Leica Nova (MS60, TM60, TS60) and Leica Viva (TS16)

This guide may be used for initial configuration, connection and basic operation of the Leica Nova and Viva Total Station within SA. For more details on instrument operation and configuration, please contact Leica Geosystems directly.

License Requirements

In order to gain full total station integration with SA additional licenses must be purchased from Leica Geosystems and loaded on the instrument. Optional licenses include:

- **Virtual GeoCOM.** Used for wireless communication and control.
- **GeoCOM robotic.** Which enables remote pointing and robotic control of the total station from SA.
- **GeoCOM imaging.** Which enables image capture and display within SA.
- **GeoCOM video.** Which enables live video display within SA.
- **Scanning.** Which enables the MS60's scanning functionality

Hardware Setup

Set up the unit following the manufacturer's directions. Leica total stations may be connected either with a USB cable, wireless network adapter or Bluetooth connection. Ensure that you have the necessary cables, router or a Bluetooth adapter. Be sure the power is turned on

and the battery is charged.

Configuring the Instrument for Optimal Use with SA

1. Navigate to **Users > System Settings > Regional Settings**.
2. Check that the Hz angle display is set to *North anti-clockwise* and the V angle display is set to *Zenith angle*. This will ensure that the angles displayed on the instrument match those of the recorded points in SA.

Software Setup

It is recommended that initial connection and testing be performed using a cable connection to your computer. To connect directly to the PC, you will need to install the instrument drivers. The current drivers SA supports can be downloaded from https://www.kinematics.com/ftp/SA/Install/Driver%20Downloads/TotalStations_Theodolites/Leica/Leica%20Nova%20MS60%20Drivers/.

To use the live remote video function available on this instrument, you will also need to install the VLC player application. Once installed, a Video button will appear on the ***Camera Interface*** dialog. In the 2020.12.01 version a 64-bit version of the T-Manager was introduced which also requires a 64-bit version of the VLC player (all prior versions used a 32-bit VLC player). The tested VLC install can be downloaded from our webpage here: https://www.kinematics.com/ftp/SA/Install/Driver%20Downloads/TotalStations_Theodolites/Leica/Leica%20Nova%20MS60%20Drivers/

Direct Cable Connection

On the instrument select **Settings > Connections > All Other Connections**. Set the GeoCom connection to USB (to obtain the current IP address and port, press Cntrl..).

Connect the USB cable and continue to the section *Running the Instrument*.

Wireless Connection

A connection can be established to the Nova by adding the device to a preexisting network or by building an Ad-hoc connection with your PC. For more detailed instructions, refer to the document "Connecting a Nova total station with a PC using a WLAN" on our download page. For a quick synopsis on a Windows 7 machine, follow these steps:

Building an Ad-hoc Connection on a Win7 PC (Win10 does not directly support Ad-hoc).

1. Turn on the wireless adapter on your PC and go to **Control Panel > Network and Sharing Center**.
2. Select **Setup a new connection or network > Set up a wireless ad hoc (computer to computer) network**.

3. When prompted, enter a network name (e.g. "Ad-hoc MS60) and a security type, if desired (no authentication, WEP and WPA-2 are supported).
4. Select Save this network then Next to create the network.
5. Set the IP address to be compatible with the instrument.

Setting the IP Address in the Adapter Properties for the Instrument

1. Turn on the wireless adapter on your PC and go to **Control Panel > Network and Sharing Center**.
2. Select **Manage wireless networks > Adapter properties** for the network you wish to connect to and for editing the properties of your ad-hoc network.
3. In the ***Wireless Network Connection Properties*** dialog, select Internet Protocol Version 4 (TCP/IPv4).
4. Select Properties and enter the IP address rather than obtaining one automatically. This address determines the computer's IP address on the network.
5. On the instrument select **Settings > Connections > All Other Connections**. Set the GeoCom connection to WLAN (to obtain the current IP address and port, press Cntrl..).
6. Continue to the section *Running the Instrument*.

Connecting to an Existing Wireless Network

You can connect the Total Station directly to an existing wireless network using the following Steps.

1. Select Settings > Connections > Internet wizard
2. Select **WLAN** and connect to an available network.
3. On the instrument select **Settings > Connections >**

All other connections. Set the GeoCom connection to *Port WLAN* (to obtain the current IP address and port, press Control).
4. Open the GSI output settings and make sure that the *Output GSI data to device* option is checked.
5. Continue to the section *Running the Instrument*.

