

INSTALLATION AND OPERATION MANUAL
FOR SUPERTRACK MODEL A6
Ku-BAND TV-RO ANTENNAS



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KNS SuperTrack systems are manufactured in the Republic of South Korea.

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The Series A Family of Marine Stabilized Antenna with KA-70 Antenna Control Unit complied with the requirements of ETSI (European Telecommunications Standards Institute) Standards; EN 301 843, EN 60950 and EN 302 340 (2006-04) on November 24, 2009.

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Revision History

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1.1	May17, 2010	Update text and figures about changed ACU software (PCU Ver. 2.13 & ACU Ver. E1.20)	Hong	
1.2	Dec 15, 2010	Add the note about the package and cable.	Hong	
1.3	Mar 28. 2011	Change the radome drawing and add the SCS version (PCU Ver. 2.21 & ACU Ver. E1.23)	Hong	

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1. Introduction

1.1. Purpose

The purpose of this manual is to provide the necessary information required by the end user, customer and installer to successfully install the A6 antenna and controller and to program the KA-70 for operation.

It is recommended that all personnel responsible for operating A6 systems should know which type of system they have, read and understand the basic terms, and be familiar with the operation of these systems.

Although installations may be completed by the customer's preferred personnel, it is also recommended that personnel be trained in the KNS suite of equipment installation procedures and trained by the relevant KNS Inc. experts.

Section 2 of this document has been provided to ensure that ALL personnel are aware of the specific safety hazards involved in the installation and configuration of the KNS equipment (e.g. electrical, static and RF radiation hazards).

2. Personal and Antenna Safety

This section defines the areas near or within the radiation area of the auto acquires antennas currently deployed. It is recommended that ALL customers operating this equipment become familiar with the radiation patterns of these units and adhere to the cautions below.

2.1. Radiation Limits

Radiation limits are defined in terms of maximum permissible exposure (MPE), which is a frequency-dependent level of radiation that a person is subjected to over some duration of time. Besides being frequency dependent, the MPE level and duration of time based on the Specific Absorption Rate (SAR) of the human body, depends on whether the area around the antenna is controlled or uncontrolled. The definitions of these two types of areas are quoted below from OET 65 below:

“The FCC guidelines incorporate two separate tiers of exposure limits that are dependent on the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. The decision as to which tier applies in a given situation should be based on the application of the following definitions.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. As discussed later, the occupational/controlled exposure limits also apply to amateur radio operators and members of their immediate household.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not

employment-related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

For purposes of applying these definitions, awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of an RF safety program. Warning signs and labels can also be used to establish such awareness as long as they provide information, in a prominent manner, on risk of potential exposure and instructions on methods to minimize such exposure risk.”

The following conclusions can be drawn from these tables (Figure 2-1):

1. Power density between the feed flange and reflector is at a hazardous level and access to this area must be prevented while the terminal is transmitting. Under no conditions should any body part be placed in this region while the terminal is transmitting.

Based on the controlled-area power density of 5 mW/cm^2 over any 6 minute period shows that in some cases less than 14.6 seconds of exposure is allowable in this region. Note that, in general, an operator would not be manually adjusting the feed while a high-rate, high-power transmission was occurring. Also note that the power density decreases toward the reflector (as the beam widens from the feed), so the maximum exposure time increases as distance from the feed increases.

2. Near-field radiation levels are below the controlled-area requirement, but in some cases are above the uncontrolled area requirement. Although the nature of transmissions is such that radiated power levels should not reach full power at any time, there is no absolute guarantee of reduced transmit levels; therefore access to the near field of the antenna must also be restricted. Since the near field is contained within a cylinder pointed from the reflector toward the satellite, we can compute the horizontal distance from the front of the reflector to which access must be restricted. Table 2-1 computes this distance. At distances further than the tabulated limits, access can be unrestricted. Between the antenna and the tabulated limits, access should be limited to less than 10 minutes in any 30 minute interval.
3. Far field radiation levels are below the uncontrolled-area requirement and are therefore not a concern.

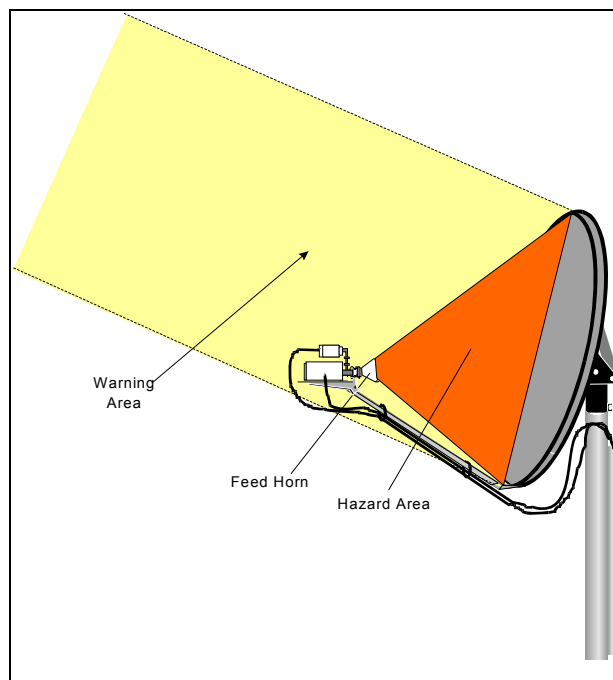


Figure 2-1 Defined Radiation Areas

Hazard Area (Between the feed and reflector) – this is the highest power density region because the area of power radiation (the feed flange) is smallest.

Warning Area (Near field) – this is the area bounded by a cylinder with diameter of the reflector, and extending from the reflector toward the satellite for, in the case of auto acquire systems, less than 75 meters (exact distance depends on frequency and reflector diameter).

Far field – this is the area at some distance from the antenna, where the radiation density falls off with the square of distance.

2.2. Recommendation

Access to the immediate vicinity of the antenna (reflector and feed) must be restricted to trained customers and certified contracted/service personnel, and no personnel should put body parts between the feed and the reflector while the terminal is transmitting. At full output power, this region is dangerous for exposure of more than approximately 14.6 second.

At full output power, the near field output of auto acquire terminals exceeds allowable levels for *continuous* exposure in an *uncontrolled* area. This near field is a cylindrical region enclosing the reflector and pointing toward the satellite. Because many sites accommodating the auto acquire terminals are accessible to non-operational personnel, these sites should be considered as uncontrolled and the recommended precautions taken.

The primary precaution is to restrict access to the immediate area in front of the reflector to short durations, which with worst-case assumptions means that access should be limited to less than 10 minutes within any 30 minute interval. If *limited-duration* access cannot be insured, then *no* access should be allowed within the distance specified in Table 2-1 below. (Table 2-1 assumes 6 ft. tall personnel at ground level. The horizontal distance must be scaled up if personnel are at a level higher than 6 ft.).

	IA-6
Minimum Elevation City	Rock Springs
Minimum Elevation (deg.)	39
Minimum distance in front of reflector to clear 6 ft. tall person (ft.)	7.4
Minimum distance in front of reflector to clear 1.8m tall person (m)	2.3

Table 2-1 Exclusion Region in Front of Antenna (Random)

3. Installation

3.1. Site Selection

Determine the optimum mounting location for the antenna radome assembly. It should be installed where:

1. The antenna has a clear line-of-sight view of as much of the sky as is practical. Choose a location where masts or other structures do not block the satellite signal from the dish as the boat turns.

2. The antenna is situated at least 5m away from other transmitting antennae (HF, VHF and radar) that may generate signals that may interfere with the SuperTrack A series antenna. The further away the SuperTrack A series antenna is from other such antennae, the less impact their operation will have on it.

The antenna radome assembly should be rigidly mounted on the boat. If necessary, reinforce the mounting area to ensure that it does not flex due to the boat's motion or vibration.



Figure 3-1 Best Location I



Figure 3-2 Best Location II

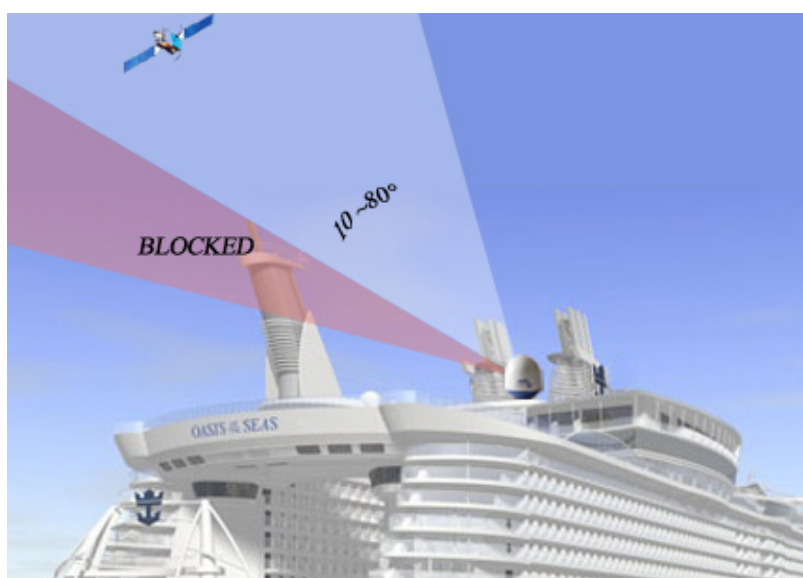


Figure 3-3 Antenna Blockages

3.2. Unpacking the Unit

Open the wooden box using pliers and remove the items of antenna equipment. Do not turn the box on its side to tip or roll out the product, or turn the box upside down to remove it.

Lift carton box straight up



Figure 3-4 Unpack the Antenna

3.3. Equipment and Cable Installation

The coax connector bracket beneath the radome is labeled. The functional assignment of these labels is as follows:

A6 Connectors

TX: Connect to TX of modem

RX: Connect to RX of modem

ACU: Connect to ACU

NOTE: Unused coax connections (on the connector bracket) MUST be terminated with a 75ohm terminator.

NOTE: We recommend the following cable types for cable lengths:

-within 20m: RG6

-within 50m: RG11

-within 100m: LMR400

-within 200m: LMR600

NOTE: Impedance of cable is 75ohm. Also you can select the other cable types. However we recommend all attenuation of cable is under 20dB at 2.5GHz.

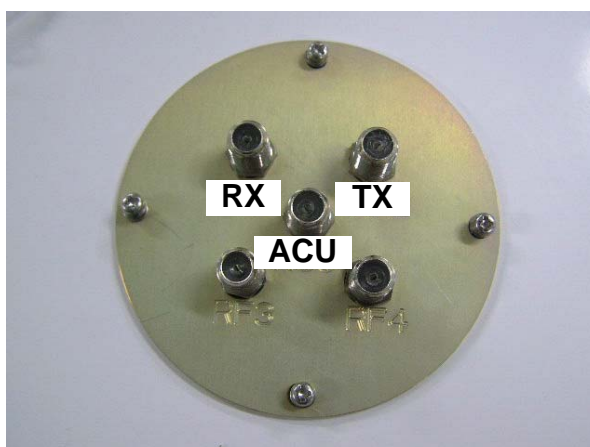


Figure 3-5 RF Connector Bracket

3.4. Antenna Unit Mounting

1. Drill four bolt holes and cut out a cable access hole on the mounting site. (See reference appendix.)
2. Position the foam seal on the mounting surface with the hole centered over the cable access cut-out.
3. Position the base plate over the mounting holes and the cable access hole, and then align the radome base plate's "Bow" label (shown in Figure 3-6) with the ship's bow.



Figure 3-6 "BOW" Label of the Radome Base

4. Connect the data/power and the RF cables from below decks to the base plate with a 7/16" wrench, applying 30 pounds of torque. Check the label on both ends of each RF cable to match its antenna base-plate connector. Do NOT use Teflon gel on the cable fittings as it reduces signal strength at high frequencies.
5. Install flat washers and spring washers and a mounting bolt to each mounting hole of the radome base from the underside of the mounting surface. Apply Loctite 241 to the threads of the mounting bolt up near the mounting surface and tighten each of the 4 bolts to 24 in-lb (21 kg-cm) of torque [finger tight, then about 1/4 turn tighter] with a wrench. DO NOT OVER-TIGHTEN. You have to install mounting bolts of the proper length. If a bolt is too long, the extra length of threaded rod that extends above the radome base should be cut off.

