TopSURV: Store as a Check Point

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Webinar Agenda

- Collecting a control point, best practices
- Point Check dialog. Store as a Check Point option, defined
- Managing Check Points
- Weighted Average option, defined
- Usage of the Weighted Average function
Control Surveys

- Control Surveys. They are used to establish precise horizontal and/or vertical positions of reference monuments. These monuments serve as the basis for future field work (topographic, boundary, construction types of surveys, etc).

- The ultimate success of any engineering or mapping project depends on appropriate survey control.

- Repetition. While setting control points, the more redundant/independent measurements that can be made to our project’s reference monuments (set in the ground), the better.

- This procedure increases precision, eliminates certain instrumental errors, and prevents mistakes from going undetected.

- To support this proven methodology, TopSURV data collection software offers a data collection feature called **Store as a Check Point**.
Collecting a control point, best practices

- The scenario will be to take a field measurement on a control point.
- When using a GNSS receiver, the longer that we stand still and measure, the better.
- …to a point.
Collecting a control point, best practices

- The longer you occupy a control point with a GNSS rover receiver the better the resulting precision will be. However, it has everything to do with how many satellites are being tracked and used at the time of occupation in the field.

- A “nice and round” number that is commonly used to measure a control point with a GNSS receiver is **30 epochs**. …we’ll see this again later.
Store as a Check Point with TopSURV

- So how do we use the **Store as a Check Point** feature in TopSURV? To call up the Store as a Check Point function, you will intentionally cause a “data collision”.

- Meaning, we will measure the control point once. Then, upon measuring the same control point for our subsequent (redundant) times, we will purposefully declare that **the point name is the same** as the first time we measured it.
Store as a Check Point with TopSURV

• Let’s put some names to it. For this example, we will store a control point numbered 102 in our TopSURV job.

• Since it is a control point, we will observe this point in a Fixed solution and will log 30 epochs…all while keeping, “the bubble in the circle” for a steady / minimal movement field observation.
As mentioned, upon measuring the same point for a subsequent time, we will purposefully name the redundant field observation **102**. This will result in a “point name data collision” within your TopSURV job.

TopSURV will prompt you that a point with this name already exists in your current job.

The screen logic is, “The positional difference from the first observation to the second is *this* (shown in delta north, east, and height / elevation). What do you want to do?”

…let’s take a look.
Managing Check Points

- From the main menu, tap the **Survey** icon and select **Topo** to begin the process of collecting a field measurement.

- Working your way down the screen, the point name will be **102** (as shown above).
Managing Check Points

- From this screen, we will tap the **Settings** button at top center to see data collection options. We are using the default data quality filter for a Solution Type of **Fixed Only**.

- Next, we are going to purposefully increase the **Number of Measurements to Average** from the global default of 3 epochs to **30**.

- Again, the purpose of this is to increase the resulting precision of this control point. This can be changed from shot to shot as needed. User preference. Tap OK to return to the **Topo** screen.
Managing Check Points

- With the Epoch Count now set to record 30 measurements, we are ready to collect this control point.

- Time to put, “the bubble in the circle” and tap the Start button.

- Recall that this is our first field observation for this point numbered 102. When done, TopSURV will automatically increment our point number from 102 to 103. In this case, we will purposefully change the point name to be 102 again.
Managing Check Points

- We are still physically setup over the same point. We have not moved. We will purposefully measure another 30 epochs while in a Fixed solution.

- Once all 30 epochs are collected for the second time, as mentioned, TopSURV will realize that a point named 102 already exists in the current job. Collision.

- You will be prompted with how much the initial measurement differs from the subsequent (shown as delta north, east, height).
Managing Check Points

- Next, you have options of how to proceed. You can Overwrite or Rename if you wish. Or you can select the **Store as a Check Point** option.

- Notice that we have not checked on the **Use in Weighted Average** option yet. This is for training purposes. We will see this again later.

- With the Store as a Check Point option turned on, tap the OK button to return to the Topo data collection screen.
So what just happened? Two independent field measurements have now been made over the same physical monument on the ground. The second has been Stored as a Check shot.

To verify this, tap the **Context Menu** (Topcon logo at upper left corner) and select the **Edit Points** option to see a listing of all points currently in your field job.

Select point **102** and tap the **Edit** button.
Since multiple field measurements were made on point 102, notice that as a result, you have a tab labeled **Check Points**.

Within the Check Points tab, we see how the two independent field measurements differ from each other (delta north, east, and height).

...keep going. Tap the **WA (Weighted Average)** tab.
Weighted Average option, defined

- Notice that the first row of point number 102 shows positional residuals of zero. However, below this row is another instance of 102 (colored red) with values for positional residuals.

- This indicates that the second instance (second field measurement) is not influencing the final position. Recall that we purposefully did not check on the Use in Weighted Average option earlier.

- Tap the second row of 102 to highlight and then select the Use in Weighted Average (WA) button.
Weighted Average option, defined

- In TopSURV, the Weighted Average function will assign “weight” to field observations based on distance.
- Meaning, the RTK vectors that are further away will influence the final result less than an RTK vector that is shorter.
Weighted Average option, defined

- For this graphic, the RTK vector that is 10,000 feet away will have less of an influence than the shorter of 5,000 feet.
- There are many options and field scenarios for the process.
Weighted Average option, defined

- For training purposes, we did not check on the Use in Weighted Average option initially during the collection of the second field observation for point 102.

- This was to show you that this can be turned on / off at anytime later.
Questions?
Setting Control Points, best practice

- While setting Control Points for a field project with a GNSS rover receiver, it is a widely accepted best practice to set / measure them once in the morning.

- The same method as shown previously…to occupy each control point with a 30 epoch measurement while in a Fixed solution.

- Then it is common to let some time go by and “hit them again” in the afternoon of the same day.

- The purpose of this is to let the constellation of satellites up above to drift and change enough to provide an “independent” field measurement from the first round.
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