



Directional Antenna Plugin User's Guide

January 17, 2011

Author(s):

Alex Barchet

2621 Wasco Street / PO Box 1500 / Hood River, OR 97031

(541) 387-2120 phone / (541) 387-2030 fax

www.cloudcaptech.com / sales@cloudcaptech.com / support@cloudcaptech.com

The Goodrich logo consists of the word "GOODRICH" in a bold, dark blue, sans-serif font. Above the letters "I", "D", and "R" are three red, horizontal, slightly curved lines that suggest motion or speed.

GOODRICH

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1 Introduction

The Directional Antenna Plugin provides an integrated solution to either Piccolo Command Center (PCC) or ViewPoint for control of a third party positioner. The plugin currently supports the following positioners:

- Directed Perception (DP) PTU-D300, DP PTU-D100, DP PTU-D47/D48. These may be controlled with or without an Inertial Stabilization Module (ISM) in the loop.
- Optimum Solutions OS-PT-25-FB
- TECOM 203399
- Latitude Engineering

1.1 Requirements

- A windows based PC running a version of PCC no older than 2.1.0.k. The Latitude Engineering positioner requires PCC 2.1.2.f or later.
- A version of ViewPoint or Gimbal UI no older than 1.3.2.f. Please contact Cloud Cap Technology to discuss ViewPoint requirements for the Latitude Engineering positioner.
- A serial port is required to communicate with the positioner. A USB to serial port adapter may be used for systems without a serial port.
- Some positioners may require RS-485. If so, appropriate adapters are required.

1.2 Licensing

The software is licensed on a per-computer basis. Use of the same user name and key number for multiple computers is prohibited. Distribution of the software license user name and key to any other individuals or organizations is prohibited without procuring a license name and key(s) for the new users.

2 Setup

This section addresses the key features of the plugin used during setup. All the features can be accessed from the buttons at the bottom of the main **Antenna Plugin** dialog (Figure 1).

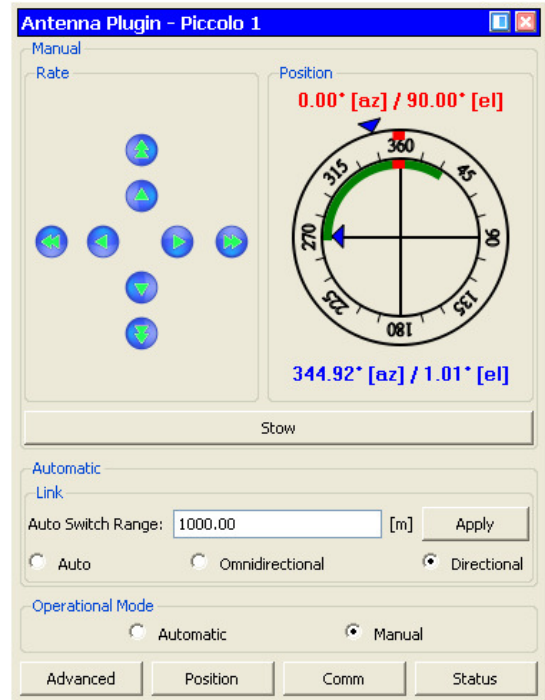


Figure 1 - Antenna Plugin Dialog

2.1 Communications

After loading the plugin, communication must be established with the positioner. This can be done using the **Antenna Communications** dialog (Figure 2).

Be sure that the correct positioner is selected before clicking the **Open** button. This specifies the protocol that the plugin follows as well as the configuration of the user interface. If there are any errors opening the communications port they are reported below the **Open/Close** button.



The communications port must be closed before powering on or off the positioner.

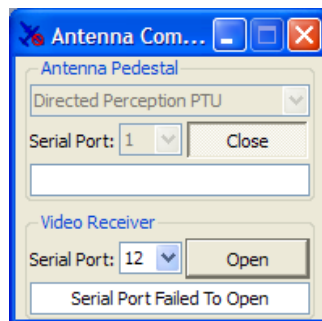


Figure 2 - Communications Dialog

2.2 Antenna Position

The plugin requires the antenna position to be able to track an aircraft or gimbal. This information can be setup in one of four ways. Until this is setup, the **Antenna Pos** button on the main dialog remains red.