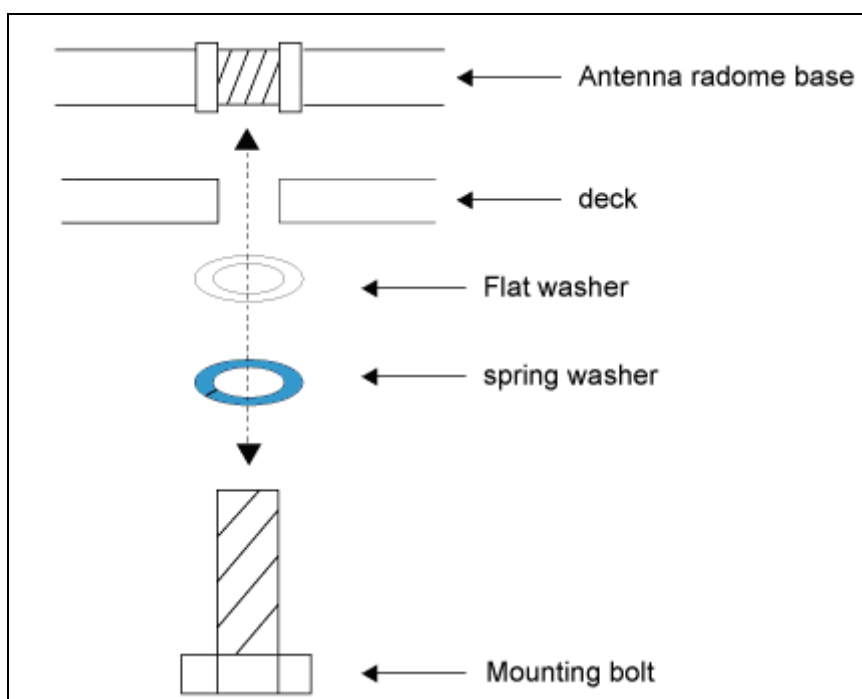


Figure 3-7 Tighten the nuts from below

6. Remove the jigs and wire ties holding the Antenna. Please refer to Figures 3-8 and 3-9 below.

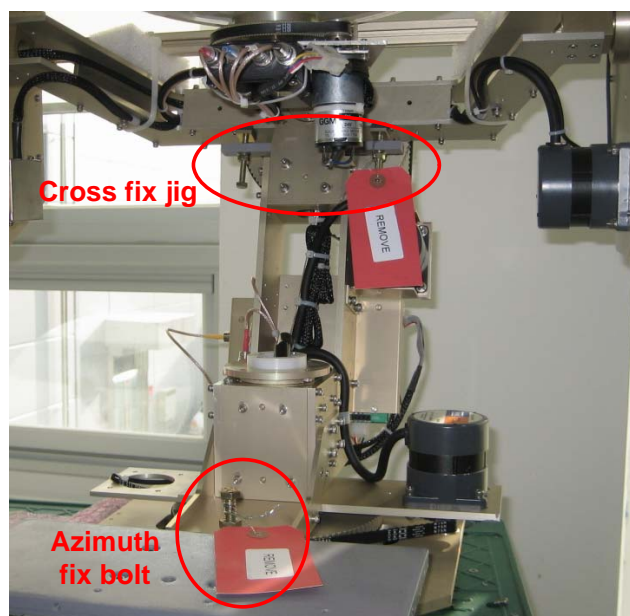


Figure 3-8 Cross & Azimuth Fix Jig 1

Elevation fix tie



Figure 3-9 Elevation Fix Tie

3.5. ACU Mounting

The ACU may be mounted either horizontally or vertically.

1. The ACU should be placed in a dry location that is convenient for the user.
2. It must be situated in a place that is not susceptible to magnetic interference; nor must it be situated on a level surface.
3. It should be placed so that the LCD display is visible and the buttons are easily accessible.

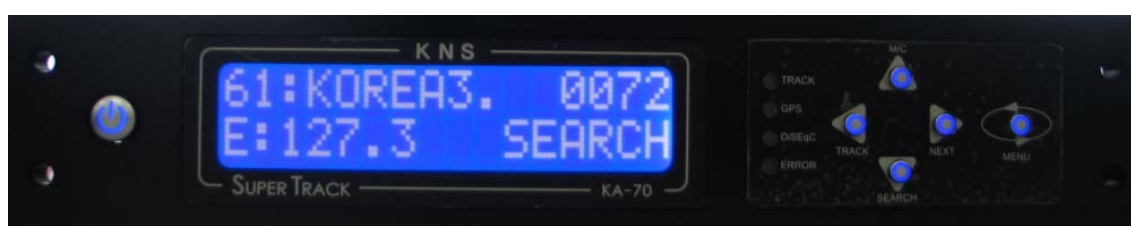


Figure 3-10 KA-70 ACU

3.6. Gyro Connection

The SuperTrack A6 receives NMEA-type gyro signals when the compass mode is 'Gyro'. Connect the NMEA port of the ACU back panel with a ship's gyro using a 9-pin connector (female type).

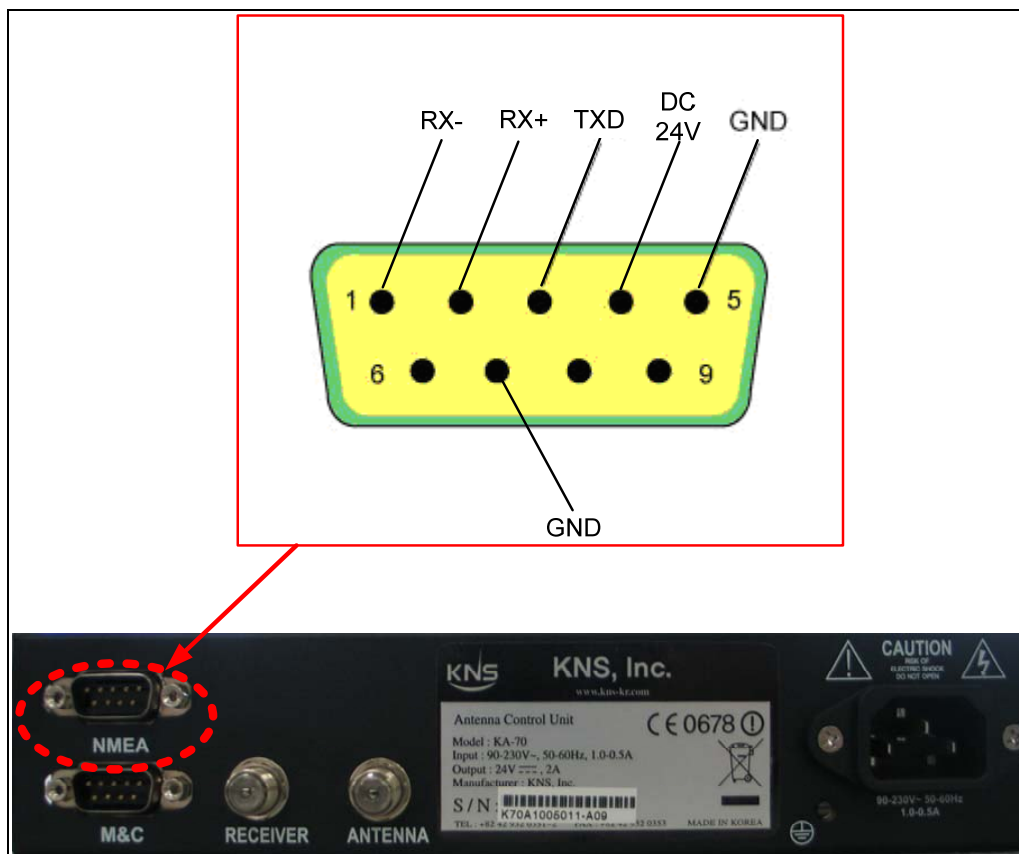


Figure 3-11 NMEA connector



Figure 3-12 Female-type 9-pin connector

Gyro Cable Connection

The cable connection differs according to the type of NMEA. Connect the NMEA port with the ship's gyro, as indicated in Figures 2-13 and 2-14 below.

Pin No.	Pin Name
1	RX-
2	RX+
3	TXD
4	DC 24V
5	GND
6	Dummy
7	GND
8	Dummy
9	Dummy

Table 3-1 Using the pin number of the ACU Connector for the NMEA type

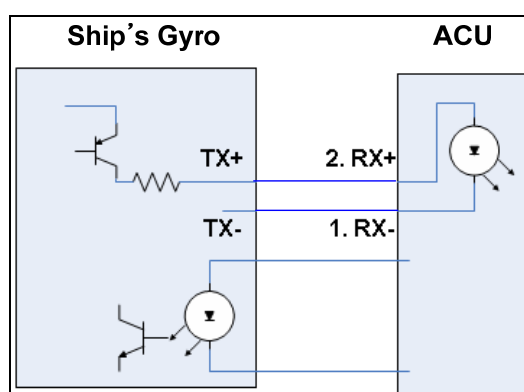


Figure 3-13 Cable Connection NMEA 422/485

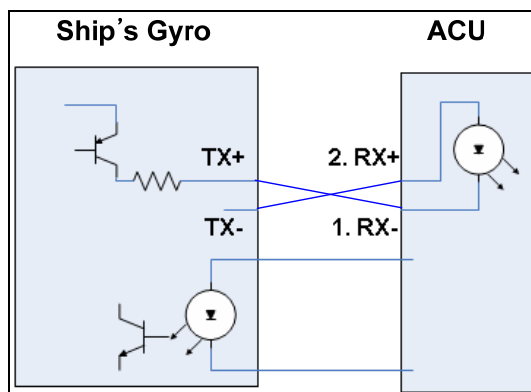


Figure 3-14 Cable Connection NMEA 232

NOTE: KA-70 ACU can receive the various format of NMEA, as follow: HDT; HDG; HDM. KA-70 ACU(ver. E.1.23) can accept the gyro signal even though there is no checksum as below.

\$HEHDT, x. x, T*hh<CR><LF>

\$HEHDG, x. x, x. x, a, x. x, a*hh<CR><LF>

*hh means checksum of format.

3.7. Cable Connection

A6 Standard Connection

Connect the A6 and KA-70 ACU with modem like below Figure 3-15.

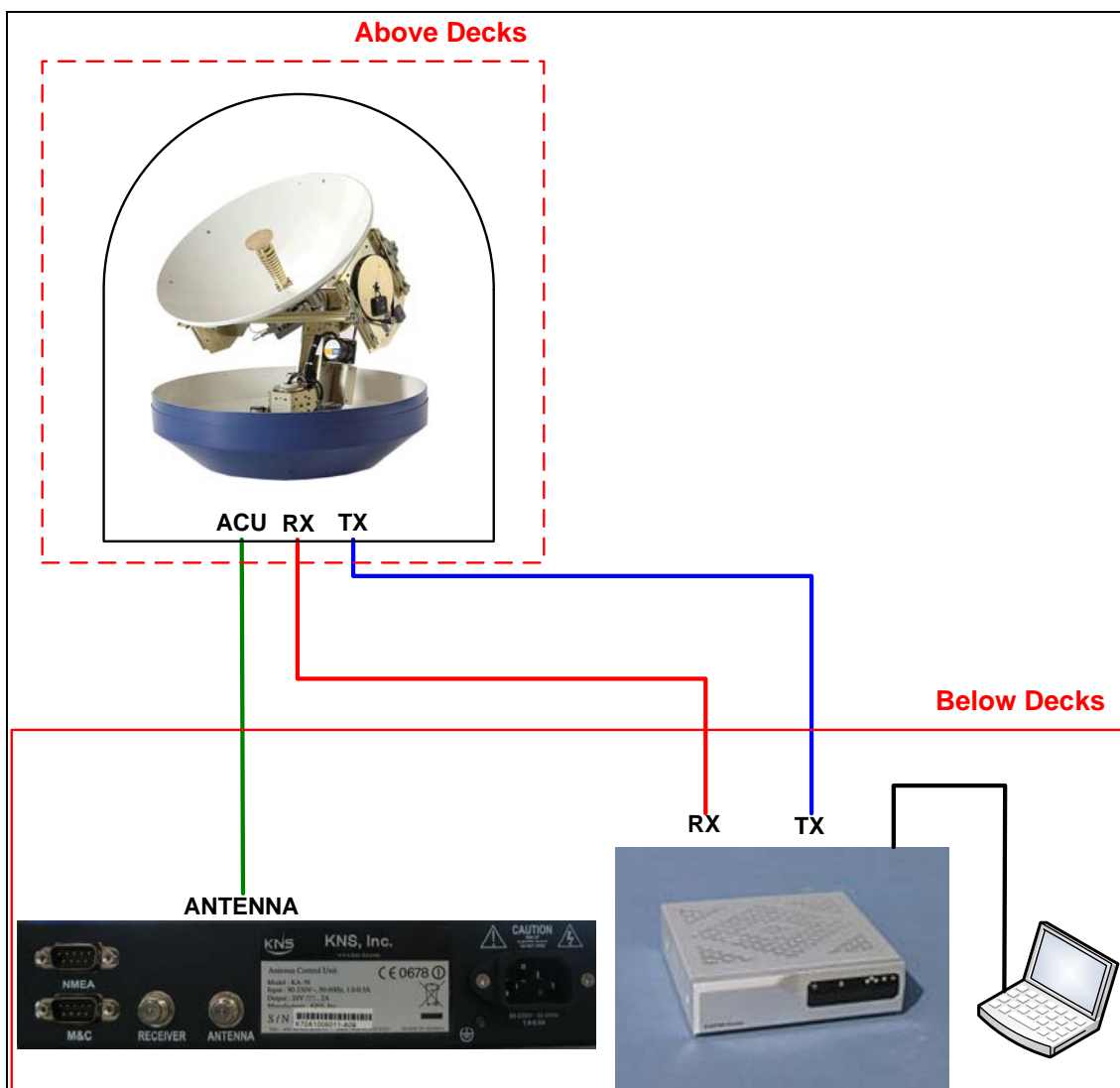


Figure 3-15 A6 Standard Cable Connection

NOTE: We recommend the 75ohm as impedance of cable

A9 Cable Connection for switching the satellite using 22KHz tone(Option)

