GPS Surveying
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Lecture - 08
Field demonstration of GPS Positioning Methods

Welcome friends. Today I am going to demonstrate the different methods of GPS surveying. Now to start with as we already told that in GPS surveying there are different methods like, single point positioning, relative positioning. And under relative positioning there are different ways we can do it like, static surveying, kinematic surveying. And again in kinematic surveying there may be stop and go and kinematic. Again in under real time you can go for RTK method.

So, here I am going to demonstrate you on field the different methods of GPS surveying. To start with let us do the point positioning. So, at the time of point positioning first we have to identify a station on which we have to set up our instrument and that is generally known as reference station. This one is our reference station here we have kept a pointer so that that is for centering purpose. So, after identifying the station we have to keep our tripod stand. So, this is the tripod stand which we will like to set up on this. Before setting up you have to first open it and take it out to as much height as possible convenient to your height .

Now, we are fixing it after raising it. Now we have to take it spread around it in such a way that all these three legs should be spread, well in equally spread and this should look for this part to make the approximate centering as well as we have to make the leveling approximate. So, approximate centering and approximate leveling has to be done spreading the legs of this tripod stand. After that we have to take the tribrach, this is the tribrach along with this is the tribrach and this is the antenna adapter both are put together. And before we are placing it on the head of the tripod stand we have to take these foot screws in the middle between the tripod and tribrach. So, that approximate leveling is to be done and that you can see through this bubble. There is a bubble where you can see about the leveling part. Now we will fix it.

So, this is the optical plummet of the instrument through which we look through see whether our centering is just at on this tip or not. Now, by adjusting this tripod leg we

have to make level. Leveling we will be able to understand by seeing the bubble at the bubble tube it should be at the center of this bubble tube. So, now it is level now we have to check whether centering has been done. Now this part it has been centered properly as well as leveled. This is a very important operation to reduce the amount of bash error as I have discussed in the errors in GPS observation class.

Now we will fix the antenna this is a very high ended antenna called geodetic zephyr antenna which removes the multiple errors. So, now we are fixing it, so taking the adapter here placing it. This is how we have placed the antenna. Now we will connect our antenna with the GPS receiver. Now, this antenna will be connected using this connector to this receiver. In this receiver there is a symbol where it will be easily understood where you have to make it, so there is a symbol of GPS, so because this antenna will receive the GPS signal. Now it is connected.

Next we will connect with this receiver the controller. Already I had shown in the class this is the controller which we will be using here. So, one end of the controller will be placed here and the other end will be kept here. After this we have to show this battery is already within this part as well as this part, so we do not need any extra battery for our work. So, now we can start.

One thing we should note that after connection is over we should be as far away as possible from the antenna because otherwise this signal will come GPS from our head also it can go to here which may cause multi path. Now you can see our arrangement we have open sky and you can see if we take an approximately 10 degrees or 15 degree, so there will not be any obstruction; physical obstruction that is very important. So, we have taken our reference station on the top of the roof.

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After the receiver has been set up, that means antenna has been centered and leveled on the point or reference station and the proper connection with the receiver as well as controller; first we have to make this controller open so that after opening we get this screen. Now from the start menu we can go inside and we can see the Trimble access is the field software which is to be used for our surveying work. So, this is to be opened; now it is opening. This is the first menu.

Now, we have to open the general survey. Here you can see the 95 percent is the amount of battery charges that is available here, and then another 91 percent is for from the receiver. So, now here you can see the satellite; there are 8 satellites we get connected and our controller is properly connected with the receiver. So, it is giving and antenna is also properly installed. Now, we have to go for jobs. We have to create a new job.

We have to give a name, let us say the job name is job one first job, job one. And keeping all other parameters now we will not be changing any other parameters. So, we can also cogo settings we can do it here. If we want we can change some of the like sea level we want to get the height with respect to sea level then we can tick it accept, accept, so we have accepted that means job has been created. Now we have to start measurement. Now if click we get we go inside the measure, but before that we can also check you can see here PDOP is 2.1. So, in our lecture class already I told you if the

PDOP is less means we have a very good geometrical constellation of satellites. So, we can start our work.

Now let me click to fast static. As I told you that the fast static is another fraction of static surveying, so when the duration is less that means fast static because we are going to take small duration observation so we have started with fast static. Now start base receiver, since this is the reference station and also it is called base receiver so we are starting the base receiver. And we can give a name to this point let us say this is the point our reference point, so roof top refer reference. So, this is the name given to it.

