Laboratory Practices in Earth Sciences: Landscape Mapping

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Week- 07
Lecture- 33

Hello everyone. So, in our last lab we have understood the basic idea about the total station. We have mounted the total station on the tripod. So, today in this lab we will learn how we can connect the total station with our field calculator and how we can do the setup of the total station and the mapping part. Here you can see I have opened all the field controllers and the total station. So, once you open your software you create the job and then you have to connect this total station with the field controller with the radio signal.

So, two options are available, one is your Bluetooth signal and another is your radio signal. So, if you connect your total station with the Bluetooth signal as we did for our RTK lab. So, your Bluetooth has some limitations with the distance if you go far. So, you can lose your connection.

So, it is better if you connect your total station with the field controller with a radio signal. So, this radio signal will give you an excess of more than a kilometer if your object is in the line of sight of your total station. So, it can measure your easting northing and height for your object. So, you mount your radio handle and then once you mount your radio handle you go to the instrument and then in the instrument you would see the TPS setting, TPS camera setting, connection and instrument status. So, first we will show you how we can connect the station with our controller.

So, for that you have to go to the connection part. In the connection part you have a TPS connection wizard and the other is all other connections. In all other connections you will see few options. So, in these few options you would also see one is the total station. So, in this total station you can see the port is Bluetooth and the device is MS 50. So, you have to change this Bluetooth to radio signal. So, you can do that by going to the edit option.

In the edit option here you can see some information regarding the instrument. One is your manufacturer, which is Leica, the model number MS 50 and the other is connected using Bluetooth. So, we have to change this Bluetooth to the internal radio. So, once you change this connectivity option you click ok and when you click ok this will connect to your total station. So, here you can see information that this total station is currently being remotely controlled. So, now, this total station is controlled with the now you can operate the total station with the remote controller.

So, this is connected. So, this connection you can see over here this signal this total the signal is coming from total station to the remote controller. So, that you can see over here you can see the signal which is indicated with the red color and the signal transferring is with a green popping light. So, this option you can see on your radio signal and that also you can see over on your screen with this option. So, now, once your total station is connected with your field controller.

So, now, you can do all the measurement with the help of this remote controller. So, you can mount this remote on your prism if you are measuring the you are doing your surveying with the help of prism. In that case you can mount on the prism or you can single handedly operate this instrument from a remote distance. If you are using the second method to identify with the help of any surface method in that case you can directly use your total station or you you you can directly operate from the from the total station only and you can do your measurement in that case you would not require the remote remote remote controller. This field controller is only required when you are alone to do the survey and you connect your field controller with the total station and you mount this total controller on the on your prism pole and you do your mapping part. So, we will mount this on the pole prism pole and then we will show you that how we do the total station setup and then we do the mapping part.

So, to set this total to do the measurement of slope distance and angle. So, that measurement you have to first set the total station you have to assign the arbitrary value in form of north easting and height of the instrument and with respect to this value it will measure all the unknown points. So, that we have to do, we will see how we can set up our instrument. Here you can see we have mounted our field controller on the pole. So, now, the first step is to set our total station.

So, we have to set the orientation of the total station. So, to setup your instrument you have to go to the go to the work option and the go to the work option in the first option is the setup option. So, you have to set up as I said that to take the measurements you have to set your total station. So, there are few options available to set your instrument height of the instrument or the measurement of slope distance. It will require the height of the instrument, height of the object and some atmospheric corrections. So, that you can do with the help of a few options are available on the total station setup method.

So, the first is set orientation, another is known back side multiple back side transfer height resection orient to line. So, set orientation is when your instrument knows its location on the globe, but the point which you are giving to the back-side point. So, at that unknown point you assign the arbitrary value to the total station in the form of an easting northing

and height and with the help of that point it will measure to the unknown point. So, that method is called the set orientation method in the known back side if you have a one back side id that has the northing easting and height and with the help of this back-side id your instrument identifies its position on the globe. So, that is the known backside method the multiple back side when you have a two or more than two known point in the form of back side back side id and with the help of that two three known back side id the instrument is locating it position or it is orienting itself with with reference to that known point that that method is called the multiple back side back side method.

And then the transfer height when you have the multiple points and based on the height of different back side points the instrument is calibrating itself. That method is given over here. The reach section method is when you have a three known back side point and with this three known backside point the instrument is identifying its location on the globe that method is your resection method. The simpler method here is the set orientation method where you can put your prism on any surface and with the reference of that prism or a known point of northing easting of your instrument the total station it will orient itself. So, that method is set orientation method and we will use this set orientation method and with the set orientation method we will orient our or calibrate our instrument. So, first you select the set orientation method and click on ok.

So, for that you have to first place your pole on such a place where you want to where you want to use that point as in the form of back side point or back side id. So, we will go to a point or position or area where we will keep this pole and then with the help of that point the instrument will orient itself. So, here you can see we have placed our pole on the surface and we want to take this point as our back-side id. So, here you can see to set the back-side id you have to input some parameter. So, the station points from which you choose the job and then you have to choose the job.