Connect the A6 and KA-70 ACU with modem like below Figure 3-16

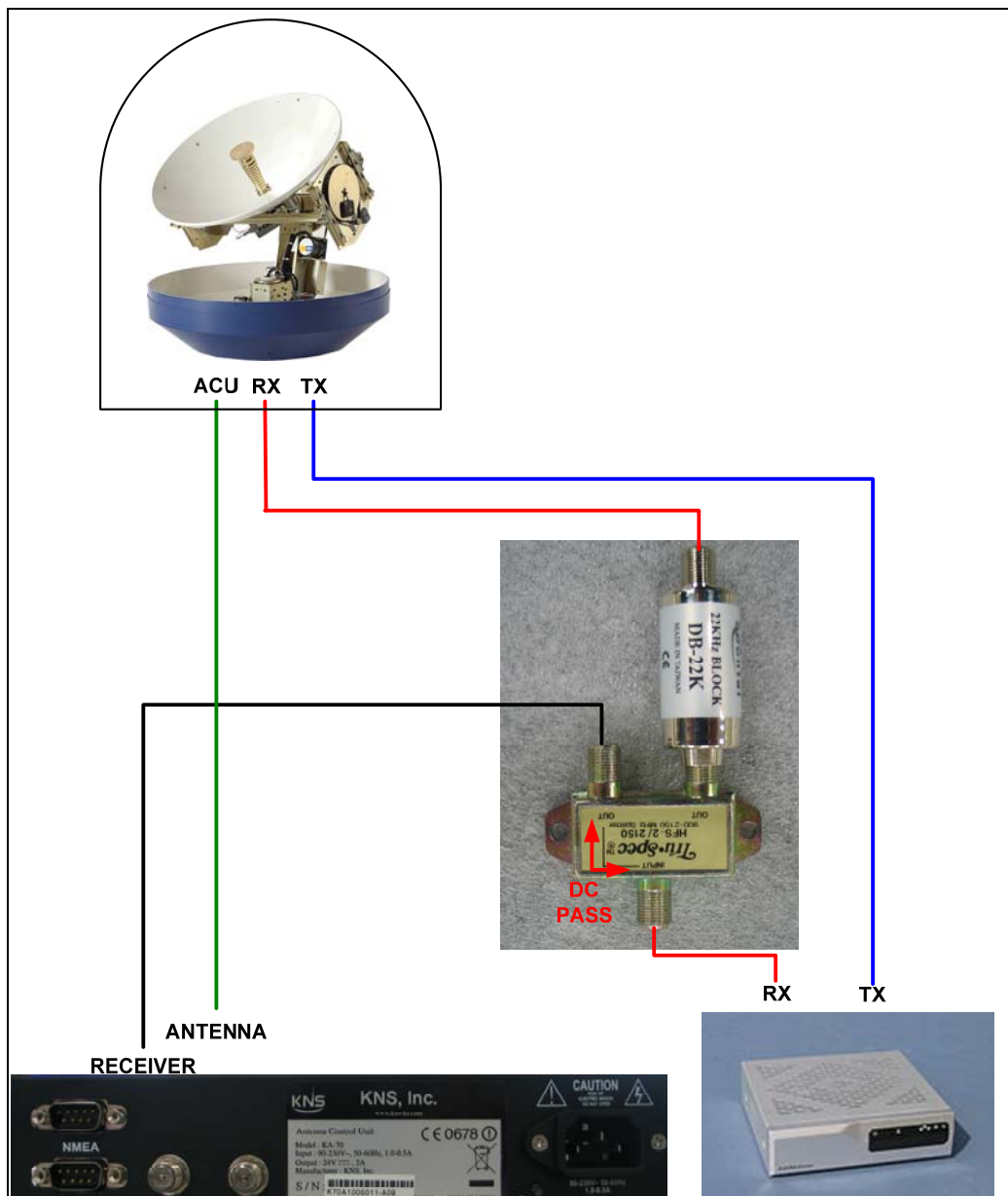


Figure 3-16 A6 Cable Connection for Switching the Satellite using 22KHz Tone

NOTE: Receiver of ACU is connected with RX port of modem via 'DC PASS' of splitter.

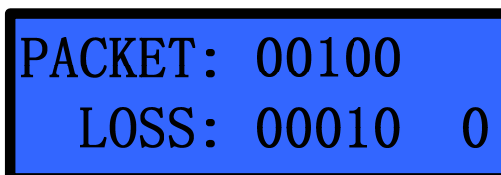
NOTE: There are no 22KHz tone block and splitter on package. However please contact us if you need them.

4. Operation

4.1. Front Panel Functions

1. **MENU** button – Press the MENU button for more than 3 seconds to enter the set-up mode. When you want to escape from the set-up mode, press MENU again for more than 3 seconds. Another function of the MENU button is that of checking the error message when the A6 makes an error. When the error LED is on, press the MENU button briefly. Then, you will be able to see the hexadecimal error message. Please press the NEXT button to clear the error. If you press MENU briefly again, you can go back to normal operation.

NOTE: Operator can make sure the communication status of ACU and antenna as below when press MENU and press SEARCH shortly again. Packet means the number of command from ACU, loss means the number of loss on the PCU. The more loss this display, communication status is not good.



```
PACKET: 00100
LOSS: 00010 0
```

Figure 4- 1 Packet Loss

2. **TRACK** button – Press the TRACK button to enter the stall mode. The antenna does not move from the position when the TRACK button is pressed. This button is also used to scroll left (◀) in the menu.

3. **NEXT** button – Press the NEXT button to select your preprogrammed next satellite. When your desired satellite is displayed, stop pressing NEXT, and then, after 3 seconds, the antenna automatically searches for your desired satellite.

Use this button when you want to scroll right (▶) in the menu.

4. **M/C** button – Press M/C for more than 3 seconds to enter computer link via RS 232. When you want to escape from computer link, press M/C for more than 3 seconds. This button is also used to scroll up (▲) in the menu.

5. **SEARCH** button – Press SEARCH for more than 3 seconds to re-search for the current satellite. This button is also used to scroll down (▼) in the menu.

6. **PWR** button (Power button) – Use this button when you want to turn on/off the antenna unit power.

7. **TRACK LED** – **Blinking** indicates that the antenna is searching for the satellite.

ON indicates that the antenna is tracking the satellite.

OFF indicates that the antenna is in the stall mode or initializing.

8. **GPS LED** – **Blinking** indicates that the antenna has distinguished the GSP but that the GPS data is invalid.

ON indicates that the antenna is receiving valid GPS data.

OFF indicates that the GPS antenna is not installed or is malfunctioning.

9. **DiSEqC LED** – **Blinking** indicates that DiSEqC option is selected as 22KHz tone.

ON indicates that the DiSEqC option is selected as DiSEqC 1.2 to switch satellites automatically.

OFF indicates that the DiSEqC option is disabled. Press the NEXT button to select the next satellite manually.

10. **ERROR LED** – **ON** indicates that one or more discrete system errors have occurred. (Refer to Error Code)

OFF indicates that no errors have occurred.

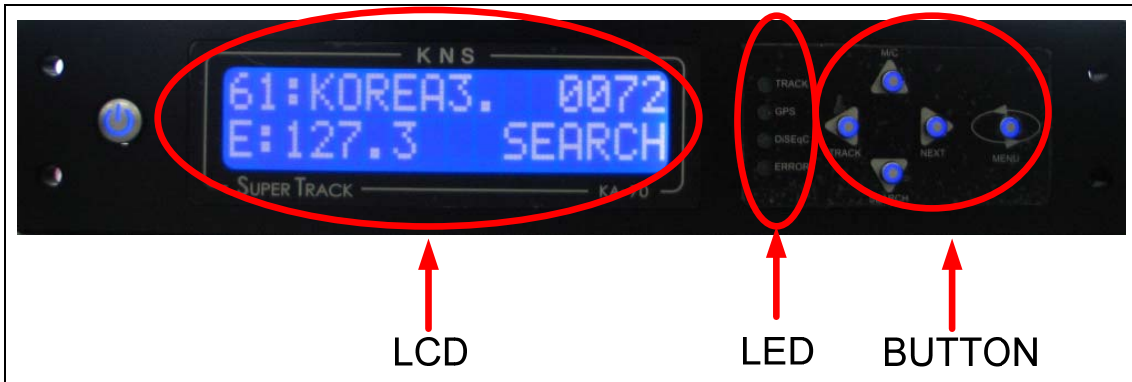


Figure 4-2 Antenna Control Unit Front Panel



Figure 4-3 Antenna Control Unit Back Panel

4.2. ACU Display Operation

If you turn on the power switch of the antenna control unit, you can view the steps shown in Figure 4-4 below.

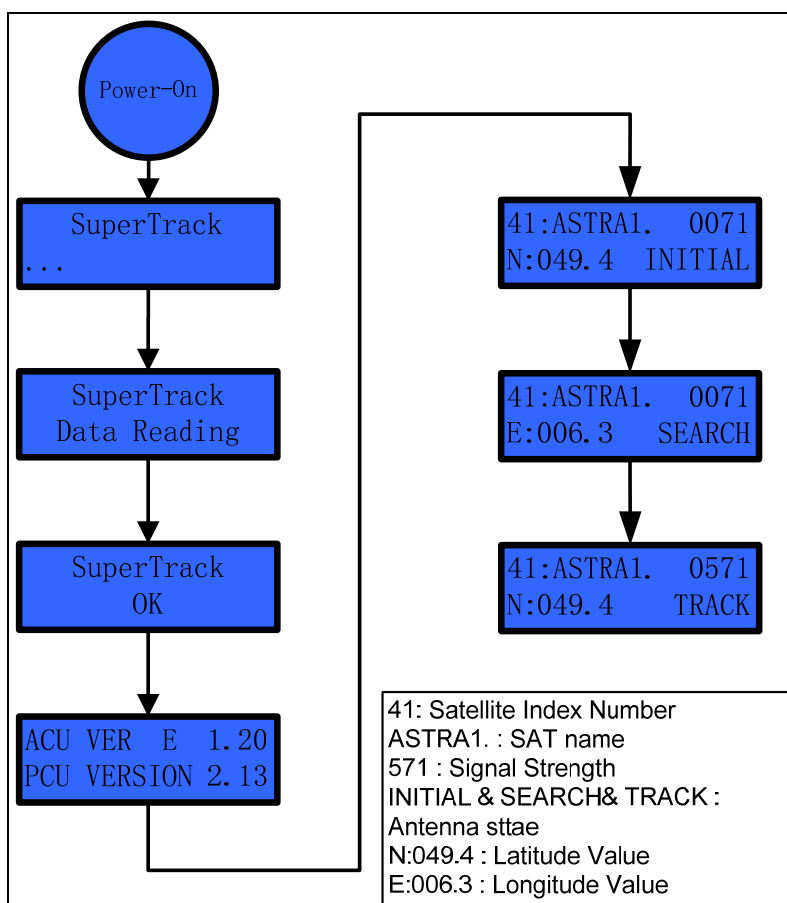


Figure 4-4 Display Flow on the ACU LCD

Display of the Antenna State

INITIAL (Initializing): The ACU displays 'INITIAL' on the LCD when the antenna is initializing.

SEARCH (Searching): The ACU displays 'SEARCH' on the LCD when the antenna is searching for the satellite.

TRACK (Tracking): The ACU displays 'TRACK' on the LCD when the antenna is tracking the satellite.

N:049.4 & E:006.3(GPS data): In the case of the internal magnetic mode, the ACU displays the GPS data on the LCD when the antenna is tracking the satellite. If the PCU compass mode is gyro, the ACU displays the ship's heading and GPS data on the LCD

when the antenna is tracking the satellite. The display of the GPS data alternates, as shown in Fig 3-4 below.

HALT: If the antenna experiences the same control error twice within 3 minutes, the PCU isn't supplying the torque to all motors to protect the antenna. In this case, the ACU will display 'HALT' on the LCD. The antenna continues in 'halt' mode until the ACU power has been reset.

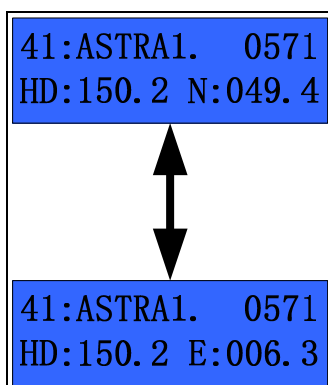


Figure 4-5 Display of tracking on gyro mode

NOTE: For the first power-on of the GPS antenna, it will take about 5 minutes to calculate your location from the GPS satellites' signals and configure the database.

NOTE: Do not push any buttons during the self-diagnosis sequence.

4.3. Set-up Mode

Initial set-up is accomplished by the installer or operator using the SETUP Mode to configure the system parameters.

Press and hold the “MENU” button for more than 3 seconds to enter the SETUP mode. To navigate the menu, press the UP or DOWN button. The set-up mode has 10 sub-menus.

Upgrade

The installer or operator can change and configure the current parameters of the A6 by computer.

Connect the M&C port of the ACU to the serial port or the USB port of the computer with an RS-232 cable (Cross cable: Female to Female), as shown in Figure 4-6.



Figure 4-6 Connection ACU with Computer

If you want to connect to the PC, follow Figure 4-7 or Figure 4-8.

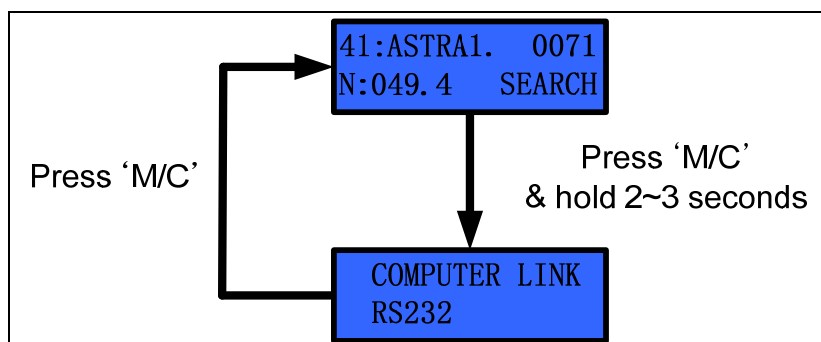


Figure 4-7 Computer Link step 1

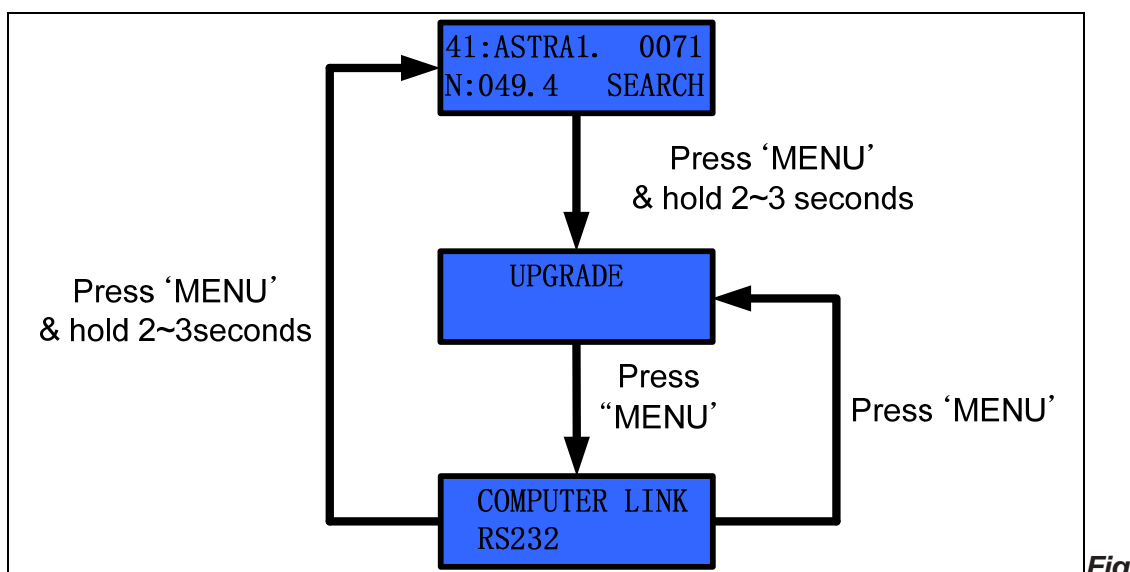


Figure 4-8 Computer Link step 2

Set Latitude and Longitude

In the event of invalid GPS data or GPS breakdown, you can input the desired latitude and longitude. Refer to Figure 4-9. This data will be changed if the GPS data is valid or if the ACU power is reset.