In some cases, you may need to set the IP address manually. You can also manually control the internet connection and check the adapter status as follows:

1. Open the Windows CE control panel by selecting **Fn + Windows Key.**
2. Click on WLAN Settings in the taskbar and select the network you wish to connect to from the network list and click Connect.

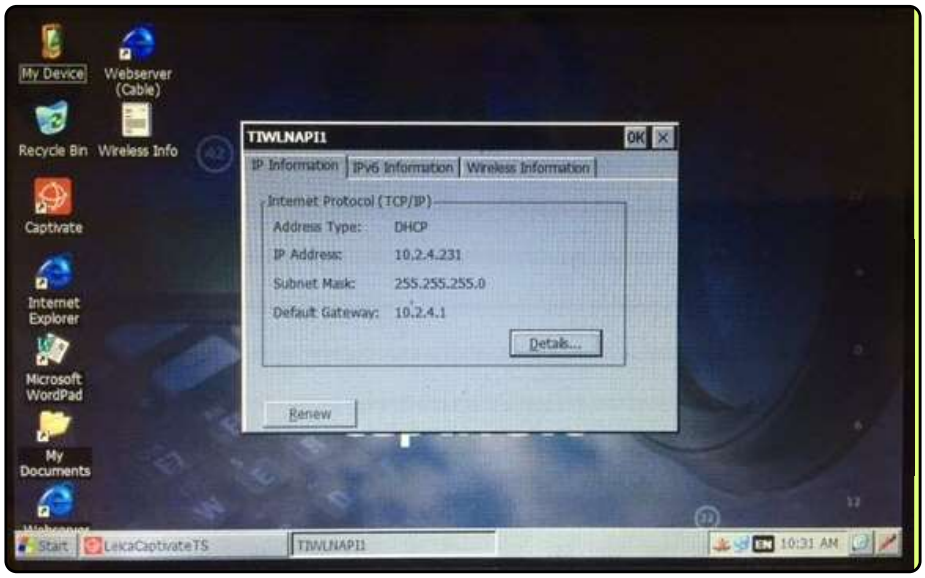

Figure 5-58. Wireless Connection through TIWLNAPI1

3. Once connected restart the LeicaCaptivate application.

- Select **Start > Settings > Network and Dial-Up Connections** TIWLNAPI1 (or OWL221A1).
- Select Enable, and then Properties.
- Choose Specify an IP address, and enter the IP address for the total station on the network. The first three numbers of the IP address need to match the first three numbers entered for the PC. The last number must be unique from the PC.
- Return to the Windows CE desktop, click on WLAN settings in the taskbar. In the ***Wireless Information*** tab, select the ad-hoc network that you created and select Connect.

4. On the instrument select **Settings > Connections > All Other Connections**. Set the GeoCom connection to WLAN (to obtain the current IP address and port, press Cntrl..).
5. Open the GSI output settings and make sure that the *Output GSI data to device* option is checked.
6. Continue to the section *Running the Instrument*.

A youtube video demonstration can be found here:

https://youtu.be/pl_6_p8mqG0

Connecting to Bluetooth

A Bluetooth connection is fast an convenient but will limit scan and video operations available for the MS60 that need a faster TCP/IP connection.

1. Select Settings > Connections > All other connections to get to the **Connection Settings**(Figure 5-59).

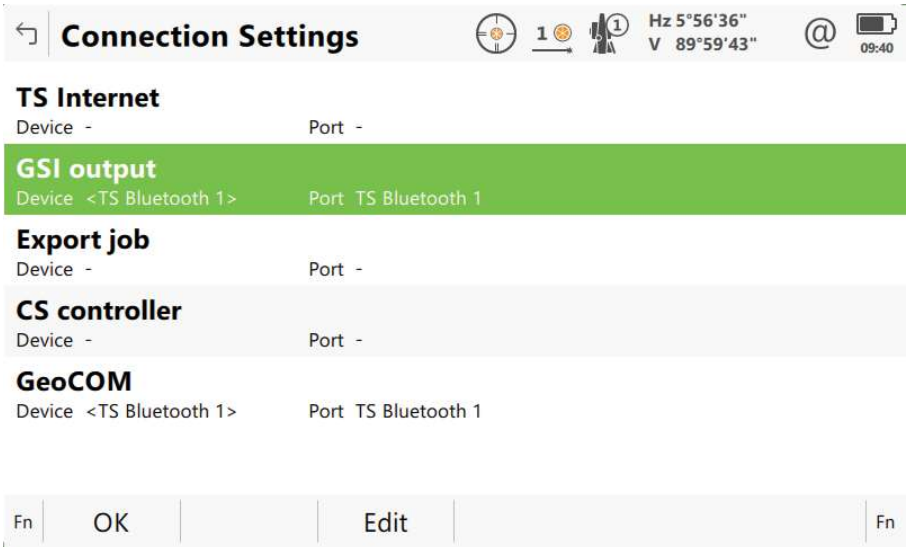

Figure 5-59. GeoCOM Connections Dialog

2. Set the GeoCom connection to TS Bluetooth 1 and also enable GSI output to allow operation of the scope to trigger measurements . You will also want to verify that the GSI Format is GSI16 Polar 2 (Figure 5-60).