So, the job was the lab. So, you go to the lab and then you have to set the point. So, you choose your job that is the lab t s and then point id you have to give a point id for this point this back-side point or that you have to give. So, you can create a new point that is you that is the t p s 001 or you can change it as a back-side id. So, here you can see that the point is 0.

01. So, this is the point that is the point that here I have chosen the back side 01 here you have to give the easting northing and elevation. So, as I said, this total station will measure all the surveying or the measuring of the unknown point with reference to a known point. So, that known point is an arbitrary value in the form of easting northing and height. So, that we will assign an arbitrary value for this case we will give it to 1000 and 100. So, 1000 1000 is for your eating and northing and 100 is for your height.

So, with respect to this 1000 1000 and 100. So, this total station will measure the calculation for all the unknown points. So, it will measure with respect to this arbitrary value here we will assign its easting is 1000 1000. So, an elevation is your 100. Once you assign the values you click on the store here you can see one point has been created that is v s 01 you click ok and now you have to give the instrument height. So, here you have to give because this is for the instrument the total station where you have a place your total station on the tripods.

So, that height you have to assign over here. So, with reference to this height it will measure all the points first you have to here we are doing the it's kind of a base setup as we did for our article app. So, here if you consider this total station as your base. So, all the information which we are currently inputting here. So, that information is related to your total station.

So, this was your point for the center of t s. So, from this point you have to measure the height of your instrument. So, here you can see this height is 154 centimeters. So, this height you have to assign in your back-side orientation part. So, at that height we will enter in the instrument height option in the field controller.

So, here you can see the instrument height. We have assigned it 1.54 that is the instrument height from your center of total station and easting, northing and elevation we have already assigned for our back-side orientation. So, this is the instrument or orientation part. So, once you are done with this you click on ok and here you can see this is for the back-side id. So, now first in the previous section we have an input or information which is related to the total station only and now we will assign the information which is related to your back-side id or the point where we have placed the prism or the pole.

So, here we will give it as a back-side id you have so you can assign any name or the id. So, we have assigned it back side id and now you have to in the second option you have to enter the target height. So, the target height is the height of your prism. So, in this case we are using the prism for the instrument setup. So, here we have to assign the prism height in the target height option.

So, here in this pole you can see it is 1.8 meters. So, this 1.8 meter we will write over here. Now, once you have input the target height now you would see that this is your direction and horizontal distance.

So, this direction is 0 degree 0 0 minute and 0 0 second. So, because we are taking this one as our back-side id. So, with respect to this the instrument will calculate it as a 0 to

300-degree 360 degree. So, here we have to assign the information. Here you can see this would be your azimuth direction and from this point it will calculate it from 0 to 360-degree direction. So, that you can see over your direction and another two options here you can see is your horizontal distance and height difference.

So, the horizontal distance as we already told you that the instrument is associated with the idiom that is your electronic distance measurement. So, with this idiom it will calculate the 2-bit travel time with the help of a microprocessor by using the height of the instrument, height of the object and some atmospheric corrections. So, once you click on the distance. So, here you can see two options one is distance and another is set option. So, once you click on the distance part.

So, with this distance it your total station will try to locate your prism. So, we will do the searching for prism option now you can see your total station is looking for the prism or you. Locked target. So, now, you can see your target has been locked, that means the prism your total station has identified your object or identify the prism. So, with this idiom it has calculated the distance.

So, now, once you click on the distance. So, here you can see earlier that this place was empty now once it located its target. So, here you can see the horizontal distance between your total station and your prism, that is your object is 1.6 meter and you can also see the associated error is 0.

0 minus 0.085 meter. So, here you can see the accuracy of this instrument in calculating the distance and angle. So, once you can see the horizontal distance and height difference that means the instrument is the instrument or the total station has located your object. So, you can now click on the set. So, this will now be your instrument.

Target not lost. So, in this case your instrument is set or your total station is oriented. So, once your total station is oriented or it has it has done the orientation part. So, you can start with the surveying part. So, this is the survey you can do by going to work. So, first before going to work or starting the survey, it is better you lock your target.

So, in this total station one feature is automatic aiming option or automatic locking option is given in your total station and you can use that option or you can lock your target. So, that will help you to do the continuous mapping part. So, once this is locked. So, as soon as you are moving with your prism. So, your instrument will automatically identify this object or your prism.

So, that you can enable from the going from here you can see this one lock option has been

given and in this lock option you would see some few options are related to your total station. So, measure any surface. So, what I was initially telling you is that another method is to measure any surface method. So, once you click on the measure measure any option. So, this will enable a laser point on your instrument and with the help of this laser point you can mark your respective object.

So, now you can see as it is in the measure of any point option. So, here you can see the measure to the prism. So, this will enable the prism mode. So, we will keep it the prism mode and now another option is the continuous measuring is off and this is your phase change the your because it is the 360-degree rotating instrument. So, you can change the phase; this is the power surge in case your instrument is unable to locate your object.

So, you can use this option then this is the red laser on. So, this will be the red laser on your instrument. So, here you can see once we enable the lead laser. So, this lead laser is enabled. So, with the help of this lead laser or any surface method you can precisely pinpoint your object or you can do the measuring part or surveying.