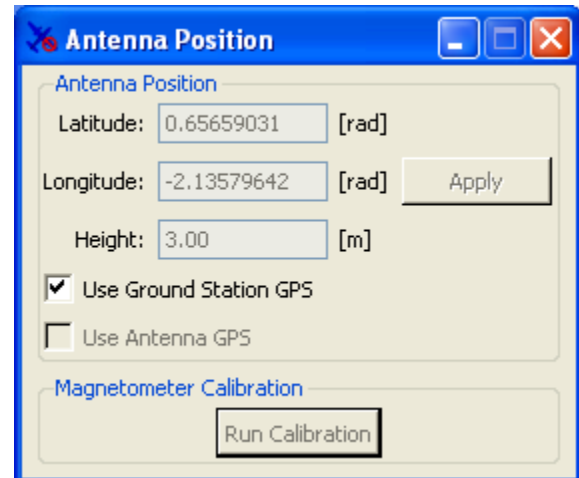


Figure 3 - Antenna Position Dialog

2.2.1 Antenna GPS Position

- The ground station GPS can be used by checking the **Use Ground Station GPS** checkbox (**Figure 3**).
- The positioner GPS can be used by checking the **Use Antenna GPS** checkbox. This feature is only enabled on positioners that have an internal GPS.
- A user defined position can be defined as follows:
 - 1) Clearing the **Use Ground Station GPS** and **Use Antenna GPS** checkboxes.
 - 2) Manually entering a Latitude, Longitude, and Altitude.
 - 3) Click the **Apply** button.
- A GPS position can be set by clearing the **Use Ground Station GPS** and **Use Antenna GPS** checkboxes, right clicking on the map, and then selecting **Set Antenna Position**.

2.2.2 Magnetometer Calibration

On systems with a built in magnetometer this button will initiate a calibration sequence for the magnetometer. This allows the positioner to be correctly aligned without the user having to enter an azimuth offset.

2.3 Advanced Settings

Advanced settings should only need to be adjusted occasionally (**Figure 4**). They can be accessed by clicking the **Advanced** button in the main dialog.

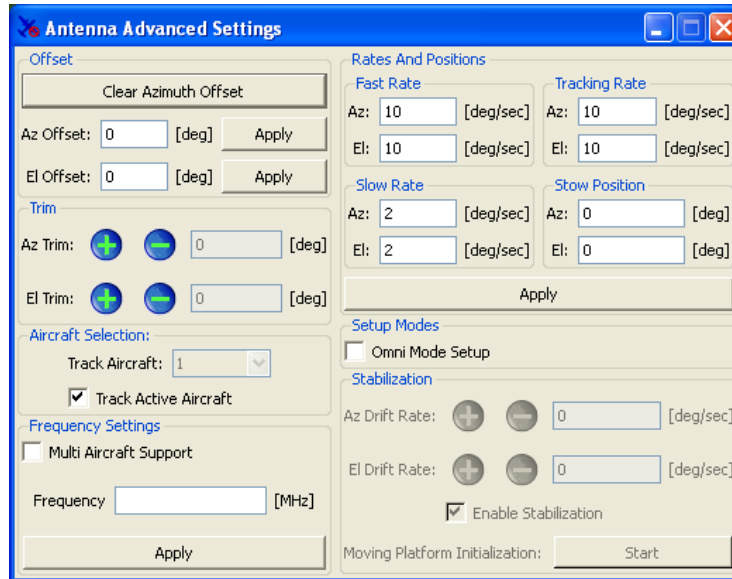


Figure 4 - Advanced Settings Dialog

2.3.1 Azimuth Offset

Most positioners have no intrinsic notion of direction. As a result an azimuth offset is required. The procedure for setting up the offset is as follows:

- 1 Press the “Clear Azimuth Offset” button. This will zero out any current offset stored by the software.
- 2 Point the positioner to a given angle and record the reported position (See section 3.1.2). A good choice is to point the positioner North (measured with a compass).
- 3 Measure the angle that the positioner is pointing with a compass.
- 4 Enter the difference between the reported angle and the measured angle in the **Az Offset** field. Click the **Apply** button. For example, the measured angle is 0° and the reported angle is 175.4°. Enter “175.4” for the azimuth offset.
- 5 In position mode, steer the positioner to 0.0°, it should point North. Steer it to 180.0°, it should point South.

2.3.2 Elevation Offset

The elevation offset is designed to support users who have positioners mounted in non vertical configurations, or have other requirements for limiting the range of motion. Adjusting this to a value other than “0” can negate the tracking ability if the adjustment isn’t made correctly.

