SURVEY ENGINEERING

Topic : Advanced Surveying Equipments

Notes

MODERN SURVEYING EQUIPMENTS

Electromagnetic Distance Measurement :

EDM is based on generation propagation reflection & reception of electromagnetic waves.

EDM instrument is placed - Master station
Reflector is placed on other-point — remote station

Name of EDM instrument :
I. Geodimeter
2. Tellurometer
3. Distomat

PRINCIPLE OF EDM :

The general principle comprises sending a modulated electromagnetic beam from master station by transmitter to reflector , where it is received by receiver and return back to master station.

Electromagnetic Distance Measurement /Electronic Distance Measurement: EDM

Types of EDM :

1. Microwave instruments:

These comes into category of of long range instrument enable distance measurement up to 100km (frequency —3-30GHz) TELLUROMETER comes under this category.

2. Visible light instrument:

These instruments use visible light as a carrier wave , with higher frequency. (5 x IO^14 Hz). GEODIMETER COMES Under THIS CATEGORY. The EDM instrument in this category has range up to 25 km.

3. Infrared Instrument:

These instrument use near infrared waves. Wild Distomat comes under this category. Range of these instrument is limited to only 2 to 5km.

Electronic Theodolite :

1. Electronic Theodolite are also known as Digital Theodolite.
2. These are attached with automatic survey system & touch of single key the angle and
distance are measured and recorded in solid state memory device (data processed in computer)
3. Electronic theodolite are light, compact , accurate and precise
4. Angle least count is 1 sec.
5. Personal error associated with reading and interpolation the vernier and micrometer
are eliminated
6. Most of electronic theodolite can upgraded to total station by attaching EDM instrument.
7. Some of the common available electronic theodolites are Wild, Trimble,Topcon.

Measurement System :

It consist of use of glass circle marked or coded in special way.

Within electronic theodolite , light is passed through encoded circle and light pattern emerging through circle is detected by photodiodes.

To scan the light pattern two measurement systems are used.

Incremental Reading system :

When horizontal and vertical of an electronic theodolite is rotated in incremental reading system, the amount of incident light passing through to the photo diodes varies in proportion to angle through which theodolite is rotated.

Absolute Reading system :

In this , the light pattern emerging through the circle is unique at every point around the circle

Incremental system has fewer sensors are required than absolute system hence more reliable.

Incremental encoders are simple to use and cost effective

TOTAL STATION :

1. Total station is combination of electronic theodolite and electronic distance measurement.
2. We can find co-ordinates of reflector and simultaneously measuring vertical and horizontal angle aod slope-distance.
3. A Micro processor in instrument take recording reading and necessary computation data can easily transfer to computer which can use to generate map.

Fundamental measurement :

Horizontal Angle : Horizontal Angle is measured from zero direction on the horizontal scale.(on horizontal circle) known as instrument North.

Vertical angle : the vertical angle is usually measured relative to local vertical(plumb direction). The vertical angle is usually measured as zenith angle (0 degree is vertically up, 90 deg horizontal and 180 deg is vertically down)

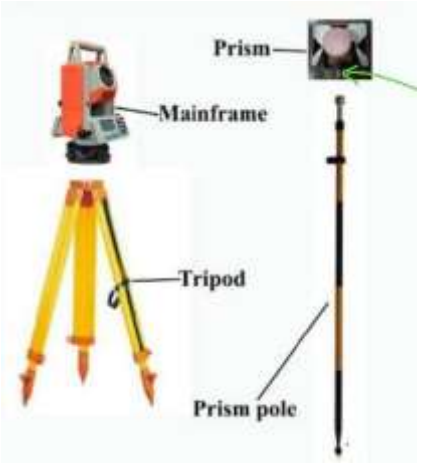
Slope Distance : The instrument to reflector distance is measured by EDM.

TOTAL STATION

Total station are operated with multifunction keyboard which is connected to microprocessor built into the instrument.

Microprocessor can perform variety of mathematical operations :

i) Averaging multiple angle measurement
ii) Calculation slope correction
iii) Distance between remote point & their elevation
iv) Atmospheric and instrumental correction.



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