So, now, we have to measure the antenna height. Antenna height can be measured; this is the way how it would take it is called slant height. And the height is how much?

1.09.

1.09. And to feed and measured to bottom of notch. So, now I can start taking observation. Starting survey this the base started. Now, the measurements are being taken by the through the antenna through the receiver and the observations are being recorded inside the receiver. Now we can exit out of it. Now it will be continue to take in the mean time we can go for next method.

Now we will be demonstrating the real time kinematic surveying. So, after setting up the reference station we have to set up another station called communication setup. Here also we will first take a tripod stand where we will take on the antenna setup we will take a radio communication antenna. This is the communication antenna which has to be connected to a stand so that the antenna height gets high enough so that the communication can go far off. This is an arrangement so that no bird gets strikes on it. This is the communication antenna which will be used for communicating the radio message from reference to rover.

Now, we will connect this antenna with this the radio arrangement, so this is the connection we have done it and another connection we have given to the battery power. Now we are connecting with power. This is all about radio communication. Now we have to make it on. Before making it on we have to connect with the receiver, this is the receiver. After getting our receiver and the communication antenna installed we have to go for our field software to be operated to communicate from reference station to rover

station. So, start with a job. Usually we go for a job which is already open and where the data for the reference receiver is already there, that means we need to take a station whose location is known. This is a job we are taking.

So, now we will start measurement. Under the measure there are different types we are going for RTK. First we have to start base receiver. So, clicking base receiver we are getting. Now under point name we have to take a name which already we have taken the data that means known point. So, base you have taken and we can start now. Now, you can see base has been started.

Now, the reference receiver from reference or base receiver this radio communication is communicated through that radio communication systems. So, now you have to go for this radio communication to rover station. After the fixing and communication unit of the reference station has been set up. Now we will go up for setting up of the rover station. First this is a rover antenna which is also a zephyr antenna which will be fixed with a vertical stand having 2 legs that is called bipod legs. This will be placed in a vertical condition using these bipods so that here we have the bubble which gives us the impression about the level.

After it is fairly leveled we will fix up the receiver to the stand and then this there will be connection between the antenna and the receiver then also we have to; this is the antenna the receiving antenna to be connected to the receiver this is called rover antenna and then we have to connect the controller. With this our connection is over. Now you can see the green light is blinking means this of rover receiver is receiving the radio communication from the reference station.

Now, we can start measurement of this point location in real time. So, let me go the RTK measure point starting survey RTK, now index 29 reliability 100 percent. So, if you remember this is the index of the reference station we have so 100 percent reliability. So, except starting survey, so we have given this rover fixed name; so measure. As we have given the name measurement it is measuring. Now you can see here RTK fixed all this is given so I can store it. So, observation has been stored in RTK mode. Now we can take this rover to some other station and again we can do the same operation to measure the point on RTK mode. With this you can conclude the RTK survey.

Now, after our reference station has been set up at the reference location or the base station has been set up as the reference station, now we will be setting up the rover station for our relative static positioning. This is the point whose location we need to find out. So, we have to center as well as leveled our tripod stand on this point. Similar to what we did in the in case of reference station we are doing the same thing first we are opening the tripod stand and we are raising the height and then we are taking the tripod stand around it so that the tripod stand is centered over it as well as to a level. Then we will be taking out the tribrach head along with the antenna adapter.

So, after taking these foot screws in the middle we have placed it here and now we will make it leveled and centered. This is the optical plummet through which we see about the centering and this is the cross bubble which provides us the level part. This tripod stand has been centered as well as leveled now we will be fixing up the zephyr antenna and we are placing it on the tribrach. After the antenna has been placed on a centered and leveled tripod stand now we will be connecting the antenna with the rover receiver. So, again on the board where GPS has been written and with this rover now we have to connect the controller, we are placing the receiver in the tripod stand itself.

So, now we are connecting the controller wire with the receiver. Now after getting the wires connected as required. Now we will start now after making the controller on this is the starting menu from the start icon we are getting the starting menu, so trimble access is the field software. We are opening it. So, it is open now we go to the general survey. So, from the job we are opening a new job say it is job 2 enter, accept. Now, we have to measure. Because it is a relative static method so we are taking the static as our option now we have to measure point. So, we can give a name to this point, suppose it is rover 0 1 and method. So, antenna height again we have to measure height of the antenna using the appropriate measuring stick. Since, we want to measure the height of the field.

