---- TARGET : SAT-™----

User Instruction Manual

A Precision Satellite Technology Instrument
By ALIEN WORKS LTD.

***U.S. Patent** 6,526,667 B1*

"Technology so far advanced, it must be Alien."

www.alienworksltd.com

TARGET: SAT™ User Instruction Manual

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TARGET:SATä Overview

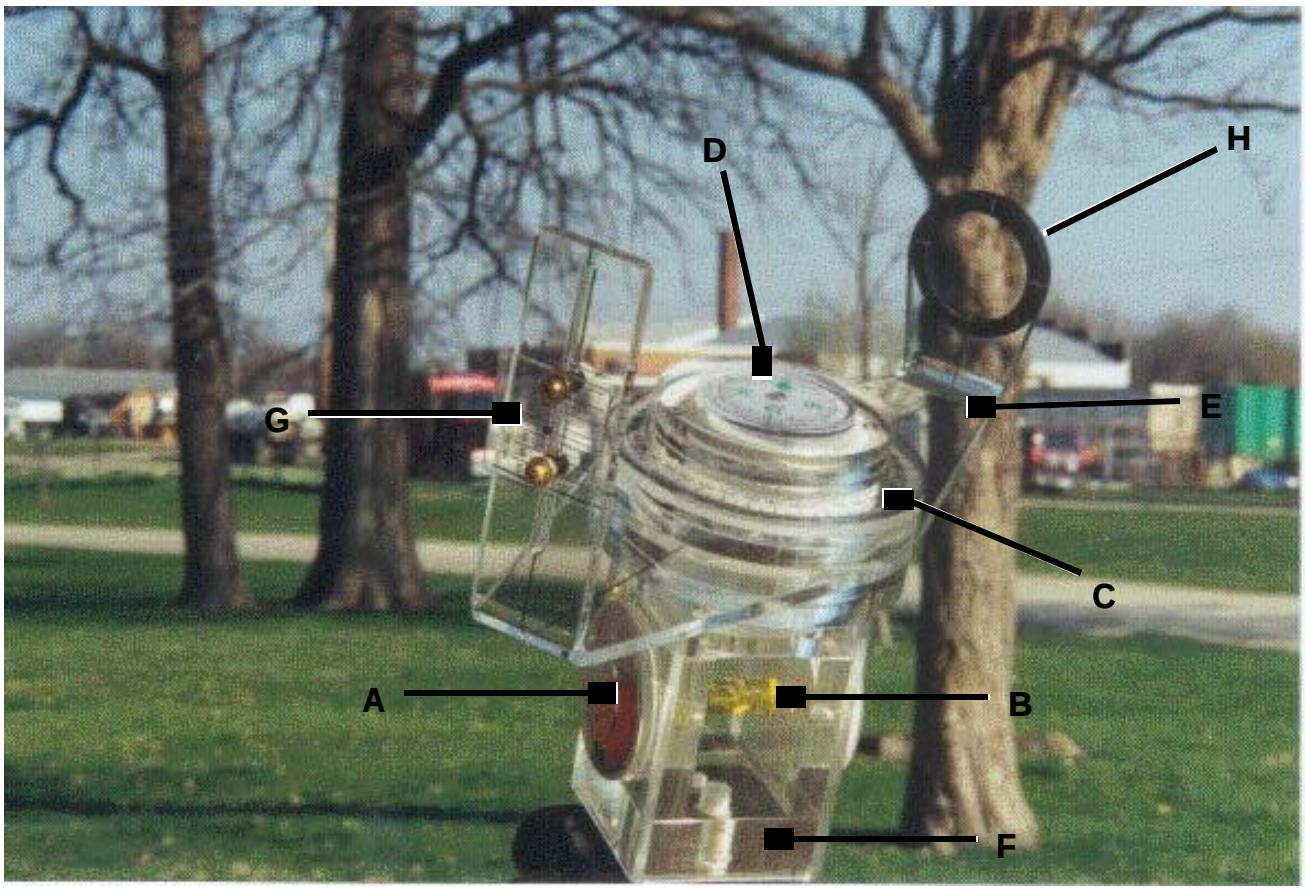
The concept of TARGET :SAT™ was derived from the need for a satellite antenna installation instrument that will accurately locate a satellite spacecraft's position in outer space with respect to the proposed antenna site's location. Consumers have a need for an instrument that will allow them to perform this location task independently, without the need for assistance from a professional installer. In addition, professional installers need a simple instrument to help them install antennas for their customers more quickly and more accurately.

Satellite reception requires a line of sight free from obstructions. The satellite electronics of today have tuning meters built inside them to locate the spacecraft's signal, but the unit must be installed completely before this tuning process can begin. All too many times the installer realizes that a location is inadequate for good reception due to obstructions. This requires that the unit be disassembled and reinstalled elsewhere, a time consuming and costly procedure. This trial and error method has proven so costly and frustrating to installers that employee turnover rates are high. In addition, improper installation has resulted in unnecessary consumer dissatisfaction. TARGET: SAT™, which has global accuracy, addresses these problems by providing consumers and professionals alike with an easy to use an instrument that quickly determine the satellite's location with respect to the proposed antenna site and ensures a clear line of site before attempting installation.