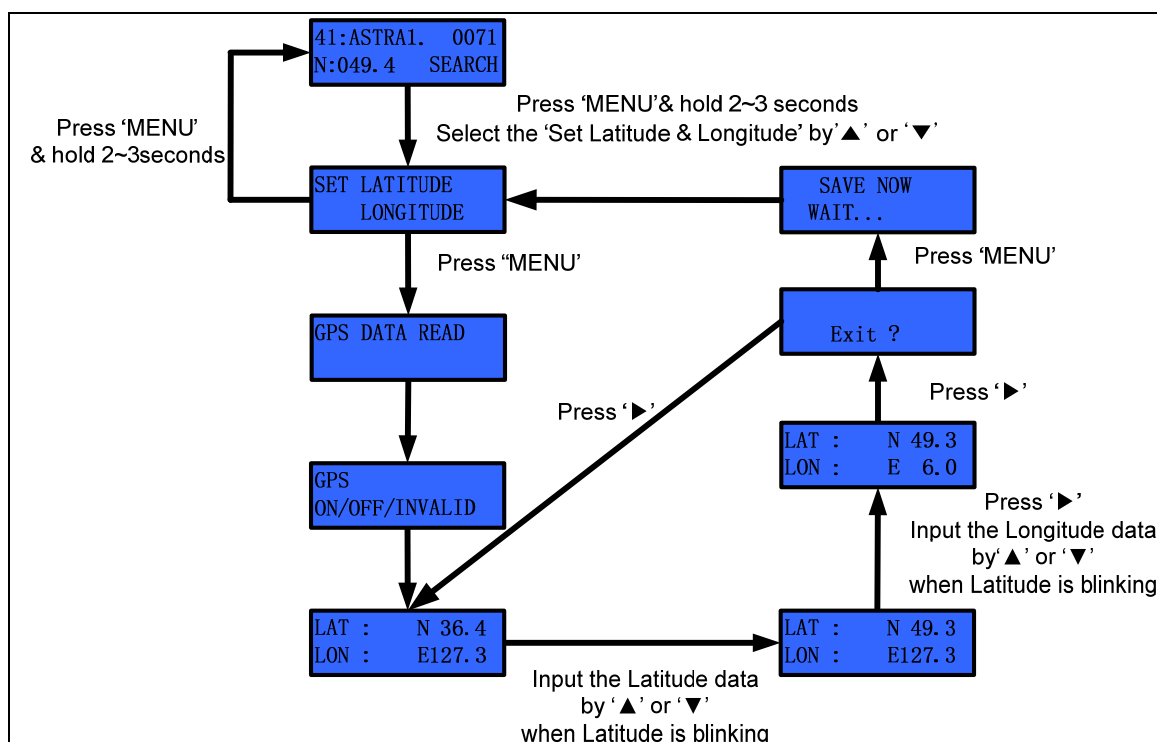


Figure 4-9 Set Latitude & Longitude step

Program Area

Before you select your satellites, you have to select the service area from among Asia, Europe, Latin America, and North America.

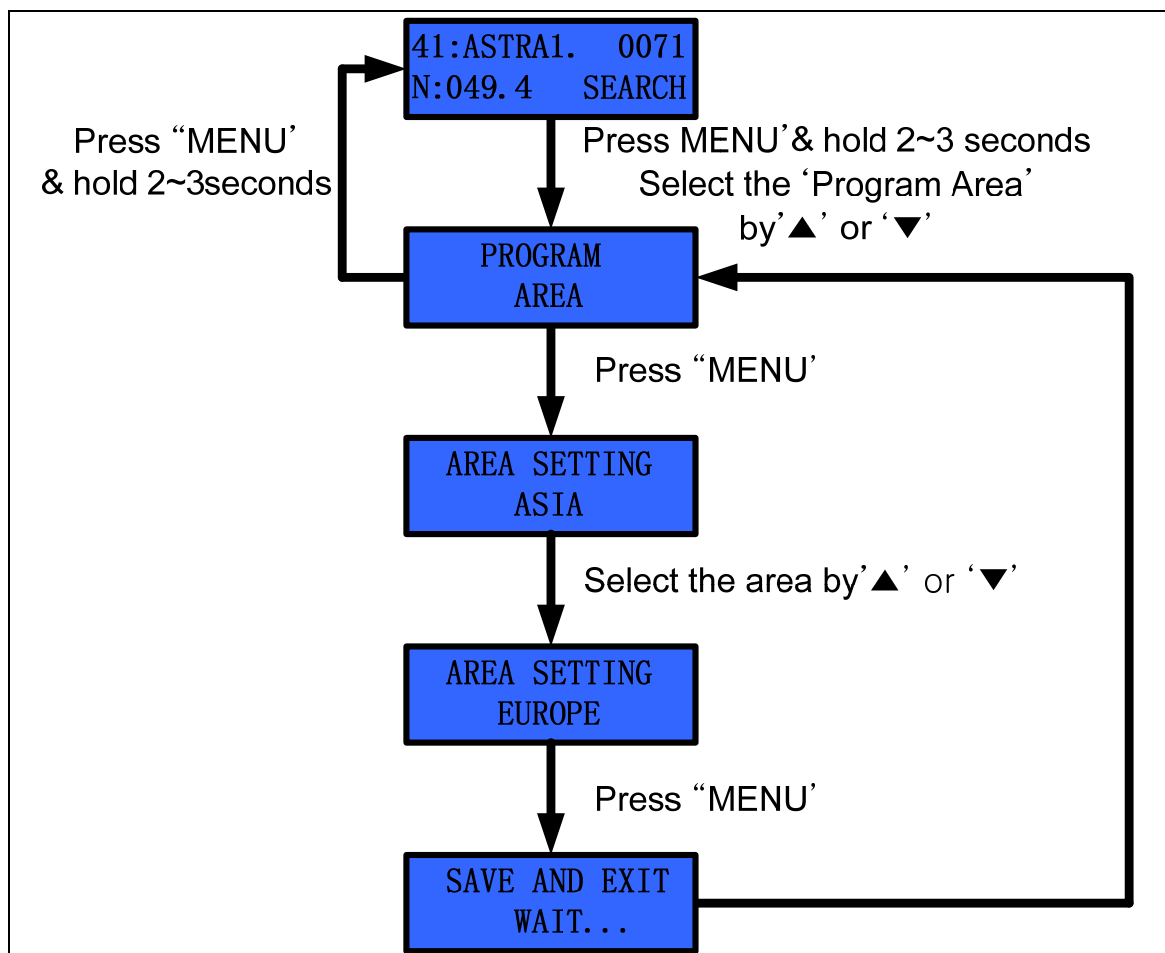


Figure 4-10 Program Area Setting Step

NOTE: The A6 has 80 satellite IDs, and each area has the parameters of 20 satellites, as shown below.

North America: Sat ID 1~20

South America: Sat ID 21~40

Europe: Sat ID 41~60

Asia: Sat ID 61~80

NOTE: If you select a different area from your area, the ACU will display SH FAIL (Searching Fail) on the LCD and the antenna will point toward the appointed position after initialization.

NOTE: All satellites on the same area share the LNB local frequency.

Program Satellite

The user can select up to 5 desired satellites on KA-70 ACU. The user has to select the DiSEqC mode from among either DiSEqC off or the 22 KHz tones before selecting the satellites.

If DiSEqC off is selected, the user can change the desired satellite using the ► (Next) button. After selecting the satellites from A to E, the KA-70 ACU changes the satellite when the user presses the ► (Next) button.

In the case of 22 KHz, firstly, the ACU commands the antenna to search for the 'SAT_A' and then, if the ACU receives the 22 KHz tone via the 'receiver' port of the AUC back panel, the ACU commands the antenna to search for 'SAT_B'. But this function requires the 22 KHz tone from the satellite TV receiver.

NOTE: If 22 KHz tone is selected, the DiSEqC LED will blink. Also, the satellite cannot be changed using the '► (Next)' button.

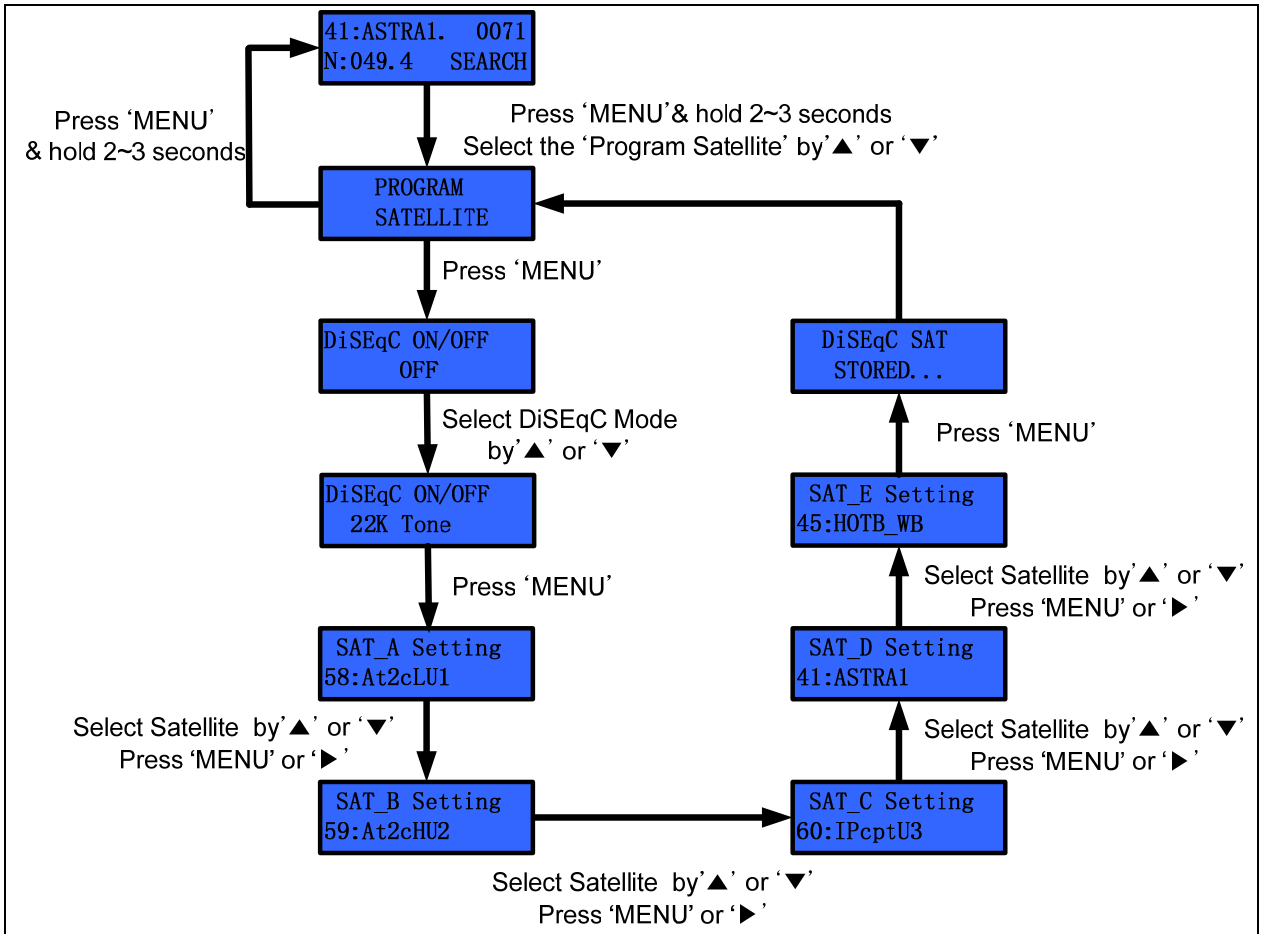


Figure 4-11 Program Satellite Setting Step

Skew Angle Setting

The A6 calculates the skew angle automatically. However, if the user wants to change the skew angle, he/she can change the skew angle using the 'Manual Mode'. The user can also readjust the skew zero position when replacing the PCU, skew assembly or potentiometer.