Figure 5-60. GSI Configuration

3. On your PC, go to your Bluetooth adapter and select Add a Device. Select the device from the available Bluetooth connections and select next.

4. When prompted, enter the pairing code: **0000**. Once connected, a pair of COM ports number will be assigned. You can use the More Bluetooth Options option to see which COM ports were assigned for the connection. You will enter the "Outgo-

ing" port number in SA to connect(Figure 5-61).

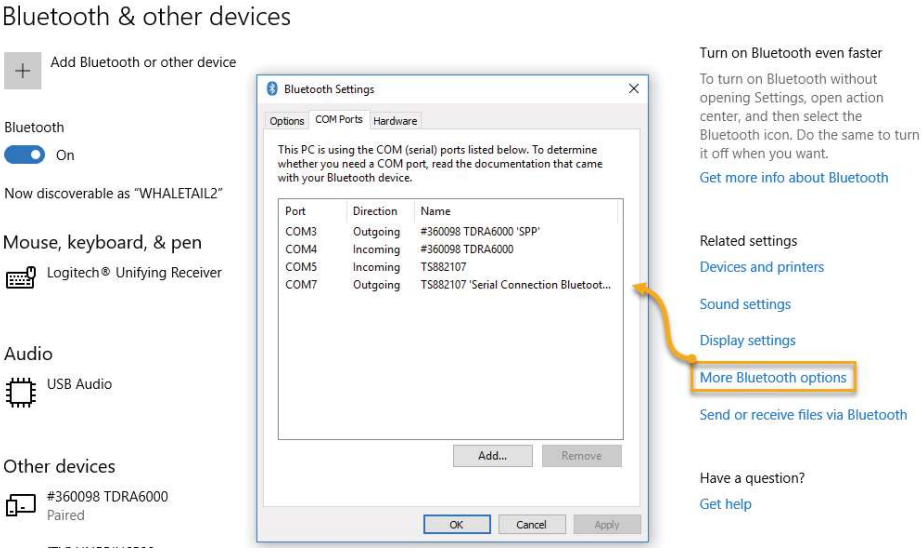

Figure 5-61. COM Port Designations in the Bluetooth Settings

5. Continue on to the section *Running the Instrument*.

No additional configuration of the Baud rate should be necessary for a bluetooth connection, but if you cannot connect you might check the settings. To do so, go to the GeoCOM Connection panel and press Device. The defaults are 115200, None, 8, 1, None (Figure 5-62). Older scopes with eariler versions of GeoCOM will suggest a slower rate of 19200.

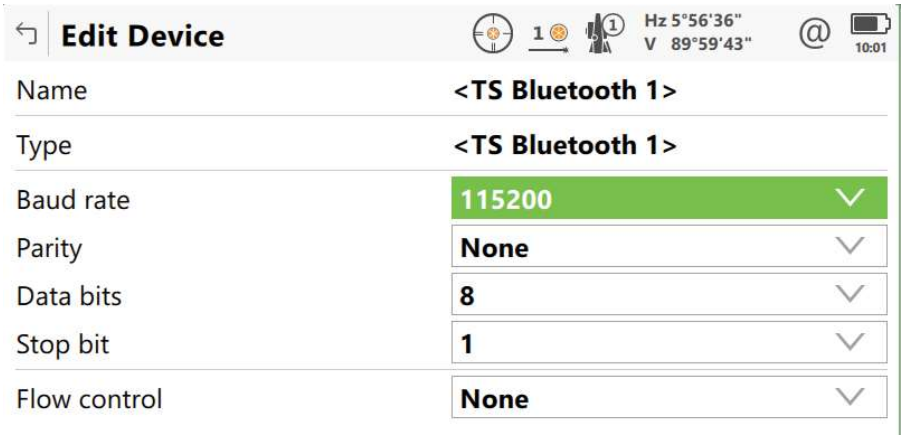

Figure 5-62. Default Bluetooth communication settings

Triggering Measurements from the Instrument

Also be sure to enable GSI Output from the scope in order to get the red trigger button on the scope to send measurements to SA. Measurements from the scope will use the Collection and Group name set within the Theodolite Manager not the instrument Control Pad. For more information see "Measurement Modes" on page 203.