2.3.3 Trim

Use the trim buttons to make minor adjustments to the positioner azimuth and elevation commands. Each button increments or decrements the azimuth or elevation trim by 0.25°. The trim cannot be adjusted beyond $\pm 30^\circ$.

2.3.4 Rates

The rates at which the positioner moves in rate mode operation, or when tracking an object should be adjusted prior to operation.

Note: We are unable to provide default rates for all positioners as it depends not only on the positioner, but on the attached load.



The positioner manufacturer specification should be consulted before setting the rates to avoid potential damage.

2.3.5 Stow Position

The stow position is a fixed position that can be commanded using the **Stow** button (**Figure 1**). This is typically set to a position for storage of the positioner.

2.3.6 Aircraft Selection

The plugin is designed to point the pedestal at an aircraft or a gimbal. The aircraft it points at can be selected from this dialog. It can also track the active aircraft by checking the **Track Active Aircraft** checkbox. If opting to track the active aircraft, and the active aircraft is changed by PCC, the pedestal points at the new active aircraft automatically.

2.3.7 Frequency Settings

The Antenna Plugin supports an interface to an L3 Communications VNRX or an AMP V-Series video receiver as well as an interface to a variety of positioners. It is designed to allow users to automatically switch frequency in a multi aircraft scenario, or control the frequency independent of the aircraft. If **Multi Aircraft Support** is checked the video receiver frequency automatically updates when the tracked aircraft is changed.

If the video receiver is not integrated into the plugin, then these fields can be left blank. If it is integrated, communications must first be established by opening a communications port from the **Antenna Communications** dialog.

When the user first opens the communications port it will try to establish communications with an AMP V-Series receiver and if this fails it will revert to a protocol for communication with the L3 receiver. In doing this the user is not required to select which receiver they are communicating with.

2.3.8 Omni Mode Setup

Entering **Omni Mode Setup** allows the user to control the azimuth of the positioner manually when in **Omnidirectional** mode. The specific use case of this feature is TBD.

2.3.9 Stabilization

The Directed Perception positioners can be connected to an Inertial Stabilization Module (ISM). When connected through an ISM these options will become enabled. **Moving Platform**

Initialization is a feature that is still in development and should not be used at this time without first contacting Cloud Cap Technology, Inc.



3 Operation

This section addresses normal operation of the plugin including tracking and manual mode.

3.1 Manual Mode

Manual mode is entered by selecting **Manual** as the **Operational Mode**.

3.1.1 Rate Mode

 Slews the positioner at the user defined “Slow Rate”.  Slews the positioner at the user defined “Fast Rate”. The exact response is positioner dependent.

3.1.2 Position Mode

To adjust the position, drag the blue triangles in the position mode portion of the dialog. The outer triangle adjusts the azimuth. The inner triangle adjusts the elevation.

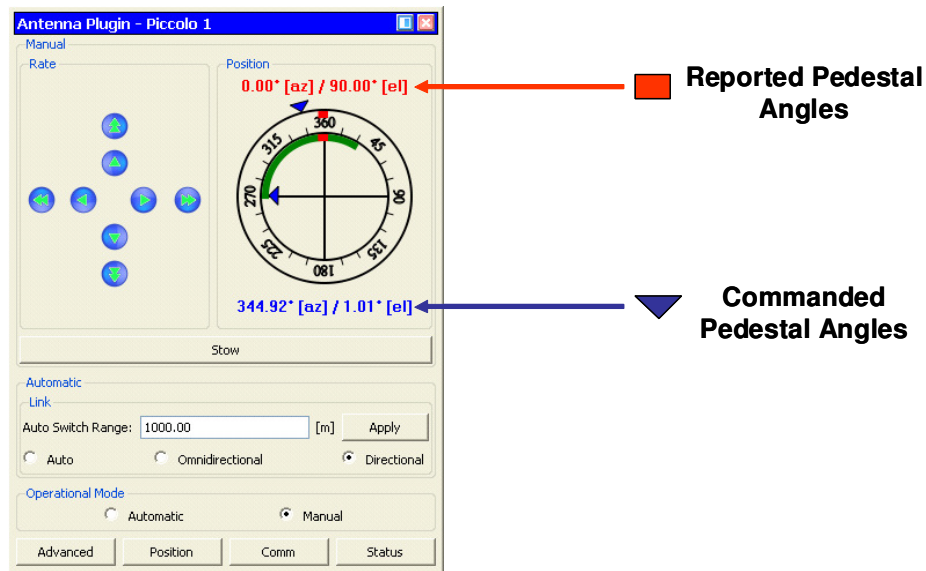


Figure 5 - Commanded and Reported Angles

3.1.3 Point to a Location

To point to a specific location, right click on the map and select “Point Antenna Here”. This feature is only available with the PCC plugin, and requires the antenna position to be set first. This option is only available when the plugin is in **Manual** mode.