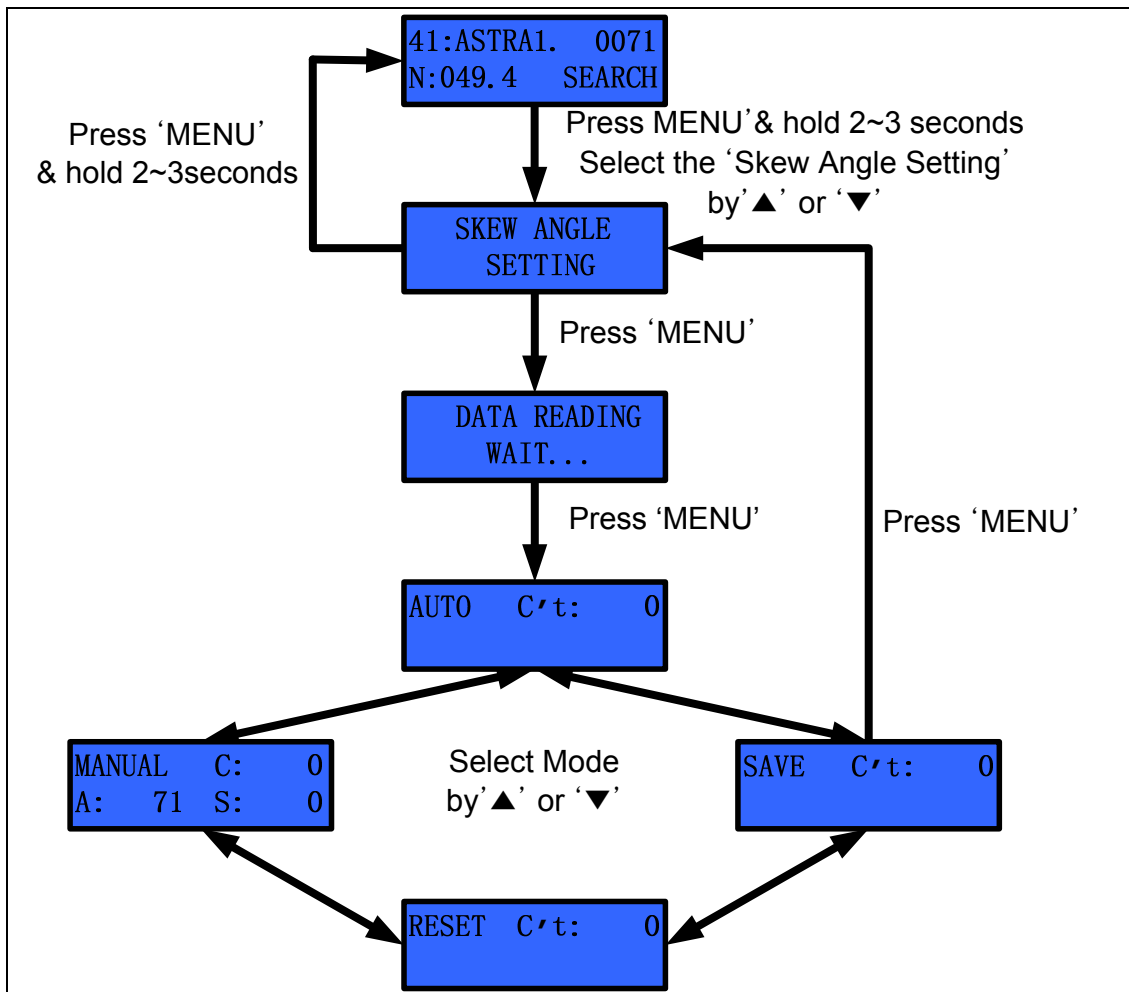


Figure 4-12 Setting the Skew Mode

a. Auto Mode

In the Auto mode, the ACU displays the skew angle calculated by the PCU. The A6's default skew mode is auto. The A6 automatically changes the skew angle when the satellite is changed.

b. Manual Mode

The Installer or Operator can change the skew angle to the desired skew angle, as shown below.

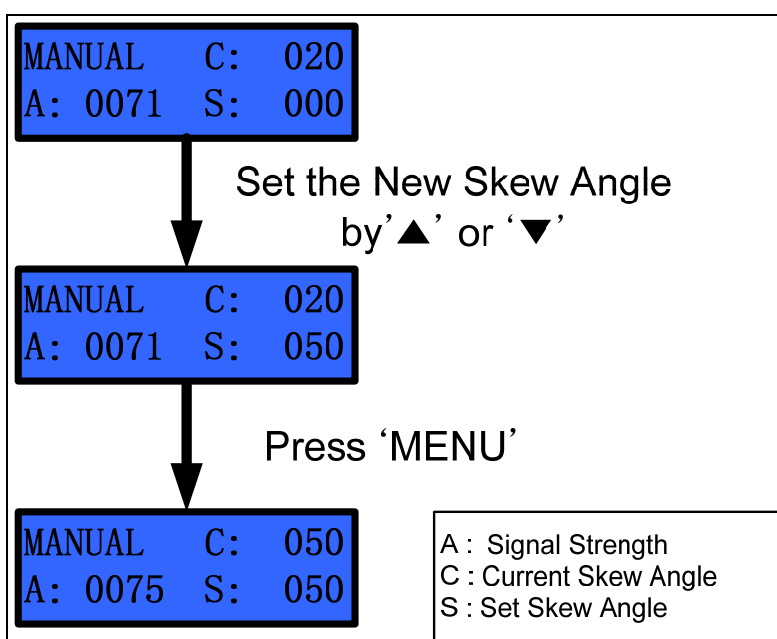


Figure 4-13 Setting the Skew Angle in Manual Mode

NOTE: 'C:' refers to the current skew angle. 'A:' refers to signal strength. 'S:' refers to the user setting the skew angle.

NOTE: Skew range of A is $\pm 110^\circ$. Skew can't go to out of range.

c. Reset

After replacing the PCU board or the skew assembly, you have to re-adjust the skew zero position. Otherwise, the SuperTrack A6 cannot search for the desired satellite. Also, correction of the skew angle is important because the signal level is influenced by the skew angle.

If 'RESET' is selected and 'MENU' is pressed at the desired skew angle, the skew angle will be set to '0' degrees. The skew angle affects signal strength, so we recommend that the user should correct the skew '0' degrees position, as shown in Figure 3-13 below.

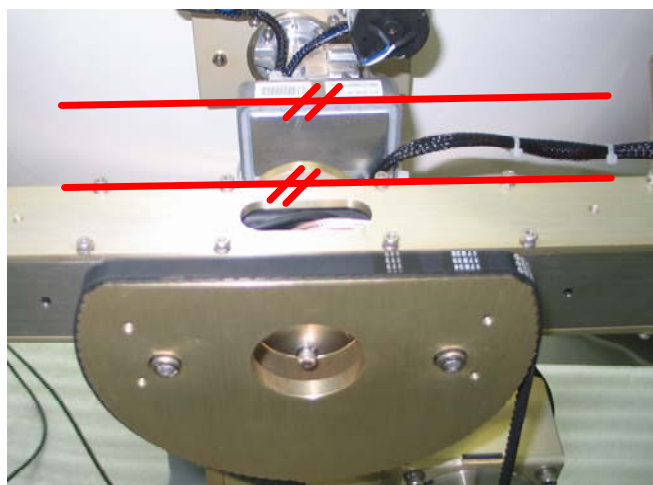


Figure 4-14 Skew '0' degrees

NOTE: If skew angle is out of range, operator must re-adjust the '0' degrees position because skew can't rotate.

d. Save

If you want to save the changed '0' degrees position, press 'MENU' after selecting the 'SAVE' mode.

e. Exit

If you want to escape, press 'MENU' after selecting the 'EXIT' mode.

Demo Mode

The A6 points toward the desired position when using the 'Demo Mode'. It is very useful when the dealer requires a demonstration inside a building. Elevation is changed every 5° by one click of '▲' or '▼'. Azimuth is changed every 10° by one click of '▶' or '◀'.

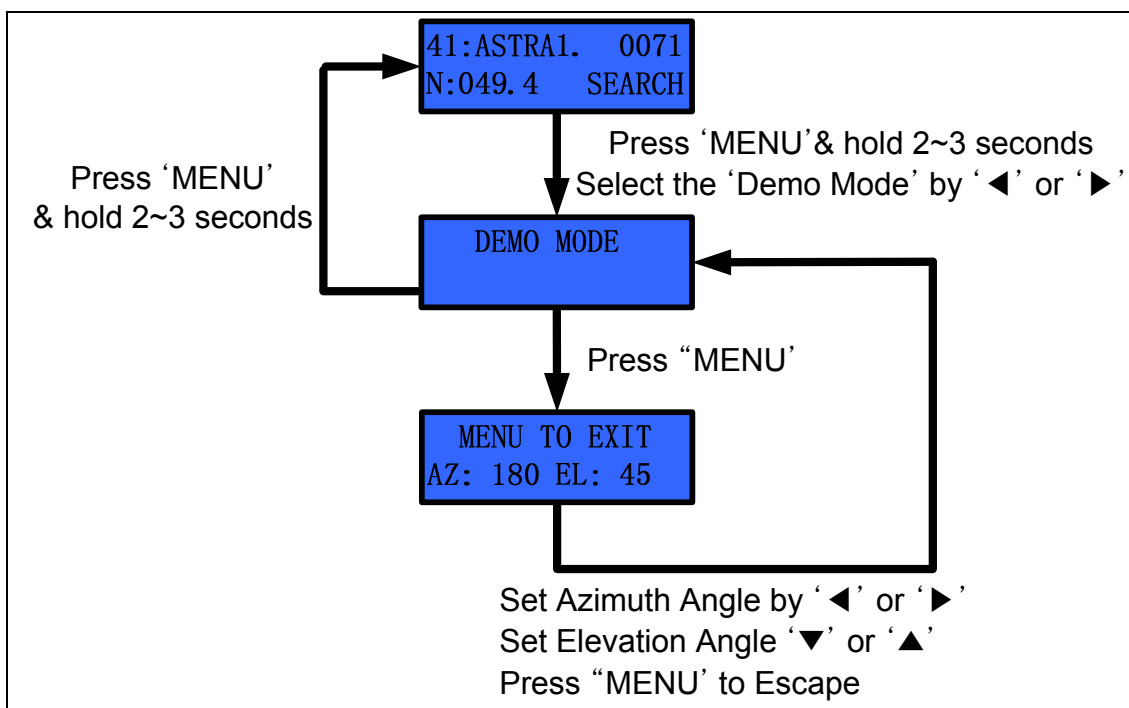


Figure 4-15 Setting the Skew Angle in Manual Mode

Selecting the Compass Mode

You can select the compass mode according to the condition of your ship's gyro. The A6 has 4 compass modes.

a. Gyro Mode

Select the Gyro Mode when using the ship's gyro (only the NMEA type). For the gyro cable connection, refer to '3.6 Gyro Connection'.

b. Internal Magnetic Mode

If your ship is not made of magnetic metal (ex: aluminum, FRP), you can use the internal magnetic mode. However, the internal magnetic compass value will be incorrect if ship is made of metal, because the internal magnetic compass will be affected by the magnetic field of a metal-based ship.

NOTE: We do not recommend use of the 'Internal Magnetic Mode' on metal ships.

c. Gyro Fail Mode

Use this mode when a gyro compass is not available. The A6 receives the ship's heading as a reference angle when satellite selection or searching or re-searching after searching fail. And, the A6 uses the gyro rate sensor value during searching and tracking.

d. Magnetic Fail Mode

Use this mode when an internal magnetic compass is not available. The A6 receives the internal magnetic compass value as a reference angle when satellite selection or searching or researching after searching fail. And, the A6 uses the gyro rate sensor value during searching and tracking.

NOTE: We recommend 'Gyro Mode' to ensure a reliable heading angle. If your ship does not have an NMEA signal, please contact us. We supply external NMEA converters (for converting 'synchro' or 'step by step' signals to NMEA signals). This is optional.

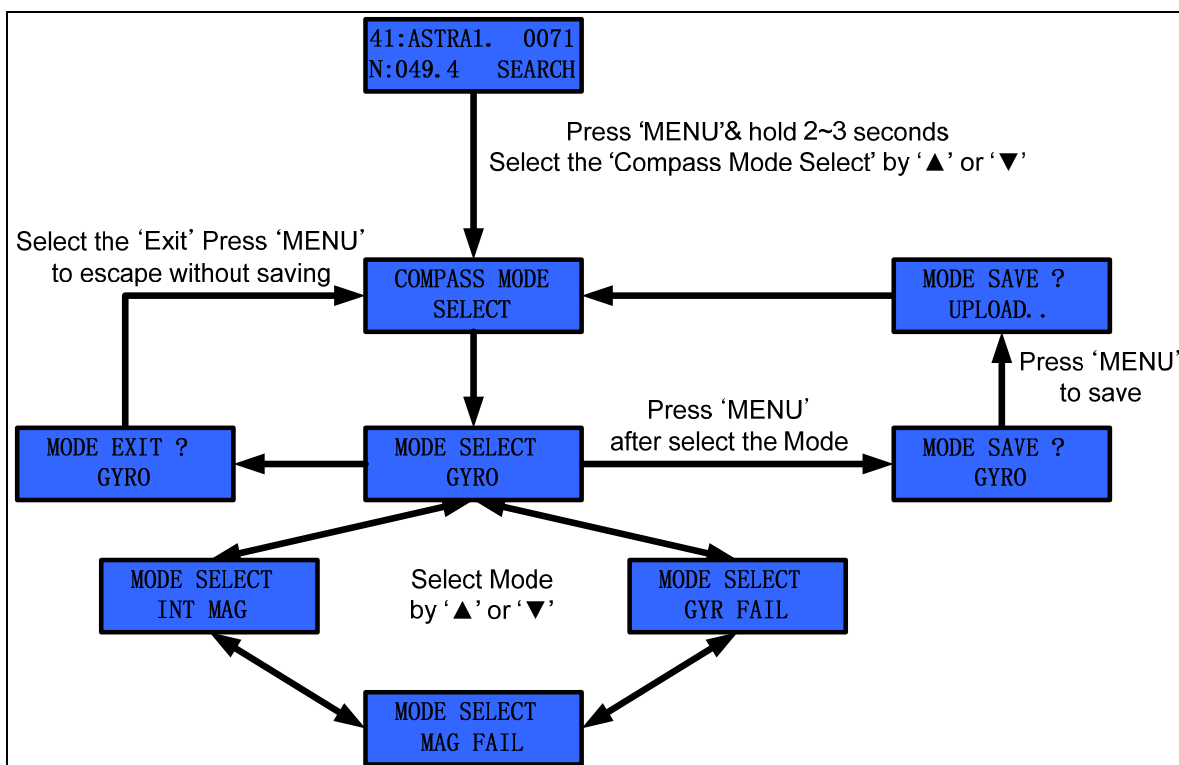


Figure 4-16 Selecting the Compass Mode

NOTE: When using the gyro fail and magnetic fail modes, the ship's gyro must not rotate during initializing. If the ship's gyro rotates, the A6 will not be able to track the satellite due to the incorrect heading angle.