1.0.

So, it is 1.0. So, we are getting it. (Refer Time: 23:53) 1.40. So, enter it will be (Refer Time: 24:09) so measure, so it has started measuring (Refer Time: 24:25). So, this is the time to go that minimum 8 minutes, we have to take. We may increase also; if we increase we go on taking it will take. So, that is what we have to do it. Now in the mean time we can see that the PDOP is 2.3, and the height of the antenna is 1.40 what we have

entered that has been given correctly. There are 6 satellites and these are the 6 satellites which is been can be seen now. In this way we can list also these satellites, their angle of elevation, then other parameters.

So, once the observation is over then we can stop by giving abundant points yes. We are about to complete our observation. We are now completing it, so only 14 seconds, now 12 seconds 11 seconds observation stored. So, you see once it is observation is over again it is telling measure. That means we can go to next point and we can took take our next observation. Now I will demonstrate you the unity method of surveying which is of stop and go type, in which we have already set up the reference receiver in the reference station and now we will be setting up our rover station. Before taking the measurement in this method first we have to go for initialization.

Now here you see that we have placed the antenna on a point after properly leveled and centered and this is a temporary point where we will be initializing we will do the initialization process. Now in order to do after doing the necessary connection as we did in case of rover receiver in relative positioning we did the same thing only we had done it in a different station point and now we have to do the initialization process. For that after the opening the field software Trimble access general survey we go again we should go for a new job. Suppose, we are giving the name as job stop and go, enter, accept.

Next after opening we should go for measurement it is the PPK, so measure points. It has started the post processing kinematic positioning. So, let us say the name as rover 6 and the antenna height we have measured as 2 meter, so we kept it, enter measure. After opening the job we are now starting measurement. So, before starting the measurement we should go for initialization we are doing the initialization process in it. So, we are taking a new point start, so here and the antenna height.

It will require 15 minutes time initialize the process. You can see 7 minutes time observation stored. So, initialization has been stored. Now we can start measurement of point by stop and go method. Now we are starting measurement of some salient points as a demonstration we have taken some points marked on this floor whose point position we will be determining by using stop and go method. First after initialization we have stopped measurement and we have brought the receiver to a stand and kept on the point

on which we want to find out the position. Now I will take to the measure and measure points. So, now as I tick the measure point, so now it has started to measurement.

So, as the measurement is over it has come to this store. Now, I can store it. Once it is stored then the name of next point rover 8 has come automatically which we can measure that we will do after shifting our instrument to next point. So, let us go to the next point. After keeping the stand just at the center of the point and making it a bit level. So, this bubble we can get the leveling. Now I am starting measurement of the next point. So the measurement is over now I can store it now.

One thing we should keep it in mind that during measurement we should keep hold without making any movement anyway. So, now the name has been changed automatically to rover nine which will be name of the next point. So, this is the third point which one to measure whose name is rover 9. As we have centered it leveled it now I will start measurement. Now we can store it. So, we can go to the next point. Let us go to the next point. It is the rover 10 after leveling and centering we have started measurement now store.

In this way we can go on continuing our measurement at different points salient points and we can further during post processing we can get the position. With this I want to conclude about our demonstration of stop and go method. Already we know how to carry out the kinematic GPS surveying. First what we did we had set up our reference station or base receiver to the reference station, then we had taken the rover receiver to some initialization point and we completed our initialization. And after the initialization now we will do the actual measurement of the kinematic positioning. To start with kinematic surveying with the rover survey first you have to create a new job.

So, new job; after creating the job we have to do our initialization which is being done now. Once as the initialization process is over now I will measure the along this line marked in the floor. So, as a matter of demonstration you have to tick continuous topo then I am ticking to start. Now we are movement, you walk along this line as slowly as possible now slower the movement more will be accurate (Refer Time: 36:45).

With this I want to end today's demonstration on kinematic movement. So, that is the completion of our demonstration. In this demonstration I had shown you the point positioning, then relative positioning by static method. And then relative positioning also

I have demonstrated the stop and go method, kinematic method. And also finally, I have shown you the real time kinematic method. With this I would like to conclude today's class see you in the next class.

Thank you.