SPACECRAFT TARGETING PLATFORM, accessed from the Alien Works Ltd web site (www.alienworksltd.com), helps you determine the longitude, latitude and magnetic variation of your proposed installation site and calculates the azimuth and elevation needed for proper antenna alignment. A tripod with built-in levels ensures an accurate starting point. State-of-the-Art laser manufacturing, along with friction reducing surfaces such as Teflon® and Nylon®, allow easy alignment of each coordinate. Using the information obtained at the web site, the angle finder lets you set the elevation and the azimuth dial helps you set the east-west coordinates. The declination adjustment allows the TARGET: SAT ™ to follow the arc of the Clark Belt (where all of the geo-stationary satellites are located) by panning the azimuth pointer from east to west. Dual color graphics on the graduated scales provide precise positioning of the coordinates and a viewing lens allows you to determine whether you have a line of site free from obstructions to the spacecraft. Completing the package is a base that universally accepts all camera and video tripods. A weapons grade laser attachment provides precise ground placement of the antenna mast. Satellite antennas can now be quickly and accurately installed, optimizing reception and eliminating the need for disassembly and reinstallation.

®Registered art name of E .I. Dupont Co.

View of TARGET: SAT™ Components

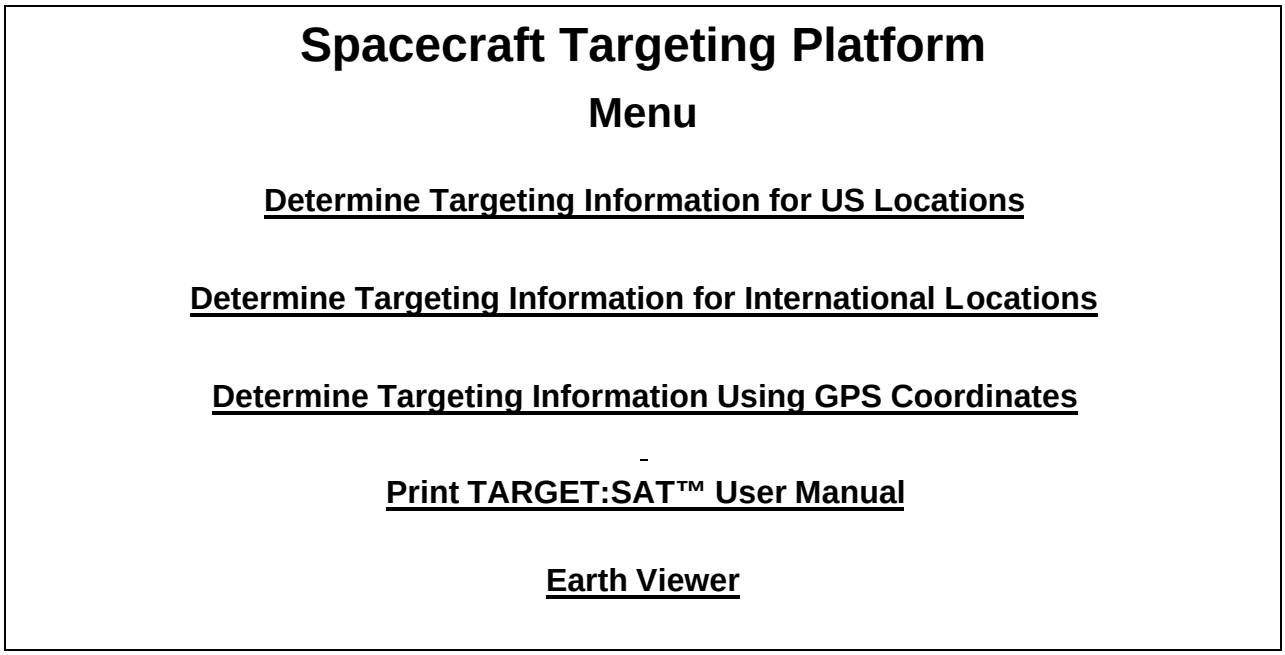


A. Angle Finder
B. Horizontal Bubble Vial
C. Azimuth Dial
D. Compass
E. Azimuth Pointer
F. Tripod Attachment Point
G. Declination Slider
H. Viewing Lens

TARGET: SATä Web Site Menu:

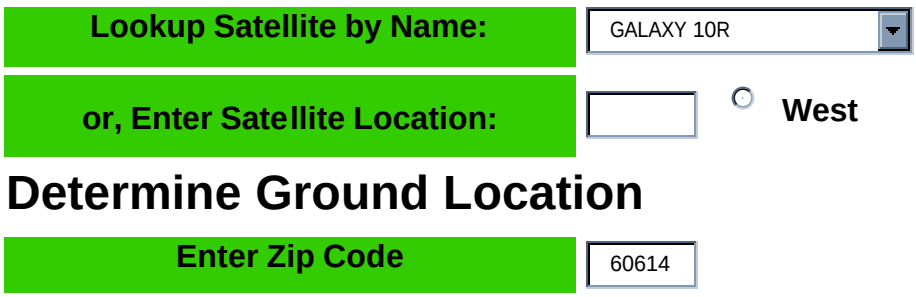
Go to www.alienworksltd.com, select “Spacecraft Targeting Platform”

The following menu will be displayed:



Select the Proper Targeting Option (US, International or GPS)

Pre-Installation Calculations: United States:



Find Satellite Location:

If you know the satellite’s orbit slot in degrees west, you can enter it on the second line, otherwise use the drop down box to locate the satellite’s name. The location is usually provided by the vendor supplying you with the programming guide. Satellite locations are also posted in some of the satellite magazines.

Find Ground Location – U.S.:

For the United States, entering the ZIP Code will generate the longitude and latitude of your proposed satellite antenna installation site.

Calculate the Magnetic Variation & the Azimuth/Elevation of the Satellite:

The Magnetic Variation for the installation location, which is needed to adjust the compass heading to locate the true heading of the satellite's position, is calculated using IAGA's GEOMAG Program. This input, along with the ground location's latitude and longitude and the satellite's orbit slot in degrees West, is used to calculate the proper Azimuth and Elevation settings for targeting the satellite.

