Topcon GM-55 Total Station Setup Using Topcon FC-5000 Data Collector
Maryland NRCS

1. Set up tripod and level base plate.
2. Place GM-55 Total Station unit on tripod and level:
   a. Adjust tripod legs individually to get the bubble near level.
   b. Use thumb screws on total station to make fine adjustments and center level bubble.
   c. Rotate total station and center over each tripod leg. Verify that the bubble is level at each stop. Make fine adjustments as necessary.
3. Press the power button on the total station.
   a. Make fine level adjustments to center digital level bubble.
   b. Push **[F1]** to select "**OK**".
4. Aim total station sight towards North and establish 0° (deg).
   a. Rotate total station so that it aims in the direction of magnetic North.
   b. Push **[F1]** to select "**0Set**" function.
5. On the FC-5000 data collector, press the power button .
6. Once at the Windows 10 home screen, open the MAGNET Field© software.
   a. Tap the **Windows** icon at the bottom-left of the tablet screen.
   b. Tap **All Apps** icon .
   c. Scroll down to **M** section and tap **MAGNET Field** folder.
   d. Tap and open **MAGNET Field** app.

****** If this is a first-time set up, proceed to step 7. If this FC-5000 has been set up previously, skip to step 11. **

7. Close the *Connections* window by pressing the home screen icon near the top-right.
8. Set up GM-55 connection profile.
   a. Tap **Configure** icon.
   b. Tap **Survey** icon.
   c. Under the **Optical Configuration** box, tap **[Edit]**.
   d. Under the **Configuration** window, enter the following before tapping **[Next >>]**:
      Name: **GM-55 TS**
      Type: **Conventional**
   e. Under the **Config: Instrument** window, enter the following before tapping **[Next >>]**:
      Manufacturer: **Topcon**
      Model: **GM-50/100(Topbasic)**
   f. Under the **Config: Conn Mode** window, enter the following before tapping **[Next >>]**:
      Initial TS Connection: **Bluetooth TS**
   g. Under the **Config: Survey Settings** window, enter the following before tapping **[Next >>]**:
      Meas Method: **Direct**
      Tolerances, Hz: **5.000**
      Tolerances, Dist.: **0.02**
      Tolerances, VA: **5.000**

h. Under the **Config: Survey Settings** window, enter the following before tapping the checkmark icon ✓ near the top-right:
   Measurement Type: **HA/VA/SD**
   Target Type: **Prism**
   EDM Mode: **Coarse**

g. Tap the accept/home screen icon ✓ near the top-right.

9. Establish default measurement units:
   a. Tap **Configure** icon.
   b. Tap **Units** icon.
   c. Under the **Distance** tab, enter the following:
      Distance unit: **US Feet**
      Distance precision: **0.123**
      Area unit: **Square USFeet**
      Volume unit: **Cubic USFeet**
   d. Under the **Angle** tab, enter the following:
      Meas angle unit: **DD.ddddd°**
      Meas angle precision: **0.123°**
      Calc angle unit: **DD.ddddd°**
      Calc angle precision: **0.123°**
   e. Under the **Coordinate** tab, enter the following:
      Norting/Easting precision: **0.123**
      Lat/Lon units: **DD°MM'SS.s"**
      Lat/Lon precision: **0°00'00.123"**
      Height precision: **0.123**
   f. Under the **Other** tab, enter the following:
      Temperature unit: **Fahrenheit (°F)**
      Pressure unit: **inHg**
   i. Tap the accept/home screen icon ✓ near the top-right.

10. Establish default display settings:
    a. Tap **Configure** icon.
    b. Tap **Display** icon.
    c. Under the **Display** window, enter the following:
       Coord Type: **Ground**
       Plane Coord Order: **Northing,Easting,Height**
       Geod. Az. Origin: **North**
       Direction: **Azimuth**
       Display Slope As: **Percentage (%)**
       Station Prefix: **Sta.**
       CL Position: **12+34.000**
    d. Tap the accept/home screen icon ✓ near the top-right.

11. Connect the FC-5000 data collector to the GM-55 Total Station:
    a. Tap **Connect** icon.
    b. Under the **Connections** window:

    Tap **Optical** radio button.
    Select **GM-55 TS** configuration.
    Select/check: **Connect to last used BT device**
    Select/check: **Prompt for connection at startup**
    Tap **[Connect]**.
    ******* For initial connection procedure ************************
    Tap and select the **GM-55** bluetooth device in the device list.
    Tap **[Select]**.
    Require PIN: **uncheck**
    Tap [**Connect]**.

    ******* When connected, the Total Station will beep and the bluetooth symbol* ✳ *should appear in the on-board screen. The FC-5000 will also make a sound – indicating a successful connection – and return to the main menu.* ************************************

12. From the main menu, create a new survey job:
    a. Tap **Job** icon.
    b. Tap **New Job** icon.
    c. Enter the following:

    Name: **<user-defined>**
    Created by: **<user-defined>**
    Comments: **<user-defined>**

    j. Tap the accept/home screen icon ✅🏠 near the top-right.
13. Enter data for the first occupation (HUB) point:
    a. Tap **Edit** icon.
    b. Tap **Points** icon.
    c. Tap **[Add]** near the bottom-right.

    d. Under the **Point** tab, enter the following before tapping the checkmark icon ✅ near the top-right:
    Point: **1**
    Code: **IP**
    North: **5000.000**
    East: **5000.000**
    Elevation: **0.000**

    e. Close the **Points: Ground** window by pressing the home screen icon 🏠 near the top-right.