Starting the Interface

1. Select **Instrument > Add** and choose the Leica Nova MS50/MS60/TS16 Total Station from the ***Add Instrument to SA*** dialog (Figure 5-63).

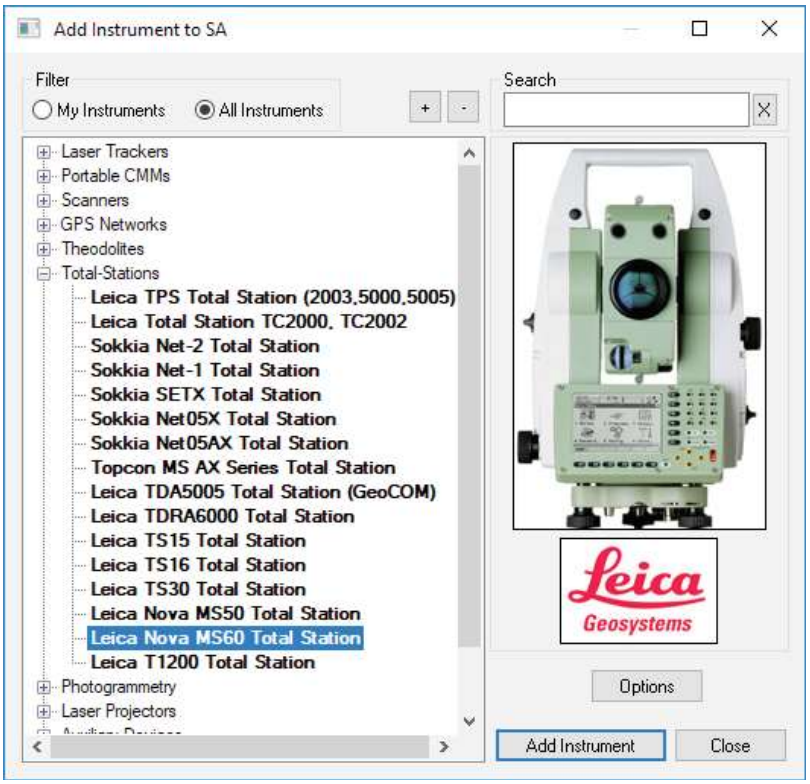

Figure 5-63. Adding the Leica Nova MS60 Total Station to a job.

2. Now run the instrument interface module under **Instrument > Run Interface Module** and choose **Theodolite Manager**.
3. Select New Setup and then Add (Figure 5-64).

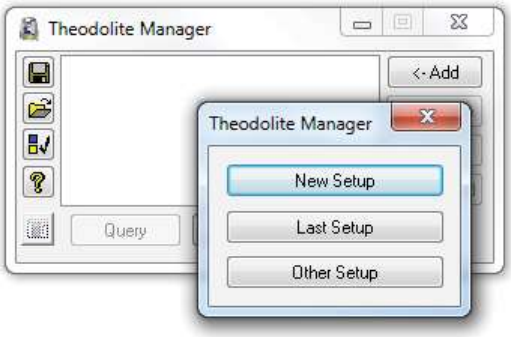

Figure 5-64. The Theodolite Manager dialog.

4. Select the instrument type and the COM Port. Set the COM Port to TCP if you are connecting with either a cable or wireless; or enter the port number for Bluetooth. Then select the instrument in the available SpatialAnalyzer list and click Connect (Figure 5-65).

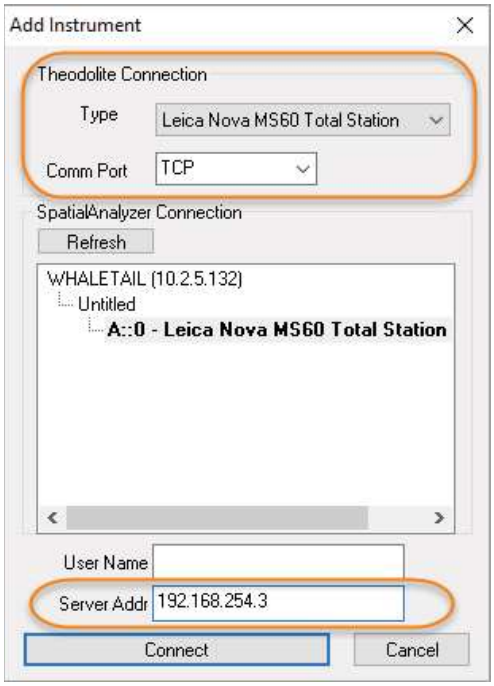

Figure 5-65. Adding a new setup.