Confirmation Screen:

City:	CHICAGO
State:	IL
Zip:	60614
Latitude:	41.9229° N
Longitude:	87.6483° W
Magnetic Variation:	-2.8167° (negative numbers denote west, positive denote east)
Satellite Name:	GALAXY 10R
Satellite Position:	123.0000°
Azimuth:	226.7158°
Elevation:	29.8216° (negative elevation means not viewable from location)

View/Print Configuration Worksheet:

You then have the option to print a TARGET: SAT™ Configuration Worksheet to send to the installation site. This worksheet walks you through each step of targeting the satellite.

Alien Works Ltd.

TARGET: SAT™ Configuration Worksheet

Confirmation Screen:

City	Chicago	**Satellite Name**	Galaxy10R
State	IL	**Satellite Position**	123.0000°
Zip	60614	**Azimuth**	226.7158°
Latitude	41.9229° N	**Elevation***	29.8216°
Longitude	87.6483° W	**Note: An elevation of at least +15 is needed for reliable reception.**	
Magnetic Variation	-2.8167° W		

TARGET:SAT™ Installation Steps:

1. If possible, adjust tripod height to expected focal point of installed antenna.
2. Level TARGET: SAT™ and make sure South at 180° on compass is aligned with the 180° mark on the Azimuth Dial.
3. Set declination slider to 5.77°:

Latitude: 41.9229°	**Chart A Value:** 5.771519°	**Declination Setting:** 5.77°

Calculate Chart A value by determining the value that would be 9229/10000 of the way between the values for 41 and 42 (41=5.67; 42=5.78; Difference=5.78-5.67=.11; Chart A Value = 5.67 +.9229*.11)

4. Rotate the Azimuth Dial 2.82° in the opposite (East) direction, counterclockwise, from the south position of 180 degrees on the compass dial to adjust the Azimuth Dial for magnetic variation. Negative value indicates a West error of 2.82° (rounded).

Magnetic Variation: -2.8167° West	**Rotate Azimuth Dial in the Opposite Direction for True Heading:** 2.82 ° East (rotate dial counterclockwise)

5. Rotate the Azimuth Pointer to align with the Azimuth Dial at the 180° mark. This becomes your Azimuth starting point.
6. Rotate the Azimuth Pointer away from the 180° mark on the Azimuth Dial to the 226.5° Azimuth setting. This is the azimuth location of the spacecraft.

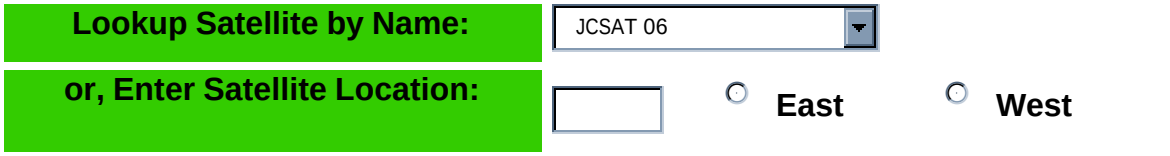
Azimuth: 226.7158°	**Azimuth Setting:** 226.5°

7. Take the ground location latitude, add .5° to center on the spacecraft's beam and subtract this amount from 90° to calculate the Angle Finder Setting of 47.5°. Tilt TARGET: SAT™ back on tripod to 47.5°.

Latitude: 41.9229°	**+.5° Adjustment**: 42.4 °	**Angle Finder Setting:** 47.5°

8. Align your eye with the black dot on the declination slider with viewing lens cross hairs so that the dot on the declination slider is centered in the viewing lens crosshairs. This is the actual position of the spacecraft. Any obstruction in viewing lens' view will degrade signal strength. If provided, activate laser attachment for precise positioning of antenna mast.

Pre-Installation Calculations: International



Determine Ground Location

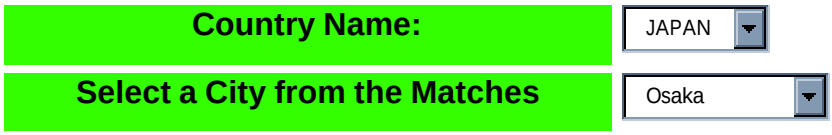
Find Satellite Location:

If you know the satellite's orbit slot in degrees west or east, you can enter it on the second line, otherwise use the drop down box to locate the satellite's name. The location is usually provided by the vendor supplying you with the programming guide. Satellite locations are also posted in some of the satellite magazines.

Find Ground Location – International:

Use the drop down box to select the Country and enter a full or partial city /location name. You will then be taken to a second screen where you will able to browse through the matching countries and cities and finalize your selection.

Determine Ground Location – Second Screen



Confirming your choices on this second screen will provide the longitude and latitude of your proposed satellite antenna installation site.

Calculate the Magnetic Variation & the Azimuth/Elevation of the Satellite:

The Magnetic Variation for the installation location, which is needed to adjust the compass heading to locate the true heading of the satellite's position, is calculated using IAGA's GEOMAG Program. This input, along with the ground location's latitude and longitude and the satellite's orbit slot in degrees West, is used to calculate the proper Azimuth and Elevation settings for targeting the satellite.

Confirmation Screen:

City:	Osaka
Country:	JAPAN
Latitude:	35.9500° N
Longitude:	137.2670° E
Magnetic Variation:	-7.3833° (negative numbers denote west, positive denote east)
Satellite Position:	236.0500°
Azimuth:	201.9587°
Elevation:	45.9386° (negative elevation means not viewable from location)

View/Print Configuration Worksheet:

You then have the option to print a TARGET:SAT™ Configuration Worksheet to send to the installation site. This worksheet sheet walks you through each step of targeting the satellite.

