

Alien Works Ltd. Inc.

Satellite Antenna Site Surveys and Installation: Web Site Instructions

Using

TARGET: SAT™

U.S. Patent 6,526,667 B1

And

The Spacecraft Targeting Platform

To

**Target Satellites & Ensure Clear Lines of Sight from Horizon-
to-Horizon across the Clark Belt**

"Technology so far advanced , It must be Alien"

Site Surveys & “Targeting” Satellites - The Problem:

C- Band Satellite TV customers want the most unobtrusive antenna location possible.

Installers want the easiest to install location that has a clear line of sight to the satellites needed.

In the old days, when customers had fewer options, the easiest thing to do was put the antenna on the roof or on a pole tall enough to get over all of the surrounding obstacles. Many communities no longer let you do that, even if you could talk the customer into it. Plus, no one wants to climb on the roof or up a pole in bad weather to provide service. The ideal site is on the ground. Next best is on a porch or in a specially enclosed section of the roof under a skylight (so it can be accessed from inside).

The customer may want maximum viewing flexibility and want to install a motorized mount with the antenna so that he can receive programming from satellites located from horizon to horizon. Now, ensuring a clear line of sight line to them becomes much more complicated. As more and more satellites crowd the sky, hand-held targeting instruments become ineffective – you can’t get 2° accuracy and feel comfortable you’re pointing at the right satellite and avoiding obstacles.

How do you quickly and cost effectively locate the alternative antenna sites that can provide clear lines of sight to all of the required satellites so that your customer has flexibility in choosing an antenna location?

Alien Works Ltd. has developed a targeting instrument and an accompanying web site that makes targeting satellites and ensuring clear lines of site simple for even the novice.

Background:

Satellite broadcasting is made possible by the fact that communications satellites are positioned in geo-stationary orbits (traveling at a speed in sync with the rotation of the earth) approximately 22,300 miles (35,800 kilometers) above the earth and within 1° either side of the equator. This allows each satellite to appear in the same relative position (azimuth and elevation) above a given ground location at all times, which in turn allows satellite antennas installed in a fixed ground positions to transmit and receive signals to/from specific orbiting satellites. . This band around the equator is known as the “Clark Belt”. Each satellite is designated a specific orbit “slot”, such as:

Satellite G0 (Galaxy 10R) = 123° West
Satellite T6 (Telstar 6) = 93° West

To prevent signal interference, satellites are “slotted” a minimum of 2°s apart – i.e. 89°, 91°, 93°. Now that digital transmission and circular polarization has evolved, interference between collocated satellites has been reduced.

In order to optimize picture and audio reception quality, the focal point of the antenna needs to be pointed at the correct location in the sky and the visual path (line of sight) to that satellite must be free of obstacles such as trees, telephone/cell towers and buildings. For the antenna installer, this means knowing the azimuth and elevation of the satellites targeted relative to a specific ground location.

To calculate the proper azimuth and elevation using readily available formulas, you need the ground coordinates (latitude and longitude) of the proposed installation site and the orbit slot of the designated satellite in degrees West or East if in the Euro eastern part of the world.

This is complicated by the fact that the calculated coordinates are all base on “true north”, If you are south of the equator then this becomes simpler. Installers north of the Equator use South as their reference point. In reality, most installers have to rely on a compass to know where North or South is . As most installers have found out, there is a difference between magnetic north and true north due to variations in the earth’s magnetic field. This “magnetic variation” varies from location to location around the world and the differences can be quite substantial. Where the variation in Minneapolis is only 1.7°, in Massachusetts it is 15.5°. Since the satellites are slotted 2° apart, it is easy to see why someone in Massachusetts could be having problems finding the right satellite.

To aid the antenna installer, Alien Works Ltd. has developed an Internet based software application to streamline the azimuth, elevation and magnetic variation calculations, and a targeting instrument, TARGET:SAT™, that allows the installer to use those calculations to quickly and accurately locate the needed satellites in the sky and ensure clear lines of sight before attempting an actual antenna installation. These tools save time in locating the correct satellites and maximizing signal strength, and also eliminate the need to disassemble and reinstall antennas due to obstacles blocking part, or all, of the satellites’ signals. TARGET:SAT™ is designed so that once the first satellite has been located, the instrument is positioned on the Clark Belt so that it is simple to pan the unit back and forth stopping at each spacecraft location ensuring clear lines of sight from horizon to horizon. In those cases where obstacles are present, TARGET:SAT™ is the ideal tool to help you find ground locations that will be ideal for antenna location

Here’s How the System Works

The web based software application, **Spacecraft Targeting Platform**, allows the user to determine the ground location, latitude and longitude, in one of three ways:

- In the U.S., entering the Zip Code and orbit slot generates a work sheet with all aligning information.

- For international locations, Country, City combinations using “drop down” boxes can be used to generate the alignment information.
- GPS coordinates (latitude and longitude) can be entered manually.
- Select the satellite they wish to “target” from the satellite drop down box

*Orbit degree slot location coordinates can be entered manually – they are available in Satellite TV programming guides or from the programming providers.

The software uses the ground latitude and longitude to calculate the magnetic variation required to adjust from magnetic north to true north.

The software will calculate the azimuth and elevation needed to target the spacecraft location in a specified orbit slot (in degrees west), It also calculates the declination adjustment required to align Target: Sat with the Clark Belt making it easy for the user to move from satellite to satellite across the sky when looking to ensure clear lines of sight to each spacecraft.

The targeting instrument, **TARGET:SAT™**, designed to sit on a standard or commercial grade tripod provides a stable platform for applying the calculated azimuth, elevation and magnetic variation coordinates and accurately locating the Clark Belt and the satellite locations Some attributes that make this task easier are :

- A built-in Compass and Bubble level make sure the instrument is properly oriented before applying the settings calculated by the software application.
- An Azimuth Dial and Pointer allows adjustment for magnetic variation and to set the correct azimuth position for viewing the satellite based on “true” North or South depending on geographical site location in reference to the equator.
- A Declination Slider and Angle Finder help set the correct elevation for viewing the first satellite needed on the Clark Belt.
- A viewing lens with cross-hairs target's the satellite and make sure that a sufficient area around the direct line to the satellite is clear of obstacles to allow for maximum signal strength.
- The panning ability movement of the azimuth pointer lets you easily move across the Clark Belt 2° at a time to ensure clear lines of sight to the other satellites you need. The Azimuth Dial keeps track of the degrees west location you are viewing so that you can position obstacles in the spaces between needed satellites.
- An optional laser attachment provides exact ground location of the mount.

*The product description section allows you to print or download a .PDF version of the TARGET:SAT™ User Manual.