Note: If connecting with a cable or wireless, enter the instrument's IP address in the Server Address box.

To obtain the current Instrument IP navigate to Settings>

Click on the GeoCOM connection and then press Control. This will display the current IP address settings for the Instrument. Be sure to close the GeoCom Dialog before trying to connect with SA.

5. Select the instrument in the available SpatialAnalyzer list and click Connect.

A youtube video demonstration can be found here:

https://youtu.be/W4O61akKCo4

Instrument Specific Operations

Tracking with the Leica Nova and Viva

Total stations can track a reflector much like a Laser Tracker.

1. In the Tracking section, Choose a reflector target from the Targets and Reflectors database (ensure that ATR is turned on for that target)
2. Choose the tracking type (Track only, Send Updates, Measure, Stable Point)
3. Press the Track (F7) button to begin tracking the target

Edge Point Measurement

The Leica scopes has a built in Edge Point Measure Mode designed to allow precise measurements to be made on the edge of parts.

1. Precisely sight on the edge you wish to measure, then in the Two Step Edge Point section, Press Measure. This will take an

angles only measurement of the edge

2. Using an edge nest or other reference target measure the precise distance to that edge point. The true edge point will then be calculated automatically from these shots and the resulting point passed to SA.

Imaging and Video Control

Both the Leica Nova and Viva total stations provide image capture and live video display options. To access the image control press the Camera button  in the Auto Measure SA Geometry section of the interface. This icon will bring up a Camera Capture window like this(Figure 5-66):

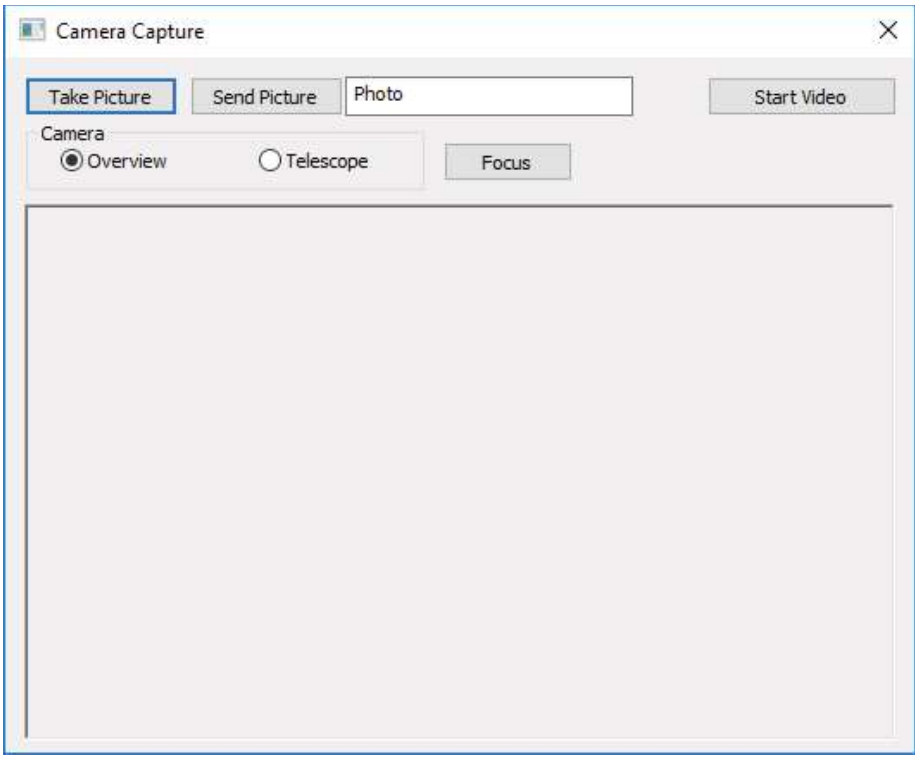

Figure 5-66. Camera Capture window Controls

- **Take Picture.** This button will request a new image from the scope and refresh the current image displayed.
- **Send Picture.** This button will capture the current image and send it as a picture to SA for use in reporting, using the name entered in the filed next to the button.
- **Overview and Telescope.** These two controls provide the ability to toggle between the two cameras, zooming in and out as needed.
- **Start Video.** This button starts live streaming of video within the camera capture window. This requires a 32bit version of the VLC media player to be installed. While live video is active an operator can click in the view to point the instrument at that

Tip: To Display video the VLC media play must be installed. Be sure to install the 32bit version of VLC play. This is required for both 32bit and 64bit SA versions.

location. This provides the means to actively drive the instrument by using the video screen.