Alien Works Ltd.

TARGET:SAT™ Configuration Worksheet

Confirmation Screen:

City	Osaka	**Satellite Name**	JCSAT 06
Country	Japan	**Satellite Position**	236.0500°
		Azimuth	201.9587°
Latitude	35.9500° N	**Elevation***	45.9386°
Longitude	137.2670° E	**Note: An elevation of at least +15 is needed for reliable reception.**	
Magnetic Variation	-7.3833°		

TARGET: SAT™ Installation Steps:

1. If possible, adjust tripod height to expected focal point of installed antenna.
2. Level TARGET:SAT™ and make sure South at 180° on compass is aligned with the 180° mark on the Azimuth Dial.
3. Set declination slider to 5.08°:

Latitude: 35.95°	**Chart A Value:** 5.084°	**Declination Setting:** 5.08°

Calculate Chart A value by determining the value that would be 95/100 of the way between the values for 35 and 36 (35=4.97; 36=5.09; Difference=5.09-4.97=.12; Chart A Value = 4.97 +.95*.12)

4. Rotate the Azimuth Dial 7.38° in the opposite (East) direction, counterclockwise, from south position of 180 degrees on the compass dial to adjust the Azimuth Dial for magnetic variation. Negative value indicates a West error of 7.38° (rounded).

Magnetic Variation: -7.3833° West	**Rotate Azimuth Dial in the Opposite Direction for True Heading:** 7.38 ° East (rotate dial counterclockwise)

5. Rotate the Azimuth Pointer to align with the Azimuth Dial at the 180° mark. This becomes your Azimuth starting point.
6. Rotate the Azimuth Pointer away from the 180° mark on the Azimuth Dial to the 226.5° Azimuth setting. This is the azimuth location of the spacecraft.

Azimuth: 201.9587°	**Azimuth Setting:** 202°

7. Take the ground location latitude, add .5° to center on the spacecraft's beam and subtract this amount from 90° to calculate the Angle Finder Setting of 53.5°. Tilt TARGET:SAT™ back on tripod to 53.5°.

Latitude: 35.9500°	**+.5° Adjustment**: 36.5 °	**Angle Finder Setting: 53.5°**

8. Align your eye with the black dot on the declination slider with viewing lens cross hairs so that the dot on the declination slider is centered in the viewing lens crosshairs. This is the actual position of the spacecraft. Any obstruction in viewing lens' view will degrade signal strength. If provided, activate laser attachment for precise positioning of antenna mast.

Pre-Installation Calculations: GPS Version:

Lookup Satellite by Name:	GALAXY 10R			
or, Enter Satellite Location:	123	○ East	◉ West	

Determine Ground Location

Enter Latitude from GPS	41.9229	◉ North	○ South
Enter Longitude from GPS	87.6483	○ East	◉ West

Find Satellite Location:

If you know the Satellite's orbit slot in degrees west or east, you can enter it on the second line, otherwise use the drop down box to locate the satellite's name. The location is usually provided by the vendor supplying you with the programming guide. Satellite locations are also posted in some of the satellite magazines.

Find Ground Location – U.S. or International Using a GPS Device:

Use readings from your GPS device to determine the latitude and longitude of your proposed satellite antenna installation site.

Calculate the Magnetic Variation & the Azimuth/Elevation of the Satellite:

The Magnetic Variation for the installation location, which is needed to adjust the compass heading to locate the true heading of the satellite's position, is calculated using IAGA's GEOMAG Program. This input, along with the ground location's latitude and longitude and the satellite's orbit slot in degrees West, is used to calculate the proper Azimuth and Elevation settings for targeting the satellite.

Confirmation Screen:

City:	
State:	
Zip:	
Latitude:	41.9229° N
Longitude:	87.6483° W
Magnetic Variation:	-2.8167° (negative numbers denote west, positive denote east)
Satellite Name:	
Satellite Position:	123.0000°
Azimuth:	226.7158°
Elevation:	29.8216° (negative elevation means not viewable from location)

Note: If you entered the Satellite's orbit slot in degrees east or west and the latitude and longitude from a GPS unit, it will not check your values to determine the name of the satellite or name of the city/location.

View/Print Configuration Worksheet:

You then have the option to print a TARGET:SAT™ Configuration Worksheet to send to the installation site. This worksheet sheet walks you through each step of targeting the satellite.

Alien Works Ltd.

TARGET:SAT™ Configuration Worksheet

Confirmation Screen:

City	Chicago	**Satellite Name**	
State	IL	**Satellite Position**	123.0000°
Zip	60614	**Azimuth**	226.7158°
Latitude	41.9229° N	**Elevation***	29.8216°
Longitude	87.6483° W	**Note: An elevation of at least +15 is needed for reliable reception.**	
Magnetic Variation	-2.8167°		

TARGET:SAT™ Installation Steps:

1. If possible, adjust tripod height to expected focal point of installed antenna.
2. Level TARGET:SAT™ and make sure South at 180° on compass is aligned with the 180° mark on the Azimuth Dial.
3. Set declination slider to 5.77°:

Latitude: 41.9229°	**Chart A Value:** 5.771519°	**Declination Setting:** 5.77°

Calculate Chart A value by determining the value that would be 9229/10000 of the way between the values for 41 and 42 (41=5.67; 42=5.78; Difference=5.78-5.67=.11; Chart A Value = 5.67 +.9229*.11)

4. Rotate the Azimuth Dial 2.82° in the opposite (East) direction, counterclockwise, from the south position of 180 degrees on the compass dial to adjust the Azimuth Dial for magnetic variation. Negative value indicates a West error of 2.82° (rounded).