Satellite Edit

Operator can edit the 5 satellites that be selected satellite on the 'SAT_A' to 'SAT_E'. If you select 'Satellite Edit', you can change the 5 satellite's name.

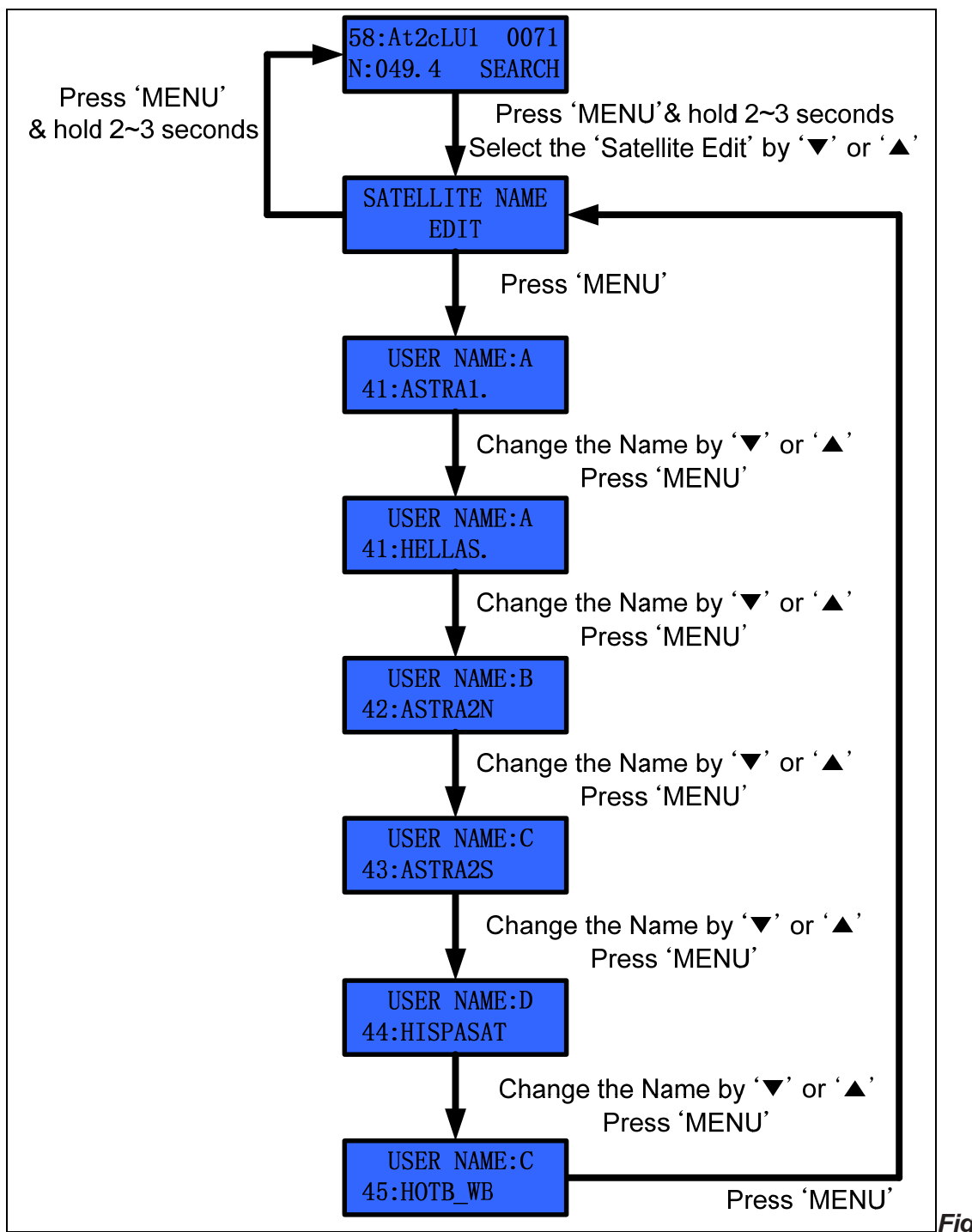


Figure 4-17 Edit User-Settable Satellite Name

5. How to Operate the SCS

The installer or operator can change the parameters using SCS (SuperTrack Control Software) Version 1.7.1 or 1.7.2. Also, SCS can show the current status of the A6.

NOTE: SCS version is depend on the PCU software as below

SCS Version	PCU Version & Antenna
1.5	S3, Z4, S4, S6, S8 of PCU ver 1.90
1.6	S3, S4, S6N, S8 of PCU ver 1.93
1.6.1	S3, S4, S6, S6N, S8 for PCU ver 1.94
1.7	V-SAT(Select the V-SAT icon) S8P, S10, S12 of PCU ver 1.924(Select the V-SAT icon) A6, A9 of PCU ver 2.00(Select the TV-RO or A-Series icon)
1.7.1	V-SAT, S10, S12 of PCU ver 1.925(Select the V-SAT icon) A6, A9, S4, S6, S6N, S8 of PCU ver 2.11(Select the TV-RO or A-Series icon)
1.7.2	V-SAT, S10, S12 of PCU ver 2.000(Select the V-SAT icon) A6, A9, S4, S6, S6N, S8 of PCU ver 2.11(Select the TV-RO or A-Series icon)
1.8.1	K4 of PCU of PCU ver 1.000

Table 5-1 SCS Version

5.1. Connect to PC

After connecting to a PC, as shown in Figure 4-6, run the SCS. Press M/C and hold for 3 seconds or select 'Upgrade' in the set-up mode.

And select the 'TVRO or A6,9 Selected after PCU V2.11' icon and click the 'OK' button, then select the COM port of your computer, select baud rate 19200. Lastly click the 'DISCONNECT', then A6 is connected with computer.



Figure 5-1 A6 selection on SCS

You will be able to see that the 'CONNECT' LED of the status panel is on, as shown in Figure 5-3. Also, you can see the current state of the antenna, which is one of 'Initialize', 'Searching', 'Searching Fail', 'Tracking', and 'HALT'.

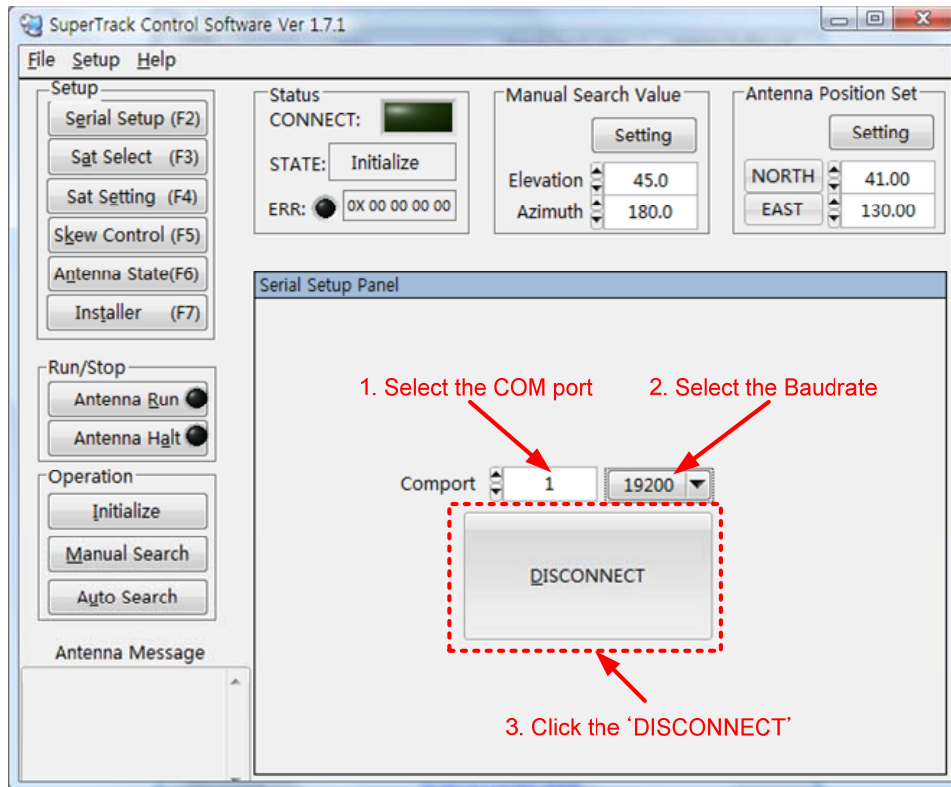


Figure 5-2 Connection A6 with PC

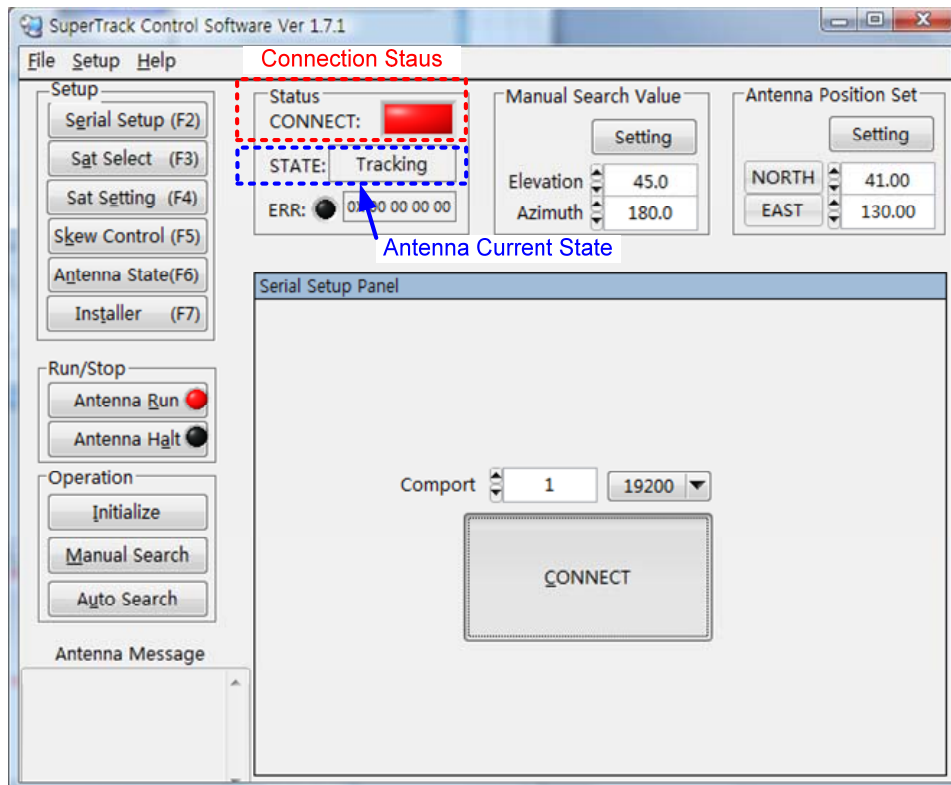


Figure 5-3 Connection Status A6 with PC

5.2. Selection Area and Satellite

You can select the area and satellite using SCS. Refer to the steps outlined below and to Figure 5-4.

1. Click 'Sat Select' (F3) or press F3.
2. Select the area in 'Zone Select'.
3. Select the satellite in 'Satellite Select'.
4. Press 'Send' to upload to the PCU.

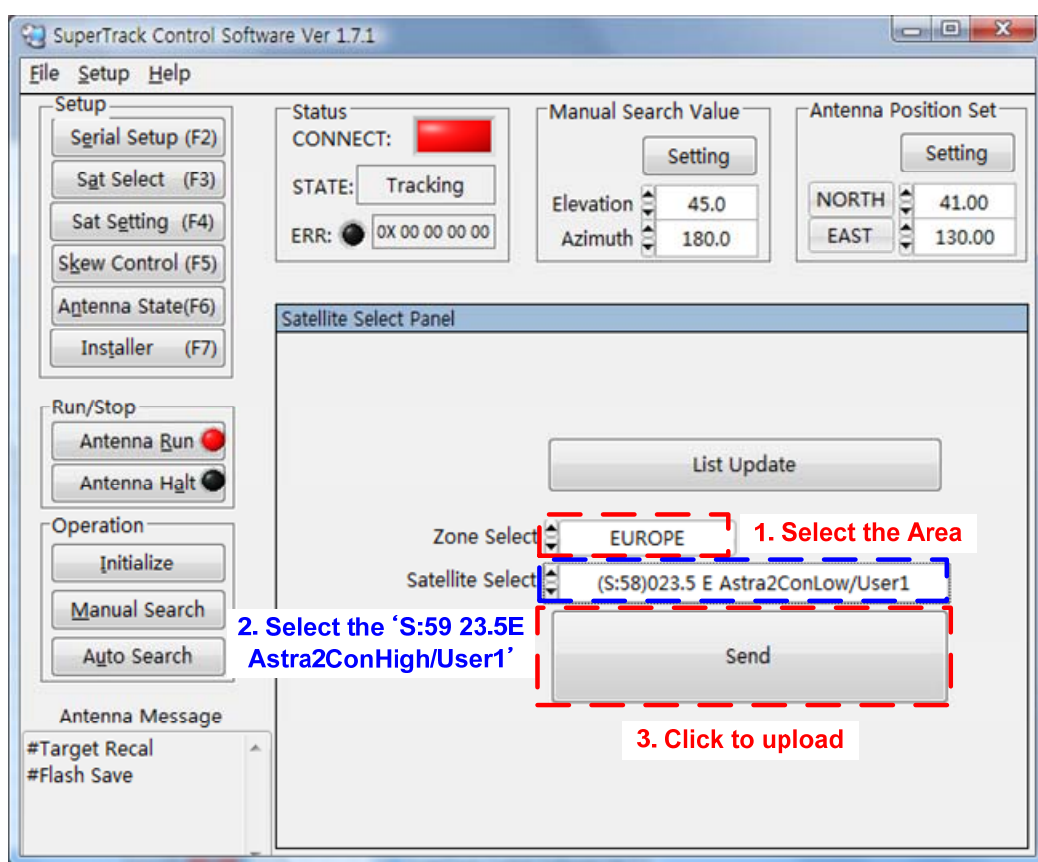


Figure 5-4

Figure 5-4 Select Area and Satellite Step

NOTE: The A6 has 4 areas (Europe, Asia, North America, and South America).