Room or Perimeter Scanning

The MS60 can quickly scan a perimeter and generate a point cloud within SA. This is ideal for quick large volume measurement.

1. In the *Auto Measure SA Geometry* section of the instrument interface, ensure that the Revert button is *not* depressed. This button changes between scanning modes (Figure 5-67). This Revert button switches the scan operation and Settings function from a scan to a precise point scan grid scan (see "Precise Point Scan within a Perimeter (both Nova and Viva Total Stations):" on page 245).

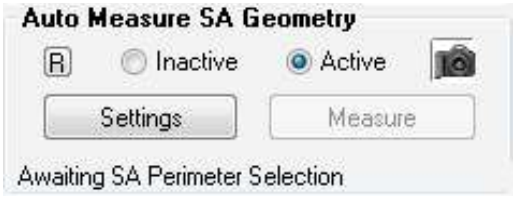

Figure 5-67. Auto measure SA Geometry section of the Interface.

2. Click Settings to change the parameters of the scan. The density of the scan is defined as the **Horizontal** and **Vertical** resolution of the grid at the specified **Distance**. Once satisfied with the settings click OK (Figure 5-68).

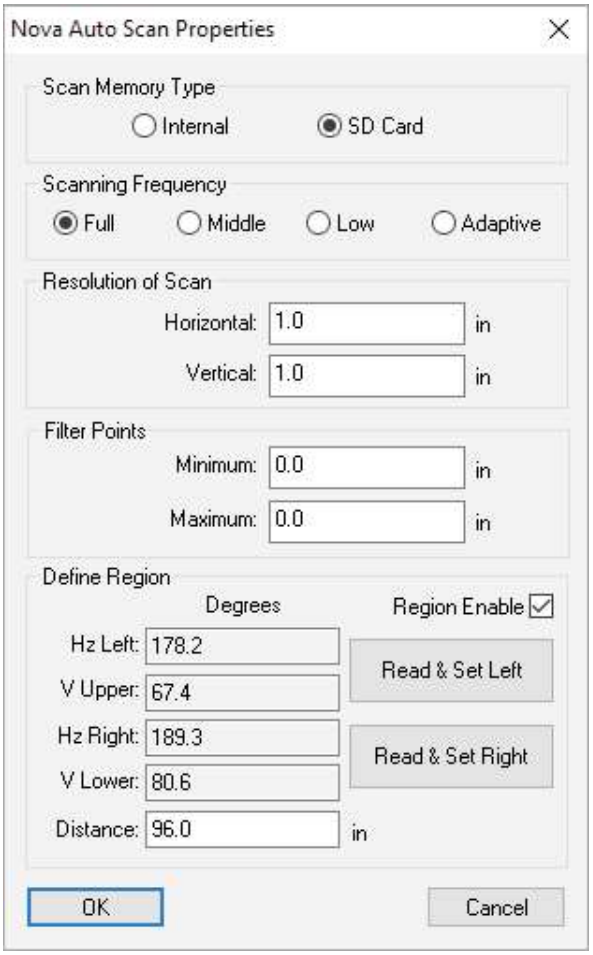

Figure 5-68. Auto measure SA geometry profile parameters.

The Scan settings now provides the ability to greatly refine your scan. It provides the following options:

- **Resolution of Scan.** This section allows you to define the density of the scan data returned with the scan by identifying the distance between returned scan points.
- **Filter Points.** This **Minimum** and **Maximum** defines distance exclusion thresholds allowing to you to set up a distance filter so that you only record points at a particular distance from the instrument.
- **Define Region.** This section allows you to define a square perimeter based upon angle shots only without defining a perimeter in SA. You can point the instrument to the upper left corner of what you want to measure and then press the *Read & Set* buttons to record the angles and then do the same at the lower right to define a box. The distance value is then used to determine the resolution of the scan within that perimeter. As long as the *Region Enabled* check box is checked this perimeter will be used. When enabled the measure button will be available without perimeter selection.