Magnetic Variation: -2.8167° West	**Rotate Azimuth Dial in the Opposite Direction for True Heading:** 2.82° East (rotate dial counterclockwise)

5. Rotate the Azimuth Pointer to align with the Azimuth Dial at the 180° mark. This becomes your Azimuth starting point.
6. Rotate the Azimuth Pointer away from the 180° mark on the Azimuth Dial to the 226.5° Azimuth setting. This is the azimuth location of the spacecraft.

Azimuth: 226.7158°	**Azimuth Setting:** 226.5°

7. Take the ground location latitude, add .5° to center on the spacecraft's beam and subtract this amount from 90° to calculate the Angle Finder Setting of 47.5°. Tilt TARGET:SAT™ back on tripod to 47.5°.

Latitude: 41.9229°	**+.5° Adjustment**: 42.4 °	**Angle Finder Setting:** 47.5°

8. Align your eye with the black dot on the declination slider with viewing lens cross hairs so that the dot on the declination slider is centered in the viewing lens crosshairs. This is the actual position of the spacecraft. Any obstruction in viewing lens' view will degrade signal strength. If provided, activate laser attachment for precise positioning of antenna mast.

On-site set up

(1) Mount TARGET: SAT™ on tripod as shown in Fig. 1.

(2) Determine your latitude, longitude and magnetic variation by:

a) Obtaining readings from a GPS Unit
b) Obtaining this information by following instructions on the Spacecraft Targeting portion of the Alien Works web site (www.alienworksltd.com)
c) Calling your local airport and requesting the latitude, longitude and magnetic variation from True North for your location.

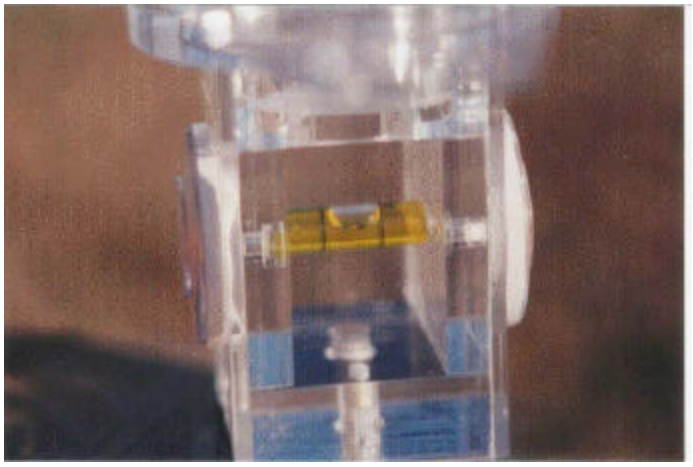


Fig. 2A

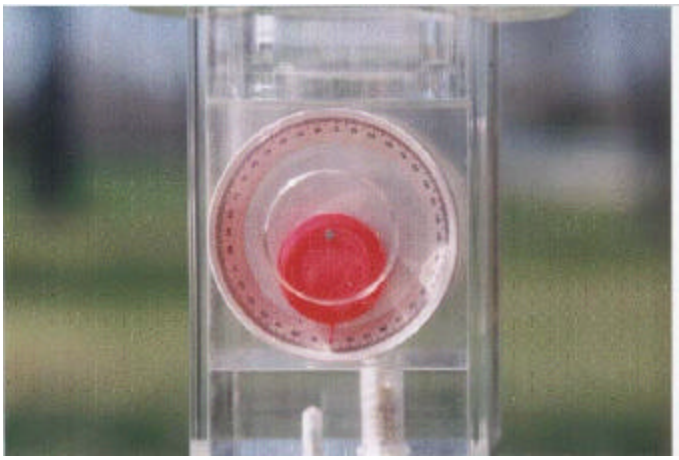


Fig. 2B

(3) Bring TARGET: SAT™ to level using unit's horizontal bubble and angle finder as shown in Fig. 2A and 2B. Center bubble in vial and angle finders at zero. This is done by adjusting the tripod leg length and the pan head adjustment.

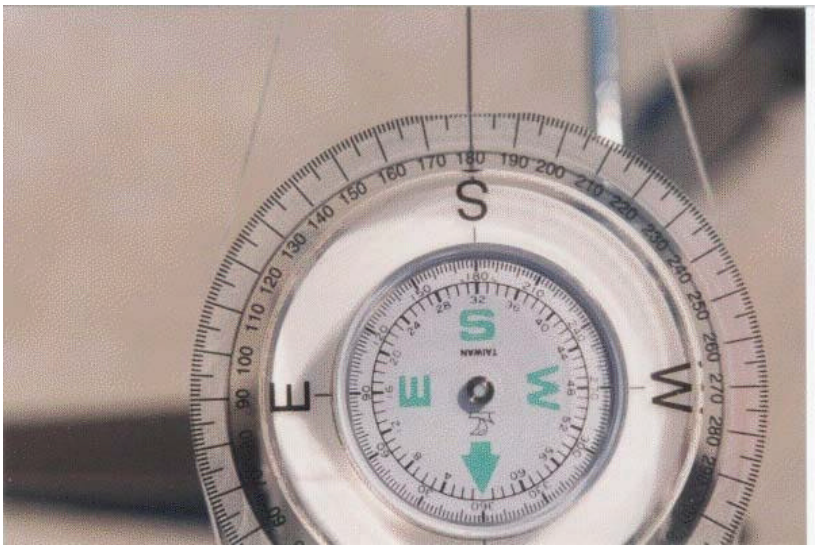


Fig. 3

(4) Rotate unit on tripod so that compass now points to South as shown in Fig. 3.

Note! If installation is South of the equator, use North in place of South at this point.

Note! Photo in Fig. 3 positions view lens at top of photo.

