: none">- Definition- Types of photogrammetry- Applications
PHOTOGRAPHY	<ul style="list-style-type: none">- Cameras- Photographic materials and processing- Types of photographs- Marginal information

<p>GEOMETRY OF AERIAL PHOTOGRAPHS</p>	<ul style="list-style-type: none"> - Definition terms - Scale on a vertical photograph - Relief displacement - Scale on a tilted photograph - Tilt displacement - Comparison of a vertical photograph with a topographical map
<p>RECTIFICATION</p>	<ul style="list-style-type: none"> - Projective geometry - Graphical rectification - Optical rectification - Optical mechanical rectification
<p>STEREOSCOPY</p>	<ul style="list-style-type: none"> - Binocular vision - Stereoscopic vision - Image separation for stereoscopic vision - Factors affecting stereoscopic vision - stereoscopes
<p>PARALLAX HEIGHTING</p>	<ul style="list-style-type: none"> - Stereoscopic parallax - Parallax heighting formulae - Measurement of horizontal parallax - Heights from parallax measurements - Sources of errors

<p>PHOTOGRAMMETRIC PLOTTERS</p>	<ul style="list-style-type: none"> - Systems in a plotter - Classification of plotters - Orientation of analogue plotters
<p>PLANNING MAPPING PROJECTS</p>	<ul style="list-style-type: none"> - Factors influencing panning flight plan data - Ground requirements

PHOTOINTERPRETATION	<ul style="list-style-type: none"> - Image characteristics - Image analysis
RADIAL TRIANGULATION	<ul style="list-style-type: none"> - Principle of radial line triangulation - Mechanical radial triangulation - Sources of errors
PHOTOGRAMMETRIC PRODUCTS	<ul style="list-style-type: none"> - Production processes - uses

PHOTO PHOTOGRAMMETRY

INTRODUCTION TO PHOTOGRAMMETRY

Specific objectives

At the end of this topic the trainee should be able to:

- a) Define the term photogrammetry
- b) Outline the various types of photogrammetry
- c) Outline various uses of photogrammetry

Define on photogrammetry

Types of photogrammetry

- i. Aerial
- ii. Terrestrial
- iii. Close range
- iv. Extra terrestrial

Uses photographic mapping

- i. Land use planning
- ii. Cadastral mapping
- iii. Forestry
- iv. Geological mapping
- v. Medicine
- vi. Archeology

PHOTOGRAPHY

Specific Objectives

At the end of this topic the trainee should be able to

- a) Explain the functions of the various components/parts of an aerial frame camera
- b) Distinguish between various types of aerial frame camera
- c) Outline the geometric properties of the aerial camera that are determined by calibration.
- d) Outline the composition of photographic materials of photographic images
- e) Explain the factors which affect the quality of photogramimages
- f) Explain the effects of various factors on the quality of photographic images
- g) Outline the procedure for processing black and white film
- h) Outline the procedures for printing positives
- i) Distinguish various types of aerial photographs
- j) Outline the use(s) Various types of aerial photographs

Functions of

Magazine

Body

Drive mechanism

Film flattening device

Lens assembly

- Lens assembly

- Diaphragm
- Shutter
- Filter

Distinction between the following types of camera

- i. Narrow angle
- ii. Normal angle
- iii. Wide angle
- iv. Super wide angle

Geometric properties

- i. Equivalent focal length
- ii. Position of principal point
- iii. Lens distortion characteristics
- iv. Positions of fiducial marks
- v. Nonflatness of the local plane

Composition of photographic materials

- i. Emulsion
- ii. Supporting bases

Factors

- i. Optical performance of the camera lens
- ii. Resolving power of the emulsion
- iii. Exposure time
- iv. Film speed
- v. Reflectance of the object
- vi. Atmospheric conditions
- vii. Object distance
- viii. Sun angle

Procedure

- Developing
- Stop bath
- Fixing
- Washing
- Drying

Procedures

- Contact printing
- Projection printing

Distinction between

- I. Vertical photograph
- II. Low oblique photograph
- III. High oblique photograph

Uses of Vertical photographs

- a) Tilted photographs
- b) Low oblique photographs
- c) High oblique photographs

GEOMETRY OF AERIAL PHOTOGRAPH

Specific objectives

At the end of this topic the trainee should be able to:

- a) Define various points, lines and planes associated with the aerial photograph
- b) Explain various methods of determining the scale of a vertical photograph
- c) Explain the directions of relief displacement on a vertical photograph
- d) Arrive the formulae for relief displacement
- e) Compare a vertical photograph with a topographical map
- f) Explain the directions of tilt displacement on an aerial photograph
- g) Derive the formulae for tilt displacement
- h) Outline the types and uses of marginal information an aerial photographs

Definitions

- i. Perspective prospective projection
- ii. Perspective center (exposure station)
- iii. Principal point
- iv. Focal length
- v. Principal axis
- vi. Principal line
- vii. Nadir point
- viii. Isocentre
- ix. Angle of tilt
- x. Plate parallel
- xi. Isometric parallel
- xii. Horizontal trace
- xiii. Principal plane
- xiv. Negative plane
- xv. True horizon
- xvi. Vanishing point

Methods of determining photo scale

- i. By ration of focal length to flying height (f/h)

- ii. By ratio of photograph distance a corresponding distance on existing map/drawing of known scale)
- iii. By comparing photograph distance an corresponding distance on existing map drawing of kwon scale)

Relief displacement

- Definition
- Direction

Direction of the displacement

Relief displacement formulae

- Derivation
- Application

Comparison of photo an map on terms of

Projection

Scale

Presentation of features

Detail

Title displacement

- Definition
- Directions of the displacement
- Title displacement formulae
- Derivation
- Application

Margin information

Types

From the camera

- Principal distance
- Altimeter
- Level bubble
- Camera number exposure number
- Time recorder

From title strips

Photograph scale

- Contract number
- Date of photograph
- Film number
- Name of site/area /region

RECTIFICATION

Specific objectives

At the end of this topic the trainee should be able to

- a) Define the term rectification
- b) Explain the projective relationship between the photograph a map an ground planes
- c) Describe various methods of graphical rectification
- d) Describe various methods of

- e) optical reflection
- f) Explain the conditions to be satisfied on an optical mechanical rectifier outline the empirical procedure for setting up a rectifier
- g) Define relationship
- h) Projective relationship

Definition

Proof of properties of enharmonic ratios

Graphical methods

Papers strip method

Perspective grid

Optical methods

- With the aero-sketch master

Conditions

- a) Lens conditions
- b) Scheimpflug condition
- c) Projectivity condition

working principles of investors

- Pythagorean
- Carpenter

Stereoscopy

Specific objectives

At the end of this topic the trainee should be able to

- a) Explain the similarity between the human eye and a camera
- b) Explain the various aspects of binocular vision
- c) Explain stereoscopic vision
- d) Outline various methods of image-separation for stereoscopic vision
- e) Outline factors which affect stereoscopic vision
- f) Explain the working principles of stereoscopic
- g) Describe the procedure for preparing a stere pair for stereoscopic viewing

similarity between the human eye and cameras a

aspects of binocular vision

Monocular vision

Depth perception

Parallaxes angles

Eye base

Stereoscopic vision

Stereoscopic model

Methods of image separation

Factors affecting stereoscopic vision

- Variation of scale
- Nature of terrain excessive tilts
- Non-parallelism between eye base and baseline

Working principles of

- Lens stereoscope
- Mirror stereoscope



IWORDS
ACADEMY

School for the smarties