3. If not measuring a region defined in the settings, change the *Auto Measure SA Geometry* to *Active* by selecting the radio button. When you do so, a note will be shown at the bottom of the interface that states: *"Awaiting SA Perimeter Selection."*
4. Click on the desired perimeter by clicking on double-clicking on it in the tree. When selected, the perimeter *Collection::Name* will be displayed.
5. To begin the scan, click Measure. An example of this type of perimeter scan is pictured in Figure 5-69.

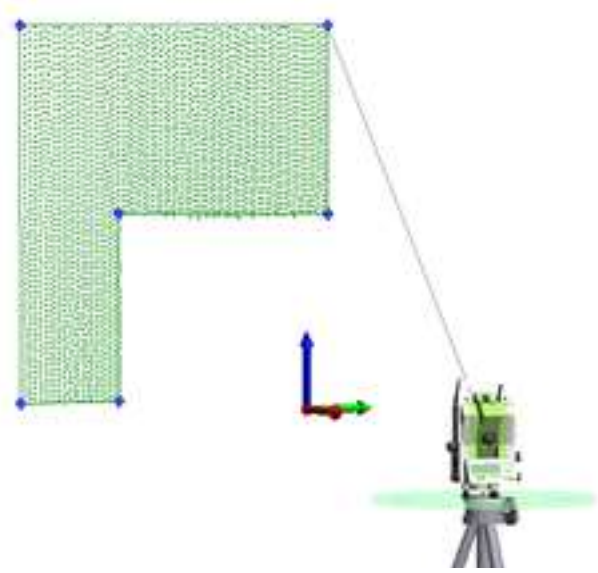

Figure 5-69. Perimeter scan using the Auto Measure SA Geometry measurement mode.

If a scan fails to transfer to SA for any reason it is not lost. The scan is saved internally either to memory or on the SD card and will only be clear if the scan transfer to SA is completed successfully. If this process fails the scan can be imported afterword.

Importing Nova Scan Files into SA

If you choose to scan while not connected to a computer, you may import these files into SA at a later time. The Nova Scans are saved as *.SDB files on the SD Card or the internal memory. To do so, follow these steps:

1. Add an instrument to your SA job file to which you wish to import the scan data. Data will be imported into SA relative to this instrument.
2. Either connect to the live instrument using a cable or connect using the simulation mode.
3. Locate and move the *.SDB files to your local machine. If you are connected using the cable, you can use Windows Mobile Device Center to navigate to the SD card directly.

4. In Theodolite Manager, select your instrument and click Import.
5. Select the *.SDB data type, navigate to your data, and click Import.

Precise Point Scan within a Perimeter (both Nova and Viva Total Stations):

While the scanning function is ideal for covering a large region quickly it can be helpful to do a more precise grid measurement using reflectorless measurements. There is still an option to do so:

1. In the *Auto Measure SA Geometry* section of the instrument interface, ensure that the Revert button is depressed. This button changed between scanning modes.
2. Click the Settings button to change the parameters of the scan based on the line and point spacing in the ***Auto Scan Properties*** dialog (Figure 5-70).

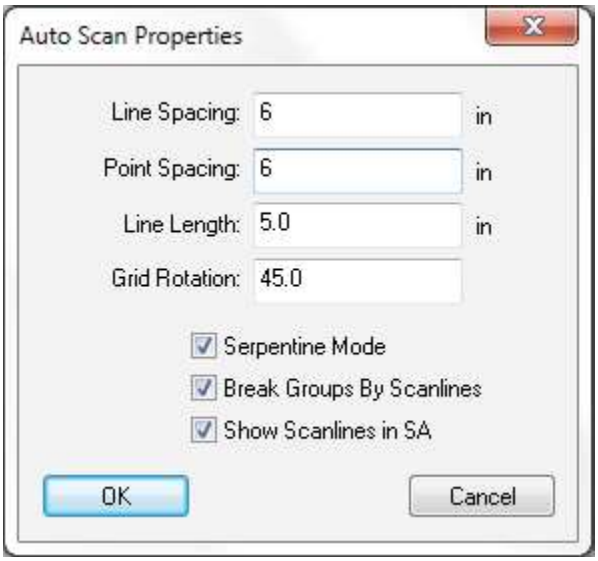

Figure 5-70. Auto Scan Properties dialog.

3. Change the *Auto Measure SA Geometry* to *Active* by selecting the radio button. When you do so, a note will be shown at the bottom of the interface that states: *"Awaiting SA Perimeter Selection."*
4. Click on the desired perimeter by clicking on double-clicking on it in the tree. When selected, the perimeter *Collection::Name* will be displayed.
5. To begin the scan, click Measure. An example of this type of perimeter scan is pictured in Figure 5-71.