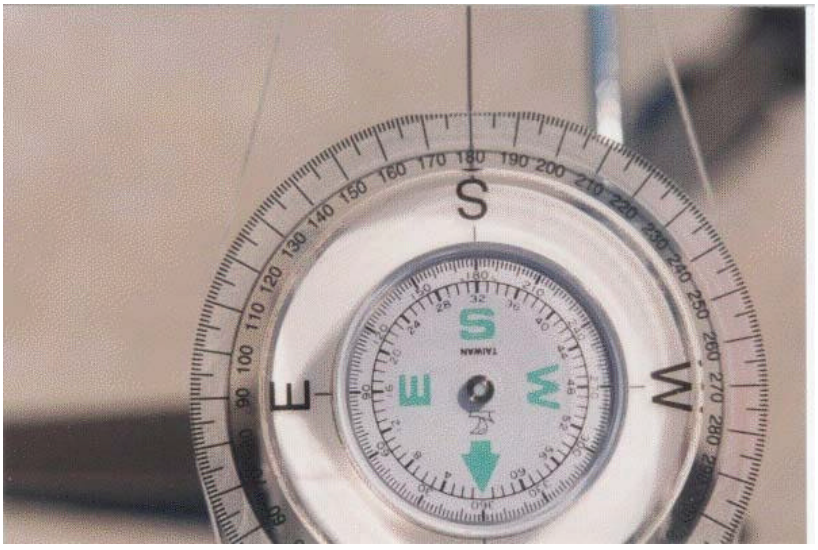


Fig. 4

(5) Now align azimuth pointer and azimuth dial with compass as shown in Fig. 4.

View lens position remains constant at top of photo.

Once this has been accomplished, the compass will no longer be needed for the setup calculations that follow. All targeting will be achieved using the azimuth pointer, the azimuth dial and the declination slider.

Fig. 5

(6) Now verify that unit still reads level on the bubble and angle finder. If not, re-align unit and compass again as shown in Fig. 5

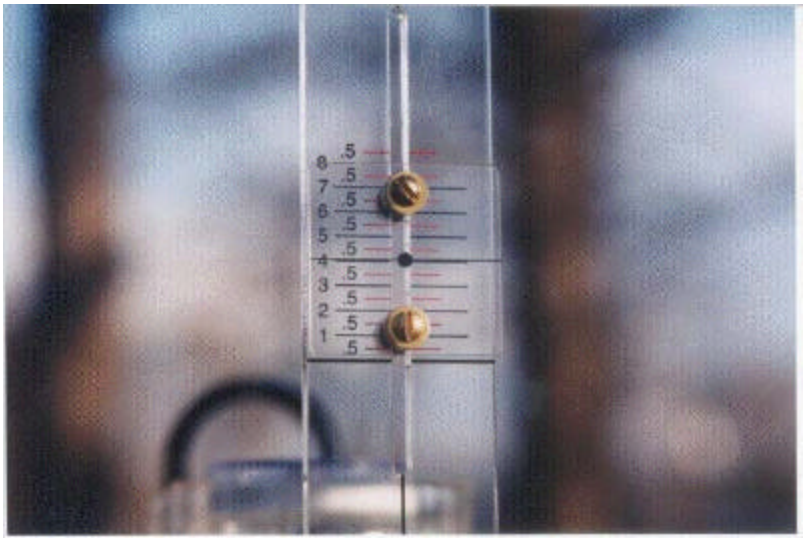


Fig. 6

(7) Refer to declination degree Chart A provided to adjust declination slider. Match the latitude recorded in step 2B to that of declination degrees column. Adjust slider to nearest .5 degrees. An example showing 4.5 degrees is shown where the latitude is 32 degrees. **Note!** Red graduations are .5 degrees and black graduations are full degrees. If the latitude calculated in Step 2 falls on a half-degree position, subtract the declination value given for your latitude from the next higher latitude declination value, take the difference, divide by 2 and add that amount to your declination value. See Chart A for example given.

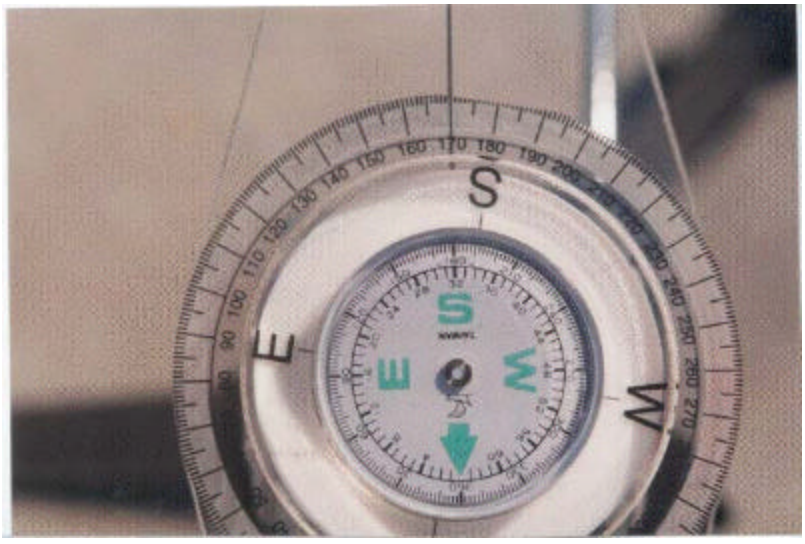


Fig. 7

(8) Using the magnetic North variation information obtained in Step 2, turn the azimuth dial away from the compass alignment position the opposite direction the number of degrees given. For example: variation is 10 degrees East, therefore, rotate azimuth dial in the West direction 10 degrees to return to the true South coordinate. Photo in Fig. 7 shows this correction to true South alignment. The view lens remains constant at top of photo.