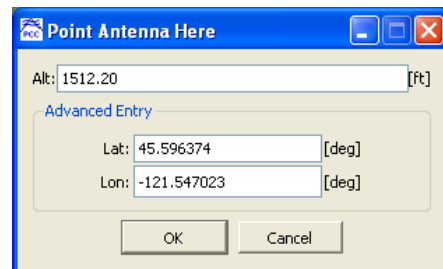


Figure 6 – Point Antenna Here

3.2 Automatic Mode

Automatic mode is entered by selecting **Automatic** as the **Operational Mode**

3.2.1 Auto

When tracking in **Auto** mode if the distance from the positioner to the tracked aircraft is less than **Auto Switch Range** the plugin operates in **Omnidirectional** mode, otherwise it operates in **Directional** mode.

3.2.2 Directional

When tracking an aircraft in **Directional** mode the plugin uses the positioner location as well as the tracked aircraft location to calculate the azimuth and elevation angles to send to the positioner. This data is sent to the positioner when new positioner or aircraft positions are received but will not exceed 4 Hz. When using the Latitude positioner the tracking is done on the positioner so instead of sending tracking commands the plugin sends aircraft position information to the positioner in this case.

3.2.3 Omnidirectional

When tracking an aircraft in **Omnidirectional** mode, the pointing angles of the positioner are controlled in azimuth only. The elevation angles are subsequently zeroed.

4 Errors

This section describes some of the common errors that you may see during setup and normal operation.

4.1 Antenna Position Errors

The **Antenna Pos** button remains red until the user has specified a valid antenna position. If using the GCS or Positioner location for the antenna position this button will remain red until one of these devices has reported a valid position.

5 Positioner Specific Notes

This section contains some useful notes about setup and configuration specific to each of the supported positioners.

Note: This section is not designed to be a replacement to the manufacturers user's guides, but contains useful information from practical experience.

5.1 Direction Perception PTU-D300, PTU-D100, and PTU-D47/D48

5.1.1 Baud Rate

The plugin requires that the baud rate for communications to the positioner be set to 19200. The default factory baud rate for the positioner may not be 19200. To change this establish communication with the positioner using Hyperterminal and send the following command: @ (19200,0,T)

5.1.2 Tilt Limits

In the event that the tilt limit has been hit the positioner must be reset. This can be done by closing and re-opening the communications port.

5.2 Optimum Solutions OS-PT-25-FB

5.2.1 Rate Mode

Rate mode control is currently not supported for this positioner.

5.2.2 Firmware License Key

This positioner requires license keys for the firmware to operate. The first time the COMM port is opened, an “Invalid Firmware” message dialog opens (**Figure 7**). This provides the serial numbers that are required by Optimum Solutions to generate a license key.

Once this message dialog is closed, another dialog opens that allows you to enter the license keys (**Figure 8**). Once this process is complete you can open the COMM port again.

Note: This only needs to be done once since the application stores the license keys in a settings file.

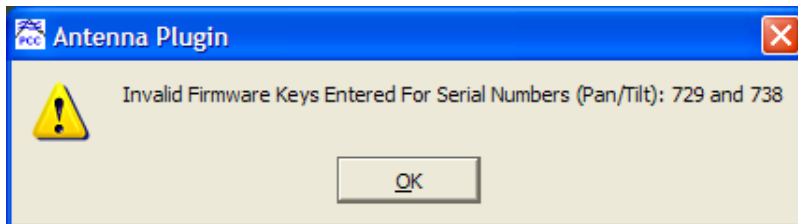


Figure 7 - Invalid Key Message

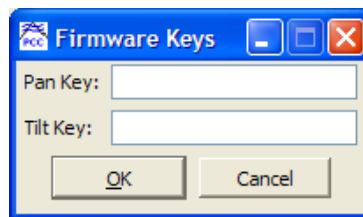


Figure 8 - Firmware Key Dialog

5.2.3 More Information

Contact Optimum Solutions at information@optimumsolution.com for more information.