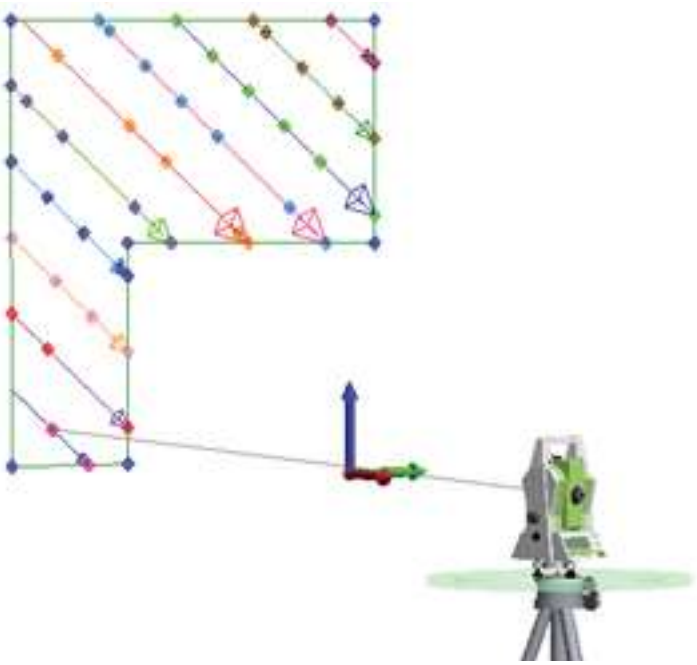

Figure 5-71. A point to point auto measure scan.

Point Import Options and Formats

SA provides a number of import options to order to import points measured without SA and then use those points for analysis. There are two ways to import points:

1. Importing points directly through Theodolite Manager. This option provides the ability to link points directly to an instrument model and can be done by connecting in simulation as well as with live instruments (Figure 5-57).

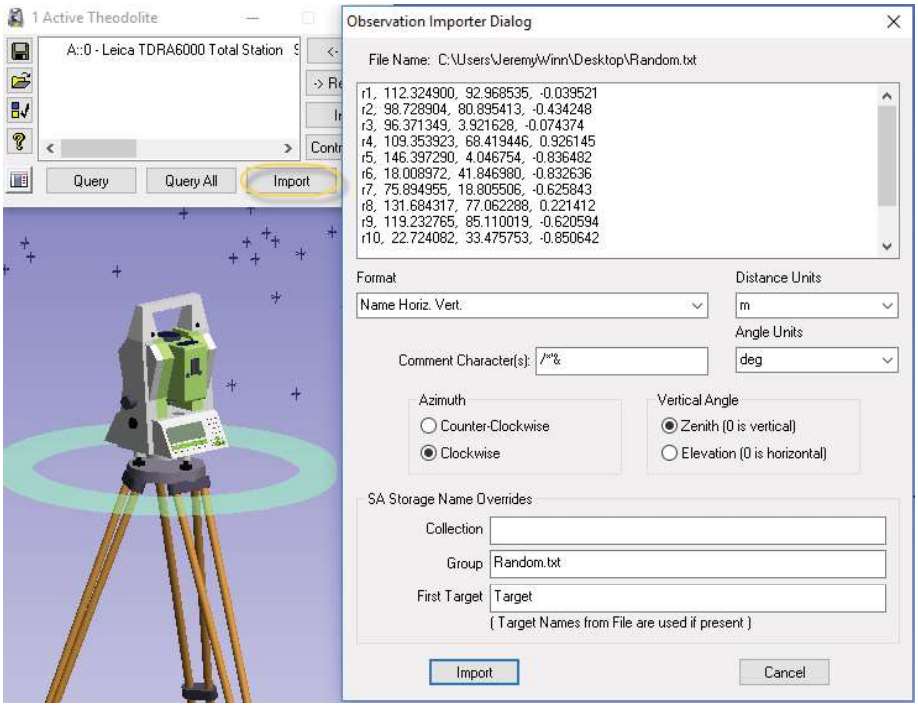

Figure 5-72. Import ascii files through theodolite manager

2. Importing through the **File > Import** options. In addition to ascii files there are a number of useful formats available through **File > Import > Custom Formats** including:

- **Leica GSI8 / GSI16 File.** Which provides import of GSI data containing Name, Hz Angle, Vert Angle, Distance OR Name, Easting, Northing, Elevation.
- **Leica ADF (.adf).** Which provide the ability to import nominal and measured points as separate point groups.