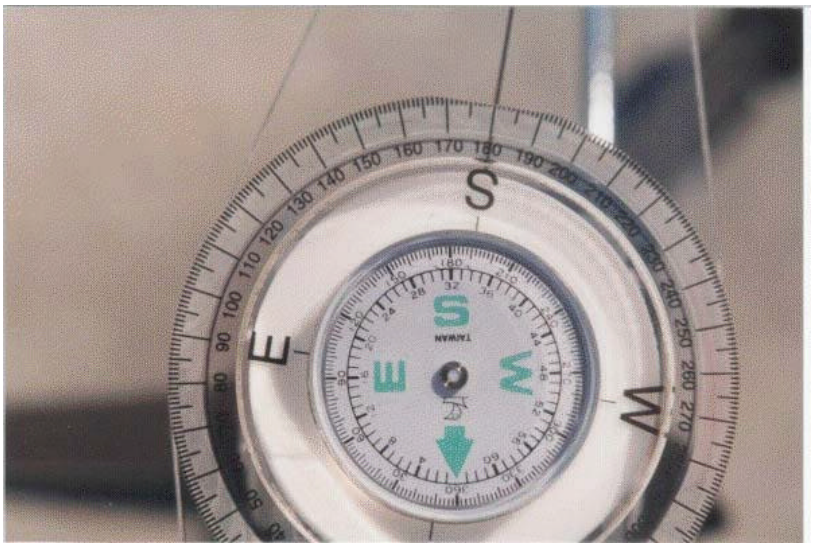


Fig. 8

(9) Now rotate azimuth pointer to align with azimuth dial at the 180 degree mark. This becomes your azimuth starting point for the satellite position you want to locate (see Fig. 8)

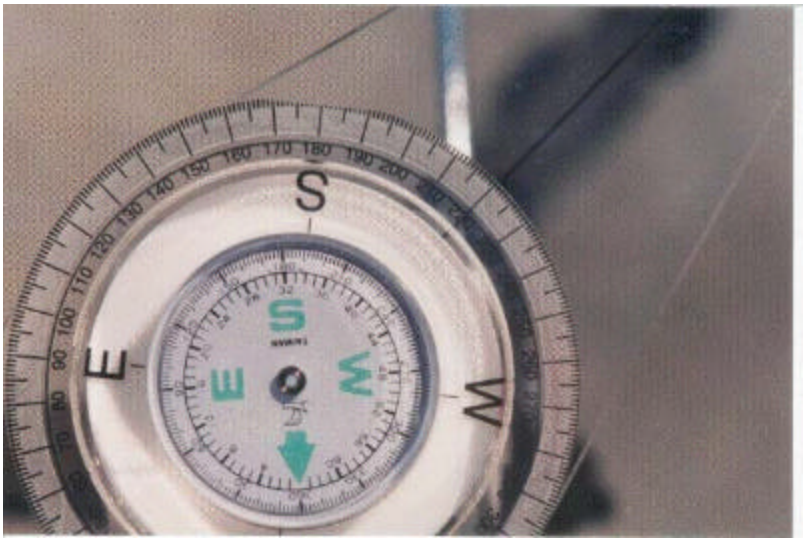


Fig. 9

(10) Rotate the azimuth pointer away from the 180- degree mark on the azimuth dial to the azimuth degree mark given from the calculations in Step 10.

Note! Photo in Fig. 9 shows 220 degrees azimuth.

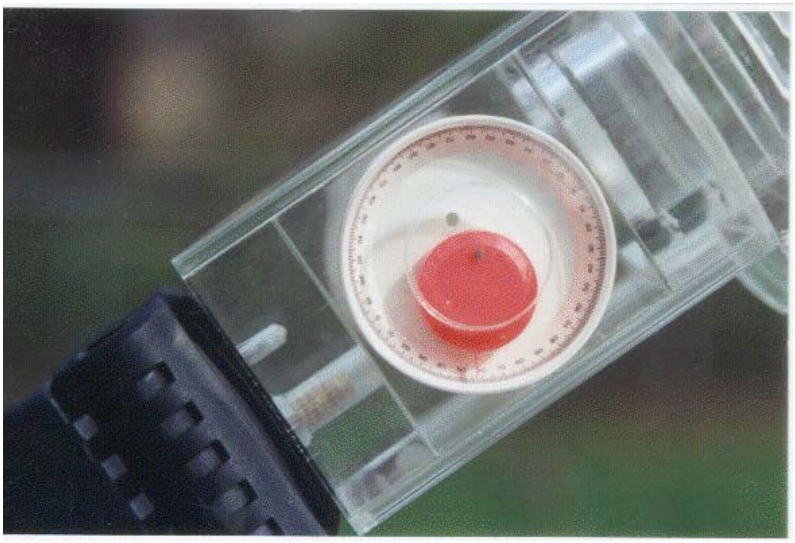


Fig. 10

(11) Now, take latitude obtained in Step 2B, add .5 degrees to center upon space-craft beam and subtract this from 90 degrees. Tilt TARGET: SAT™ back on tripod to read this position. Fig. 10 photo shows 57.5 degrees.