14. Establish a benchmark elevation:
    a. Tap **Setup** icon.
    b. Tap **Benchmark** icon.
    c. Under the **Benchmark** window, enter the following before tapping **[Next >>]**:
       Occupy: **1**
       Code: **IP** ****** *should auto-populate.* ******
       HI: ***<user-defined height of instrument>'***
    d. Under the **Benchmark: Normal** window, enter the following before tapping **[Next >>]**:
       Elevation: **100.000** ****** *tap button to toggle between* ***[Point]****,* ***[Elevation]****.* ******

       Prism (icon) : ***<user-defined rod/prism height>***

       Tap the "measure/read" icon to take measurement.

       Review the data point. If satisfied, tap the "save" icon to store the benchmark reading.
    e. Review the benchmark data on the **Benchmark: Resuts** window. If satisfied, tap **[Accept]**.
    f. A warning will appear indicating that point "1" already exists with a height of "0.000".
       Tap **"Update Height?"** radio button.

       Tap the checkmark icon near the top-right to update the instrument hub elevation to reference a 100.000ft benchmark elevation.
15. Backsight on the benchmark point and establish the benchmark data point:
    a. Tap **Backsight** icon.
    b. Under **Occupation Point**, verify/enter the following:
       Point: **1**
       HI: ***<user-defined height of instrument>***
       Scale: **1.000000000000**
    c. Under **Backsight Point**, enter the following before tapping **[Next >>]**:
       Azimuth: **0.000** ****** *tap button to toggle between* ***[Point], [Azimuth]****.* ******

       Prism (icon) : ***<user-defined rod/prism height>***
    d. Under the **Backsight: Normal** window > **Set Circle to**:

       Tap the menu icon.
       Tap and select: **Get from Instr**
       Verify that the listed reading matches the "**HR:**" angle reading on the GM-55 display.
       Tap **Set** icon.
   e. Tap **Yes** to store the measured backsight point.

    f. In the **Store Point As…** window, enter the following before tapping the checkmark icon near the top-right:
       Point: **10** ****** *Use prefered numbering rule but do not go above point number 99.* ******
       Code: **TBM**
    g. Review the backsight data (e. g. Elevation = 100.000ft) before tapping the home screen icon near the top-right.

16. Proceed to collect general survey data points:
    a. Tap **Survey** icon.
    b. Tap **Topo** icon.
    c. Under the **Sideshot-Direct: Normal** window, enter the following data:
        Point: **100** ******* Survey shots should stay within point range: 100 – 2999. *******
        Code: **<user-defined; pick from drop-down list>**

        Tap the "measure" icon and "save" the data or tap the "measure + save" icon
        to move directly to the next data measurement.
    d. Continue process as needed to complete survey. When finished, tap the home screen icon
         near the top-right to return to the main menu.
17. To view a map of survey data points:
    a. Tap the **Map** icon.
    b. Use the stylus to drag and pan the map view. Use the top toolbar to draw features. Use the
        side toolbar to zoom in/out, change layer settings and/or change overall map settings.
    c. To adjust the map properties to the following recommended settings, tap the **Map**
        Properties icon.
        General
        Map Font: **Bold**, **Small**
        Entities
        Show **Points**, **Names**, **Codes**, **Heights**
    d. Tap the checkmark icon near the top-right to return to the map.
    e. When finished, tap the home screen icon near the top-right to return to the main menu.
18. To export a complete survey data file:
    a. Tap the **Exchange** icon.
    b. Tap the **To File** icon.
    c. Under the **To File** window, enter the following before tapping **[Next >>]**:
        Data: **Points**
        Format: **Text Custom Report (*.txt)**
    d. Under the **To Text Format** window, enter/verify the following before tapping the checkmark
        icon near the top-right.
        Type: **Text Files (*.txt)**
        Filepath: **C:\Users\USDA\Documnts\MAGNET Field PC\IEFiles** *******Users can also
        browse to another folder or attached external USB device. *******************************
        Name: **<user-defined file name>**
    e. Under the **Text File Format** window, enter/verify the following before tapping **[Next >>]**:
        Delimiter: **Comma**
        Header in first row: **uncheck**
        File Style: **Name,N(Lat),E(Lon),Elev,Codes**
    f. Under the **Coordinate System**, tap **[Next >>]**:

g. Under the **Units Fomat** window, enter the following before tapping the checkmark icon ✅ near the top-right.
Plane coordinates precision: **0.000**
Elevation precision: **0.000**

h. The **Export Status** window status should read: **"Export successfully finished."** Tap **[Close]** or the home screen icon 🏠 near the top-right to return to the main menu.

19. When finished, close the MAGNET Field app by tapping the "close" icon ❌ near the top-right of the menu.

20. Press and briefly hold the power button on both the FC-5000 data collector and GM-55 total station to shut-down each device. Disassemble and pack up equipment. Be sure to center the levelling pegs (heightwise) on the GM-55 and keep the rotation-lock knobs loose during storage.