INSTRUCTIONS FOR USING THE TOPCON GR-3 BASE AND ROVER IN TOPOGRAPHIC SURVEY

These instructions outline the basic procedure for conducting a topographic survey using the Topcon GR-3 base and rover receivers with the Topcon FC-2000 data collector. They assume proficiency in setting up the base receiver, calculating the receiver height, conducting a static occupation, downloading data from the receiver, and obtaining corrected measurements from OPUS. Instructions for these procedures are provided in another document titled "Instructions for Establishing Reference Points Using the Topcon GR-3."

HARDWARE SETUP

Set up the Topcon GR-3 base receiver over a reference point, measure the slant height, record the slant height on a piece of paper, and then turn on the receiver. Let the receiver run for about a minute to acquire satellite signals and then push the Function button for about 1-3 seconds. This will initiate the static occupation and obviates the need to use the Topcon data collector for this purpose (as specified for the Topcon FC-200 in the Topcon GR-3 instructions). The Rec (record) button should begin to flash green, indicating that the unit is now receiving satellite data.

Next, carefully attach the serial cable to the GR-3. The serial plug on the base receiver is located opposite the MINTER (the panel with on/off and function buttons). Unlatch the flap and insert the cable into the middle plug. Be careful not to jostle the receiver. Then, connect the other end of the cable to the 9-pin serial port on the left side of the FC-2000.

Now, set up the Topcon GR-3 rover receiver on the adjustable receiver pole using the quick disconnect adapter (just as you did for the base receiver). Adjust the pole height to 2.00 meters and then carefully lay the unit on the ground. Then, go back to the base receiver.

SOFTWARE SETUP

Set Up Job

Turn on the FC-2000. Initialize the TopSURV program if it is not already initialized (it should be initialized unless the previous user has closed it). Click on the Job icon and then select New Job. Type in a name on the keypad and press Next on the screen.

Survey Style screen - If not already selected, select My RTK for GPS+ Config Name and My Conventional for TS Config Name. Press Next.

Coordinate System screen – Select the appropriate Projection for your survey area. For the Natchez, Mississippi area, you would select UTMNorth-Zone_15. If it doesn't appear in the

drop-down list, click the button at right, navigate to _Global | UTMNorth | Zone_15, and double-click to select it. It will now appear in the drop-down menu. For Datum, select WGS84. Leave Geoid Model as is. (This will create an error message later, which you can ignore since you will be correcting your readings to the OPUS-corrected static occupation readings.) Press Next.

Units screen – Distance should be Meters, and Angle should be DMS (degrees-minutes-seconds). Press Next.

Display screen – Leave these as is and press Next.

Alarms screen – Leave these as is and press Finish. This will return you to the TopSURV main menu screen.

Set Up GPS (Base)

Click on the Setup GPS icon and select Start Base. You can change the Point name or leave it as Base1. Enter the correct antenna slant height, make sure the displayed projection (i.e., UTM…) is correct, and then click on Auto Pos. This will display the base receiver's uncorrected coordinates. Then click on Start Base. You may receive an error message about incorrect elevation readings due to inaccessible Geoid. You can ignore this message, since you will correct your data later using the OPUS corrections for the base receiver static occupation.

Set Up Rover

Once you have started the Base, close the Start Base screen (Close button at top right) and carefully disconnect the serial cable from the base receiver. Connect the cable to the rover receiver. Set up the receiver pole using the bipod, being careful that it is firmly in place and doesn't fall over. Turn on the rover receiver and let it run for about a minute to acquire satellite signals.

Click on the Survey icon and select Topo. For a new job, Point should be set at 1 and Antenna Height should be 2.000 Vertical. Press Start and you are ready to go!

To acquire a survey point, place the rover receiver on a point, level the pole, and press ENT on the FC-2000. On the screen, you will see the Epoch count go from 0 to 1 to 2 to 3; then you will hear a beep, indicating that the reading has been recorded. This should take about 5 seconds. During this process, the rover acquires three sets of readings for that survey point and records their average. Once you hear the beep you can continue to the next point. When you are finished, press Stop, close the screen, and turn off the FC-2000.

If you return to the same job later, the Point count will be where you left off. If during the survey you want to see a map of the points you have acquired, just click on the Map tab. To turn off the FC-2000, press the Power button. During power down, it will back up your survey file. If you turn the FC-2000 off while the Topo survey screen is open, you will return to that screen the next time you turn on the data collector.

Once you have finished surveying, turn off and pack up both the base and rover receivers. Make sure that the base receiver has been running its static occupation for at least an hour so you can obtain (from OPUS) a reasonably accurate position.

DOWNLOADING YOUR SURVEY DATA

Data files stored on the FC-2000 are downloaded to your computer through Topcon Link. This software can be downloaded for free from the Topcon website. You also must have Windows CE installed on your computer. This software can be downloaded for free from the Microsoft website. Windows CE permits Windows-compatible mobile devices to communicate with Windows on your PC or laptop.

You will connect the FC-2000 to your computer using a USB cable with a mini-USB connector at one end. Connect the cable to the mini-USB port on the left side of the FC-2000. Then connect the other end to your computer's USB port. Now, turn on the FC-2000. You should see a small window briefly flash on the FC-2000 screen and then hear a faint, quivering beep. An icon for the Windows Mobile Device Center also should appear at the bottom of your computer screen (for Windows 7). Click on this icon and then click on "Connect without setting up your device." A new window should appear that says you are connected.

Open Topcon Link. Click on File | Import from device. On the left side of the Import From Device window, double-click on CF Card | TPS TopSURV | Jobs. Select the proper job name (*.tsj) and drag it to the right-hand side of the window to place it on your computer.

To open the file in Topcon Link, double-click on the file name on the left-hand side of the window. An error message box will appear saying that your elevation calculations will not work correctly because the specified Geoid model is not in the list. Click OK, and then close the Import From Device window. In Topcon Link, you should now see a split window with your topo survey data at top and a map of those points at bottom. You can copy and paste the data into an Excel spreadsheet, or you can save them in ASCII format, dxf format, or as an ESRI shapefile. (You will want to save them in Excel, since you will need to correct them later.)

CORRECTING YOUR SURVEY DATA

Before using your survey data, the xyz values need to be corrected. (This step is not necessary if you set up your base receiver on a known point and entered by hand the correct northing, easting, and elevation values instead of selecting Auto Pos when starting the base receiver [Setup GPS | Start Base].)

After downloading the static occupation file from the memory card in the GR-3 base receiver, submit it online to OPUS. The procedure for doing this is outlined in "Instructions for Establishing Reference Points Using the Topcon GR-3."

Once you receive the corrected northing, easting, and elevation values from OPUS, calculate the difference between each of those corrected values and the corresponding uncorrected values listed for Base1 in your topo survey file. Then, add (or subtract) the

difference from each uncorrected survey reading (northing, easting, and elevation) in order to bring them in line with the corrected Base1 position as derived by OPUS. Normally, the northing and easting corrections will be off less than a meter, while the elevation correction may be off by tens of meters.

NOTE ON CHARGING FC-2000 BATTERIES

Unlike the FC-200 data collector, batteries for the FC-2000 are charged externally using a battery charger. The battery is accessed from the back of the FC-2000. The charger and a spare battery are kept in the gray, soft bag along with extra cables.

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