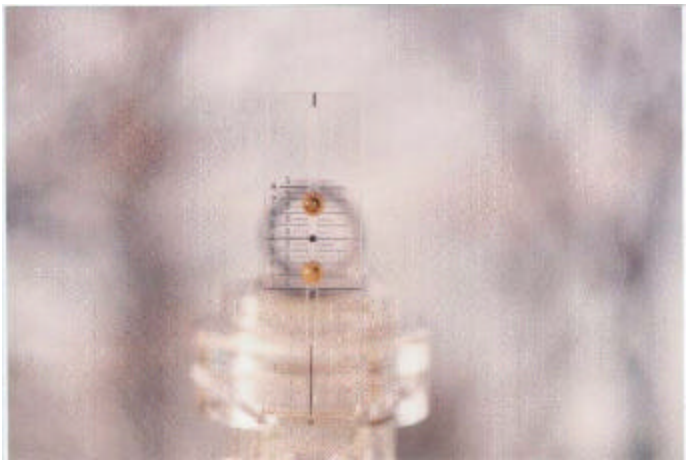


Fig. 11

(12) Align your eye with black dot on the declination slider with the viewing lens cross hairs so that dot on declination slider is centered in viewing lens crosshairs. This is the actual position of the spacecraft. Fig. 11

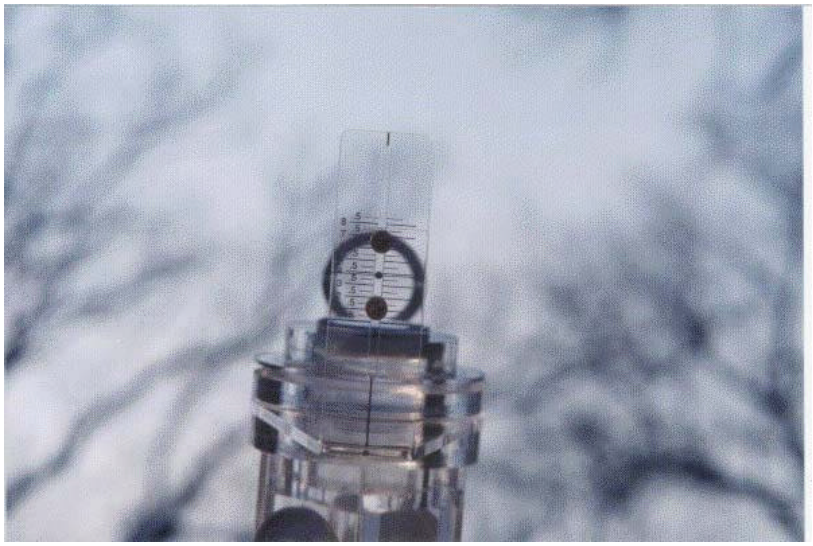


Fig. 12

(13) Any obstructions in viewing lens' view will degrade signal strength from spacecraft.
Note! Pictured in viewing lens view are trees. This location is unsuitable for maximum reception from the spacecraft. Fig. 12

Fig. 13

(14) Once a clear sight has been located, mark position for antenna mast location by extending a line from center of tripod main shaft to surface below as shown in Fig. 13 by arrow. Center of antenna mast goes here. If provided activate laser attachment for precise positioning of antenna mast ground point

For antennas having motorized mounts, follow the same steps but with additional azimuth locations for those particular satellite spacecraft of interest. All that is required is moving the azimuth pointer to those locations and viewing through the viewing lens for obstructions. Center focus, DBS and FSS satellite antennas are all viewed the same way through the TARGET: SAT™ lens.

Chart A

Latitude	Declination	Latitude	Declination
1	0.15	42	5.78
2	0.31	43	5.89
3	0.45	44	6.00
4	0.61	45	6.11
5	0.76	46	6.22
6	0.90	47	6.32
7	1.06	48	6.42
8	1.21	49	6.52
9	1.37	50	6.61
10	1.51	51	6.70
11	1.66	52	6.80
12	1.80	53	6.89
13	1.95	54	7.02
14	2.10	55	7.06
15	2.25	56	7.14
16	2.39	57	7.22
17	2.54	58	7.30
18	2.68	59	7.38
19	2.82	60	7.46
20	2.97	61	7.53
21	3.11	62	7.60
22	3.25	63	7.67
23	3.38	64	7.74
24	3.53	65	7.80
25	3.66	66	7.86
26	3.80	67	7.92
27	3.94	68	7.98
28	4.07	69	8.03
29	4.20	70	8.09
30	4.33	71	8.14
31	4.47	72	8.18
32	4.59	73	8.23
33	4.71	74	8.27
34	4.85	75	8.31
35	4.97	76	8.34
36	5.09	77	8.38
37	5.21	78	8.41
38	5.33	79	8.43
39	5.45	80	8.47
40	5.56	81	8.49
41	5.67		

Example for half-degree latitude calculations

If your latitude is 32.5 degrees, first locate declination value for 32 degrees on Chart A - which is 4.59 degrees. Next locate the higher latitude on Chart A - which is 33 degrees. The corresponding declination value for 33 degrees is 4.71 degrees. Subtract 4.59 degrees from 4.71 degrees. That difference is 0.12 degrees. Dividing this by 2 yields 0.06 degrees. This figure is then added back to 4.59 degrees giving the new declination value of 4.65 degrees. Adjust the declination slider to half way between the .5 degrees red graduations for spacecraft position.

Warranty

Warranty is to the original purchaser for the period of 90 days from receipt of purchase. This warranty is to the original purchaser only. Workmanship and material defects are covered during this period. For warranty work, a copy of the purchase receipt along with a return authorization (RA) number is required. RA numbers may be obtained from Alien Works or one of its authorized servicing agents. . Manufacturer has the option to repair or replace unit. Remainder of original warranty will be honored. No reimbursement due to loss of time and expense is given.

Unit must be shipped postage paid to factory or authorized service center. Upon receipt of unit, unit will be inspected, work performed and unit (or a replacement) will be returned postage paid to customer location as soon as possible.

No allowance is considered due to damage or breakage by dropping. No other warranties are expressed or implied.

Alien Works Ltd.