NOTE: The A6 has 80 satellites.

Sat ID 1~20: North America

Sat ID 21~40: South America

Sat ID 41~60: Europe

Sat ID 61~80: Asia

Satellite List Update

You can modify the satellite name and longitude in SCS. SCS program folder(\Program Files\SuperTrackV3_1) has on text file. The text file's name is SatIDMatch. If you want change the satellite name or longitude, you can modify this text file and click the 'List Update', select the changed text file. Then satellite name or longitude is changed in satellite list. **But changed satellite is only changed the display name and longitude on the SCS.** If you want to change the satellite parameters, you have to change the satellite parameters in 'Sat Setting(F4)'.

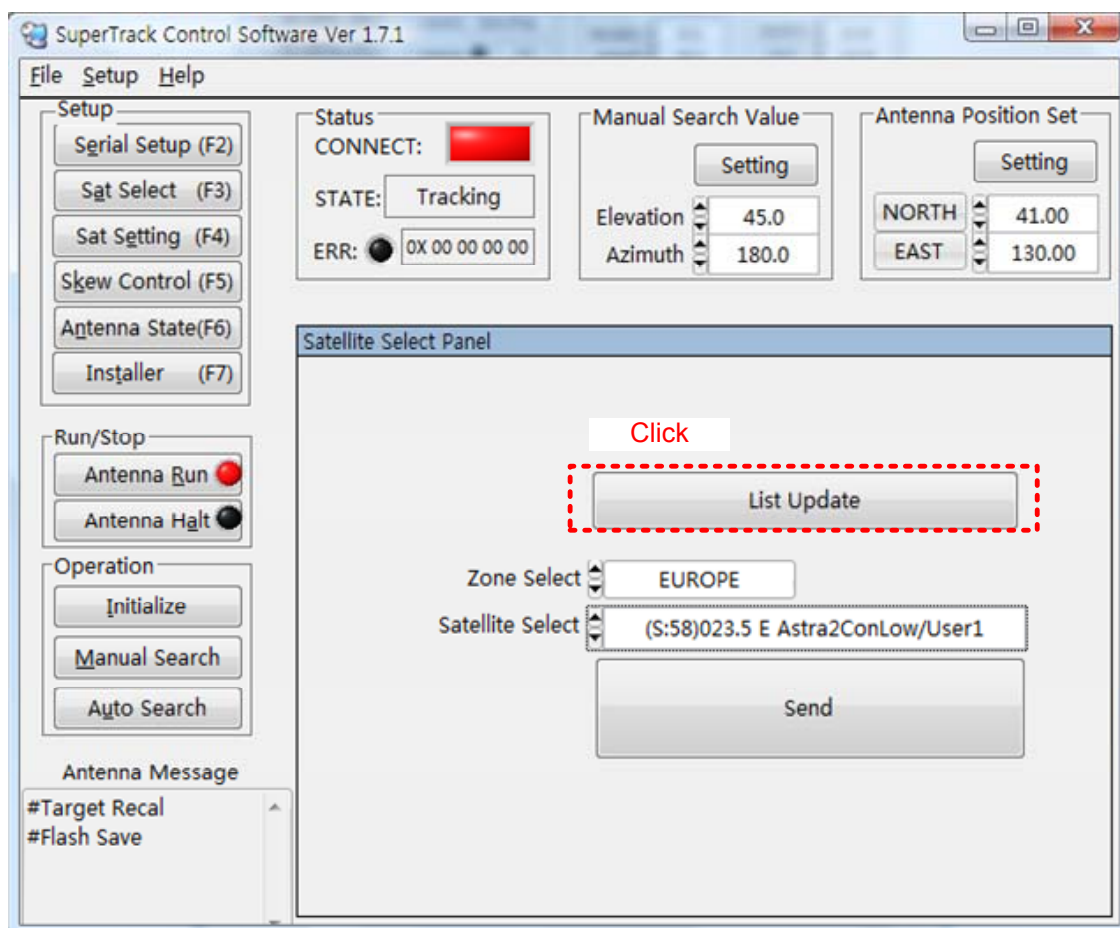


Figure 5-5 Satellite List Update Step 1

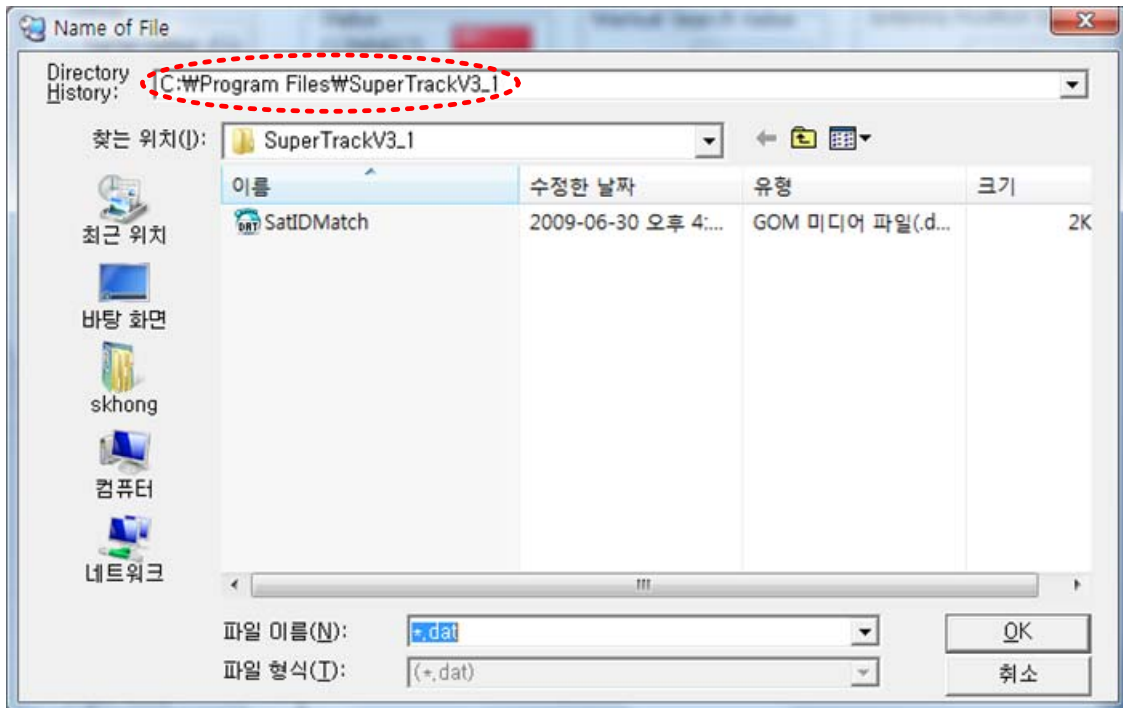


Figure 5-6 Satellite List Update Step 2

Edit the Satellite Parameters

If you select the user-settable satellite or if the desired satellite's parameters are incorrect, you can change the selected satellite's parameters. Refer to the steps outlined below and to Figure 4-7.

1. Click 'Sat Setting' (F4) or press F4 after selecting the desired satellite.
2. Click 'Sat Info Request' to update from the PCU. Then, the target satellite's parameters and the LNB local frequency will be uploaded to the satellite setting panel from the PCU.
3. If you want to change the LNB local frequency, input the new local frequency and click the 'OK' button to upload to the PCU.
4. Change the satellite's parameters and click each 'OK' button to upload to the PCU. (If you do not click after changing the parameters, the changed parameters will not be uploaded to the PCU.)
5. Press 'Save' to save the changed parameters.

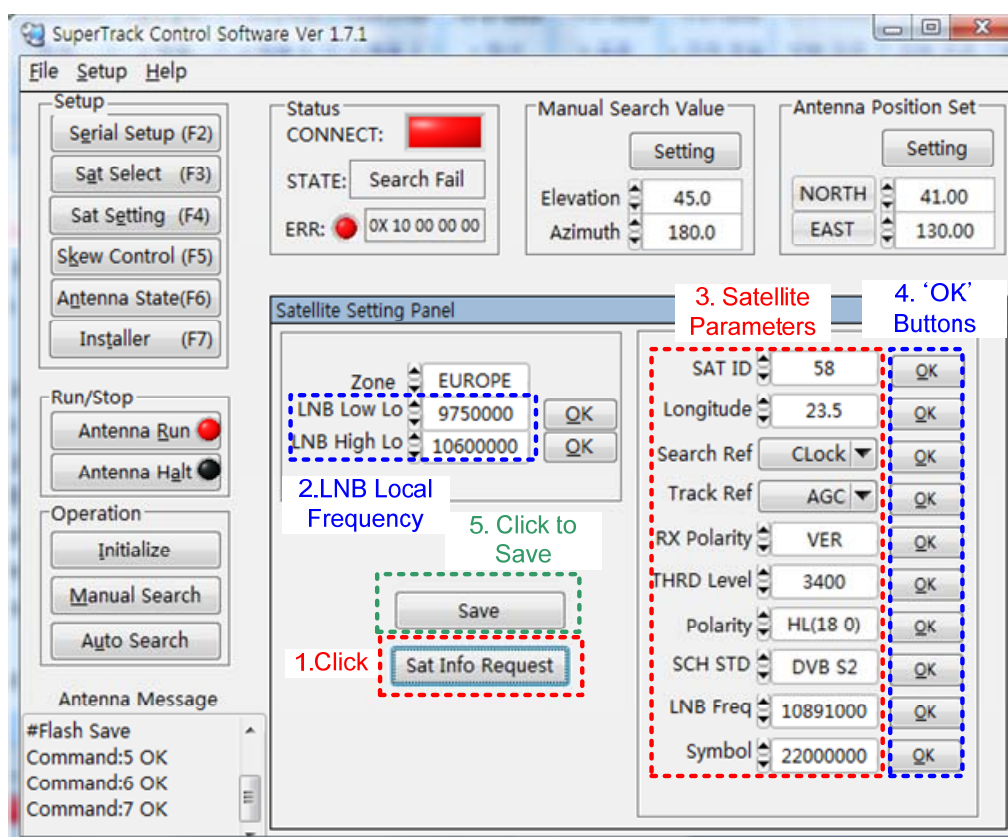


Figure 5-7 Edit the Satellite's Parameters

NOTE: The LNB local frequency is the same in the same area.

SAT ID refers to the satellite index, as shown below.

ID 1~13: North America

ID 21~26: South America

ID 41~60: Europe

ID 61~74: Asia

Search Ref refers to the A6 search reference that was used as a reference during the search for the satellite.

AGC THD: Search at a higher AGC level than the preset AGC level in the PCU.

C/N THD: Search at a higher C/N level than the preset C/N level in the PCU.

CLock: Search for the target DVB Carrier lock **(Default)**.

Track Ref refers to the A6 tracking reference that was used as a reference during the tracking of the satellite.

AGC: Track the highest AGC level (Astra2Connect default).

C/N: Track the highest C/N level(IPcopter default)..

RSSD (Receive Signal Detector): Track the highest RSSD value. **There is no function.**

RX Polarity refers to the RX polarity of the satellite.

Horizontal/Vertical

THRD Level refers to the threshold level if the searching reference is AGC THD or C/N THD. The A6 searches for a higher signal than the threshold level.

Polarity refers to the voltage and tone of the LNB. The A6's default is 'HH'.
Linear LNB (Horizontal/Vertical, High/Low)

HH (18V, 22 KHz)

HL (18V, 0 KHz)

VH (13V, 22 KHz)

VL (13V, 0 KHz)

Circular LNB (Left Handed/Right Handed, High/Low)

LH (18V, 22 KHz)

LL (18V, 0 KHz)

RH (13V, 22 KHz)

RL (13V, 0 KHz)

SCH STD means Searching standard.

Auto: PCU automatically search the carrier.

DVB S1: search the DVB S1 carrier.

DVB S2: Search the DVB S2 carrier.

DSS(Digital Satellite System): US standard

LNB Freq refers to the RX frequency of the satellite.

Symbol refers to the symbol rate of the satellite.

NOTE: In case of tracking reference is AGC, adjacent satellite's carrier can affect desired satellite's carrier like below Figure 5-8. Hellasat has the adjacent satellite interferences. So we set the tracking reference to 'C/N' in IPcopter service(Sat ID 60).