So, another option is target lock on. So, you have to go to this option and your instrument you have to first locate your object. So, for that you can use this power surge option or that you can also do in manual mode or in the with the help of power surge option because the power surge option is given. So, you can use it to simply identify your object and it will lock your target. So, here you can see the symbol is locked. So, this here you can see the target lock and that you can release this target lock by pressing on the target lock of option.

So, now, your target is locked. So, once your target is locked now you would see how your total station is connected to your prism. So, as soon as I move with my prism. So, this instrument the total station will also locate your target or prism. So, here you can see as I am moving with my prism you can see your total station is also moving because it is continuously locating an object that is the prism.

So, because we have enabled the target locked option. So, it is locked and continuously trying to identify our object. So, once you are done with your instrument setup part and your locking part now you can start your survey. So, you go to work and in the second option you can see the survey option. So, in the survey option you can now do the survey.

So, survey means you would collect your points. So, that point is all the all your unknown points and this unknown point will be connected with the help of your known point. So, the north easting and height of this unknown point will be measured with respect to your known point. So, that point you can use in different kinds of civil engineering projects or you can also use in earth science the landform mapping part. So, this high precision

horizontal and horizontal and vertical distance is helpful to measuring the stream offset or mapping your height of the river terraces or height of your fault scar. So, continuously I am telling you that it is north easting and height not the elevation because this is the height which is measuring of unknown point it is respect to your known point.

So, that is why it is height it is not elevation this this height is not measuring measured from the mean sea level it is this this is just a point you you you keep in mind that this height is measured with respect to your height of the instrument which we have assign or the height which we have place our instrument with using this height or the object height the instrument is calculating your height of your unknown point. So, once you go to the survey option here you can see as we saw in our article lab two options are available one is manual mode and another is automatic mode you can use any of the modes. So, it is better if you use the manual mode and in manual mode you can do all the surveys and you can collect your points. So, in manual mode the distance and angle of your point will be more precise because here in the pole on the pole a bubble is being given you try to keep this bubble at the center while taking the measurement. So, in automatic automatic mode mostly it is difficult to measure and keep this bubble at the center.

So, that is ultimately including some error in your data. So, it is better if you can do the manual survey. So, in a manual survey you simply put the point id. So, you can assign any nomenclature to your point id. So, I will give it to the T S 0 1. So, with this T S 0 1 if you want to take the measurement for this point you simply click on the distance and because this instrument is already locked.

So, it will calculate the horizontal distance and error here you can see this is your horizontal coordinate system with respect to the backside id which we initially identified. So, this is your horizontal and this is your vertical coordinate and then this is your horizontal distance that is your 1.4 meter for this point and the height difference is here you can see and the northing easting of this point here you can see the easting is 99999.552-meter northing is 1001423 meter and elevation is 100 meters. So, this northing easting and elevation at this point is basically calculated with reference to the northing easting and elevation which we have assigned for the total station that was 1000, 1000 and 100 meters.

So, here you can see with reference to 1000, 100 meters this instrument is calculating the northing easting and elevation for this point. So, once you are satisfied with your point or you identify your serving point or you calculate all this value you keep on stopping and measuring. So, here you can see the sound the point stored the sound has already enabled. That is why you can hear the sound and similarly you can measure the multiple points. So, here you can see the point id has also been changed. It is now on the TS02 initially it was 01.

So, the 01 is already saved in your system. So, you go to another position and you click on the distance mode and once you click here you can see the northing easting and elevation for this point and once you are satisfied with your point you click stop and measure. So, this will measure or store another point. So, similarly you can map or you can calculate the position of multiple points or locations with the help of this method. So, another option is your automatic mode. So, you go to you click on the function and here in configuration you would see the auto points in this auto point here you can see the log auto point you first you have to enable this log auto point and the store point by you have to you can change it from time to distance to height difference distance or height slope or go.

So, you can choose any of these options and you can choose the parameter at which you want to take your point. It is the similar kind of method which we saw in our RTK lab. So, with the help of this automatic point option you can do the survey and you can collect multiple points on your desired location. So, the point you can also see on your map. So, here on your map you would see the point which you have collected for your survey.

So, for this lab we have collected only two points. So, you can see the two points over here you can also see the prism location you would also see the location for your total. Once you are done with your surveying part. So, you can export this data by going to the job and export it is the similar method which we saw in our RTK lab from the export and copy data you have to choose the format and then you can you can insert the USB or pen drive in your field controller and from the selecting the job you can export this data from your external drive. So, once you export your data you open this data in excel file or you can process the data on the software which is also provided by Leica. So, you use that software to prepare the profile for your data you can generate the DEM for with the help of this data.

So, you can also create the profile for your reverse action, your profile for your height of the terrace and height of the fault disk. So, based on your own interest you first do the survey, you measure the points and then you plot those data with the help of either with the help of software or you can do the simple calculation or plot your data on the excel also. So, we will stop here and in the next lab we will do the GPR that is the ground penetrating radar. So, that we will understand in our next lab. Thank you.