LEARN DGPS USING THE LATEST
RTK SYSTEM

This course is designed to familiarize and provide a hands-on experience to the students on GPS-based surveying techniques. The course covers the following theory portions and extensive practical sessions.

Theory

Introduction to GPS; GPS System Overview; Working principle of GPS; Satellite ranging and Position Calculation; GPS errors and their corrections; Differential Global Positioning System; Basic Geodetic Aspects; Surveying Using GPS; Static Surveys; Rapid Static Surveys; Kinematic Surveys; Real Time Kinematic Surveys; Processing of GPS survey data; Plotting of GPS survey data.

Practicals

Receiver set up; Configuration of the receiver; Configuration of the terminal; Satellite tracking; Different parameters setting and Data storing; Localisation of WGS 84 Coordinates; Establishing stations and TBMs with reference to Survey of India BM (Control Points); Altitude; Stake out of the measured points and offsets; Self survey mode (absolute positioning); Static Surveys and rapid static surveys; Kinematic and RTK surveys; Post processing of surveyed data and exporting the data to AutoCAD; Topographic surveys using RTK mode and establishing control points using static mode; Precautions to be taken while using GPS receivers.

Typical Output derived from DGPS Surveying

Sky Plot

Stake out line

Stake out curve

Stake out line
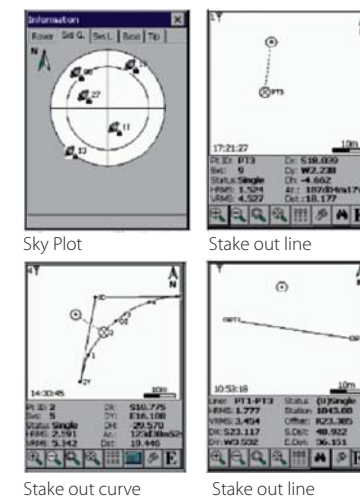
What is GPS?

GPS stands for Global Positioning System. GPS is a satellite-based locating and navigating utility that determines a user's precise latitude, longitude and altitude by tracking signals from satellites. Depending on the type of receiver and certain other conditions, it is possible to achieve real-time position accuracies within meters or even centimetres, with position calculations several times per second.

Differential Global Positioning System (DGPS) is an enhancement to Global Positioning System that uses a network of fixed, ground-based reference stations to broadcast the difference between the positions indicated by the satellite systems and the known fixed positions.

DGPS is a fast growing technologically sophisticated field, with potential applications in many industries. The most common civilian applications are in land, air and marine navigation, and surveying. More recent applications include aircraft precision approach, robotics, IVHS (Intelligent Vehicle Highway Systems), construction, resource extraction, and geographic information systems (GIS).

Advantages of DGPS

- The relatively high positioning accuracies, from tens of metres down to the millimetre level.
- The capability of determining velocity and time, to an accuracy commensurate with position.
- The signals are available to users anywhere on the globe: in the air, on the ground, or at sea.
- Its is a positioning system with no user charges, and uses relatively low cost hardware.
- The position information is available in three dimensions, that is, vertical as well as horizontal information is provided.
- It is an all-weather system, available 24 hours a day.

DIFFERENT METHODS USED IN DGPS SURVEYING

There are several methods used in DGPS Surveying such as Real-time Kinematic Survey(RTK), Static Survey and Rapid Static Survey. Of the three, the most accurate and efficient system is the RTK. **Real Time Kinematic Survey** is a method that can offer positional accuracy in real time ±2cm. RTK requires dual frequency receivers, with a radio link between base station & rover and they both must tuned to the same frequency. **The GPS based survey courses offered at V Institute uses the RTK Survey System.**

- **Static Survey:** This was the first method of GPS Surveying used in the field and continues to be the primary technique today. It is widely used for control and geodetic survey .It involves long observation time(1-2 hours observation) depending on number of visible satellites.

- **Rapid Static Survey:** This method is used to measure base line and determine position up to cm accuracy with short observation time of about (5-20 minute observation time)The observation time depends on the length of base line and number of visible satellites. In rapid Static surveys ,a reference point is chosen and one or more rovers operate with respect to it .this method is used for detailing the existing network, establishing control points etc..It is similar to Static methods, but consists of short ended site occupation time.

APPLICATION PROGRAMMES USING GPS

Control survey
With static surveying function you can do high accuracy control survey and deformation, observation, cooperation with South post processing software. It ensures users to get high accuracy results and to complete kind of tasks, like coordinate conversion, data results, edit and output.

Mapping survey
Can quickly collect data and cooperates effectively with various surveying instruments to survey, such as total station. Powerful mapping software, which one can be, imported some graphics files, like Cass, to convenience the figure surveying and revision, the function of marked point, input and mapping range selecting can avoid repeated survey or lack of survey

Electric wire survey
This function is specially designed for the users in electric power sector. It can conveniently carry out power line selecting stake-out and data format convert, especially in some invisible areas such as mountains and hills. It offers three functions: road stake out, tower construction survey and stake out, electric wire reconnaissance. It can offer various tailored tools, and many types of files, especially the conversion of *.org file.

Applied on network RTK
Can connect with all kinds of network RTK. The network function not only realizes the RTK survey without base station, but also extends the working range. Thus improve the orientation accuracy and security.

Stake-out
Can conveniently make large-scale of Stake-out of point, line and curve, can record and check location at known point in real time, can control local quantity and ensure project quality.

Road survey
Engineering Star offers road survey and stake-out function, which can be applied on road design and stake-out, control points extension, peg survey, section design and stake-out.