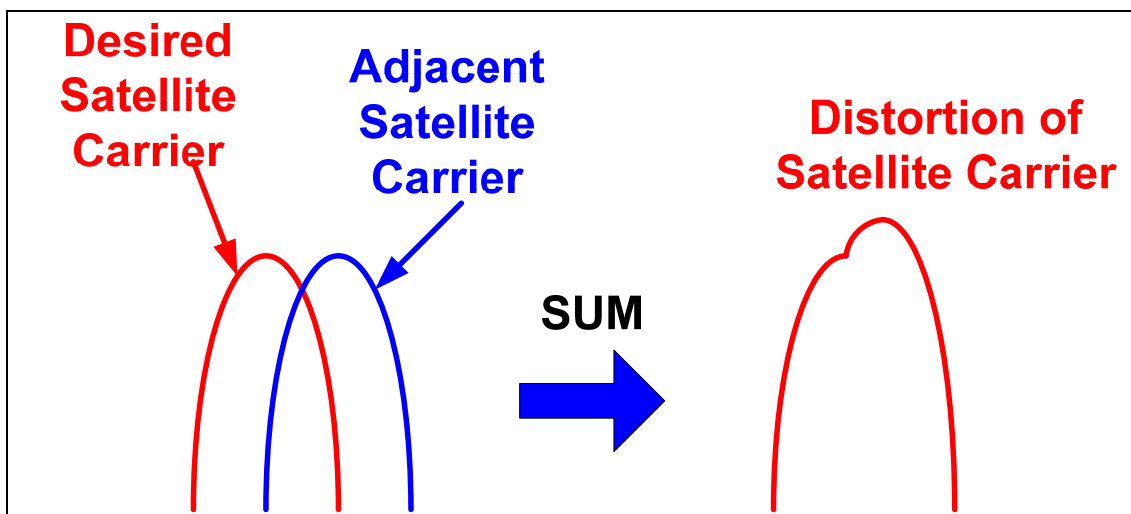


Figure 5-8 Affection of neighborhood satellite

NOTE: If select the 'Auto' in 'SCH STD', A6's searching time is slower than select the 'DVB S1' or 'DVB S2'.

5.3. Skew Setting

You can select the skew mode ('Auto' or 'Manual') by SCS. Also, you can change the skew angle to the desired skew angle.

Change the skew angle by manual mode

1. Input the desired skew angle in 'Desired Manual Angle'.
2. Click 'Skew Manual', then the skew will move to the desired angle.

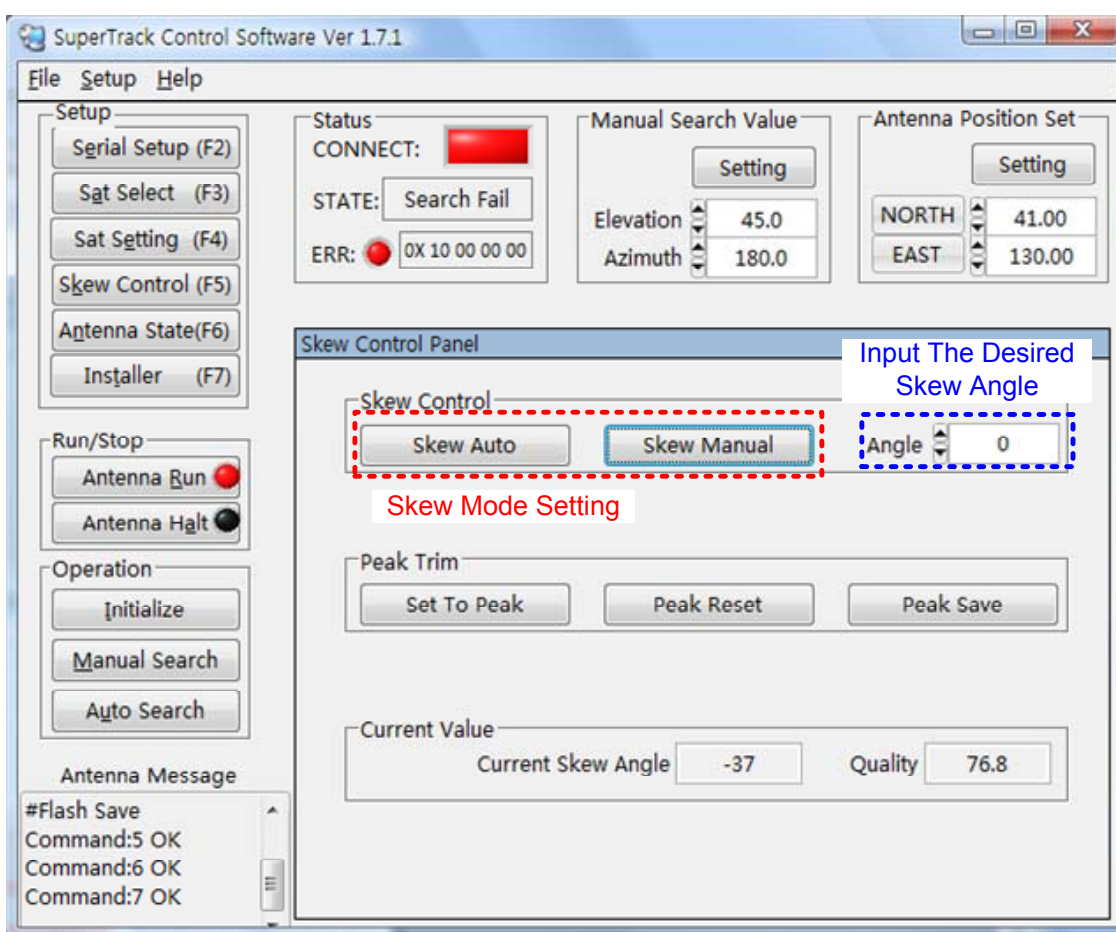


Figure 5-9 Changing the Skew Angle by Manual Mode

NOTE: If the A6's skew is in manual mode, the A6's skew will not be changed when switching the satellite or changing the ship's position (longitude, latitude). The skew mode is automatically changed to 'Auto' mode when the ACU power is turned on.

Set the peak trim

The skew angle is automatically calculated by the PCU, but sometimes the satellite has an offset skew angle. In such a case, you have to set the peak to track a higher quality of carrier. Refer to the steps outlined below and to Figure 5-10.

1. Change the skew angle using the skew manual mode after selecting the desired satellite whose skew is offset.
2. Look at Quality, then search for higher quality while changing the skew angle.
3. Click 'Set To Peak', after searching for higher quality.
4. Click "Peak Save' to save the changed peak.
5. Then, the A6's skew will move to the changed skew angle upon selecting this satellite.

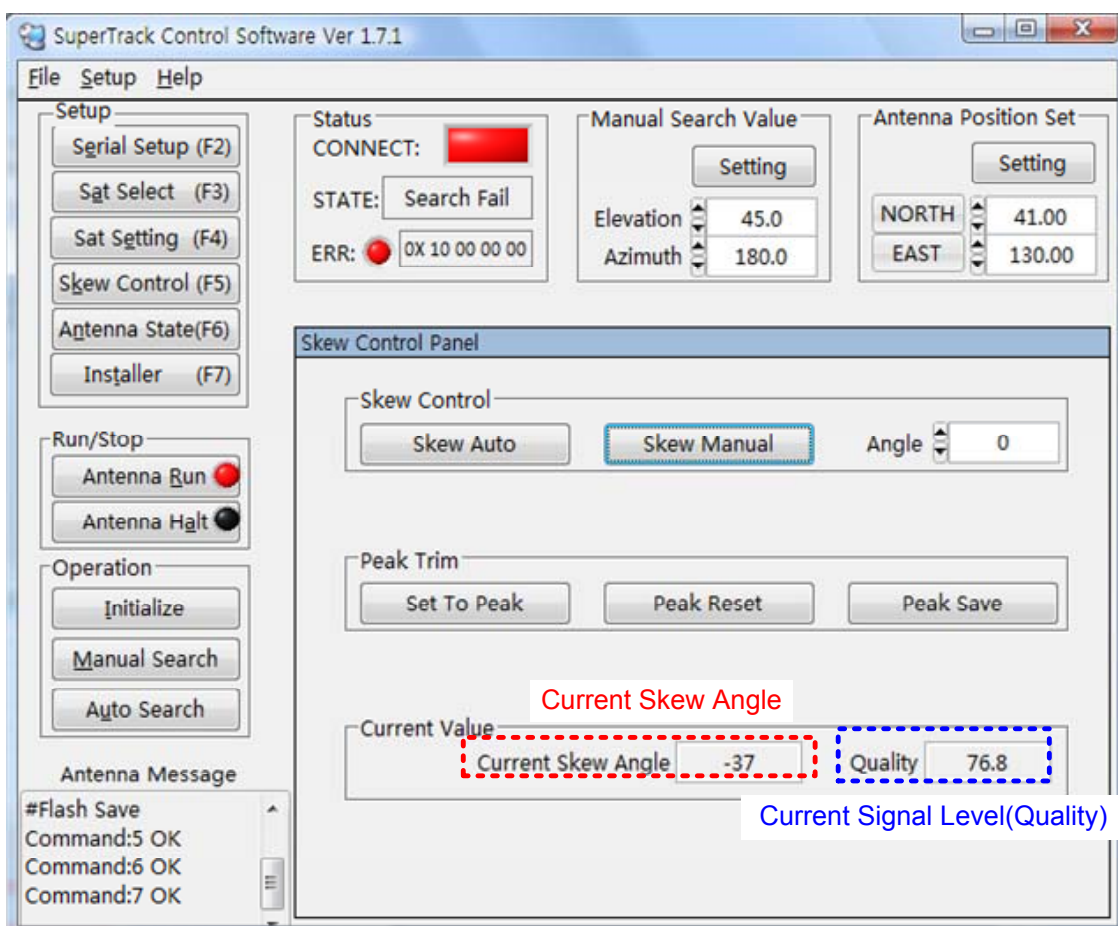


Figure 5-10 Setting the Peak Trim

NOTE: If you want reset the peak, click 'Peak Reset' and then click 'Peak Save', whereupon all peaks will be reset to the default skew angle.

5.4. Antenna State

You can see the current state of the A6 by SCS, as shown below. Click 'Antenna State' or press F6.

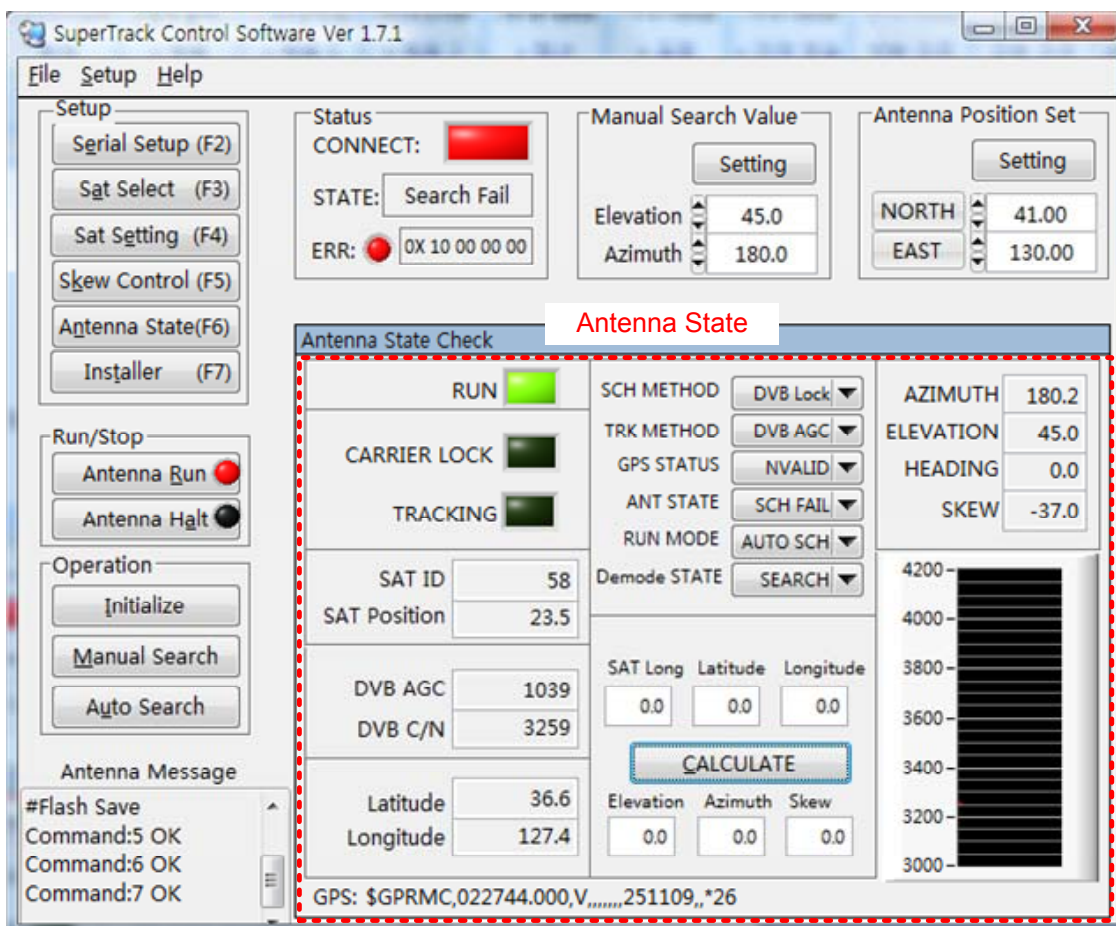


Figure 5-11 Antenna State

Calculating the Skew Angle, Elevation and Azimuth of the Antenna

You can use SCS to calculate the skew angle, elevation and azimuth of the antenna, if you know the longitude of the satellite and the latitude and longitude of the current position. Refer to the steps outlined below.

1. Input the longitude of the satellite, and the latitude and longitude of the current position.
2. Click 'CALCULATE' to calculate.
3. You can see the calculated value in 'CALCULATE' below.

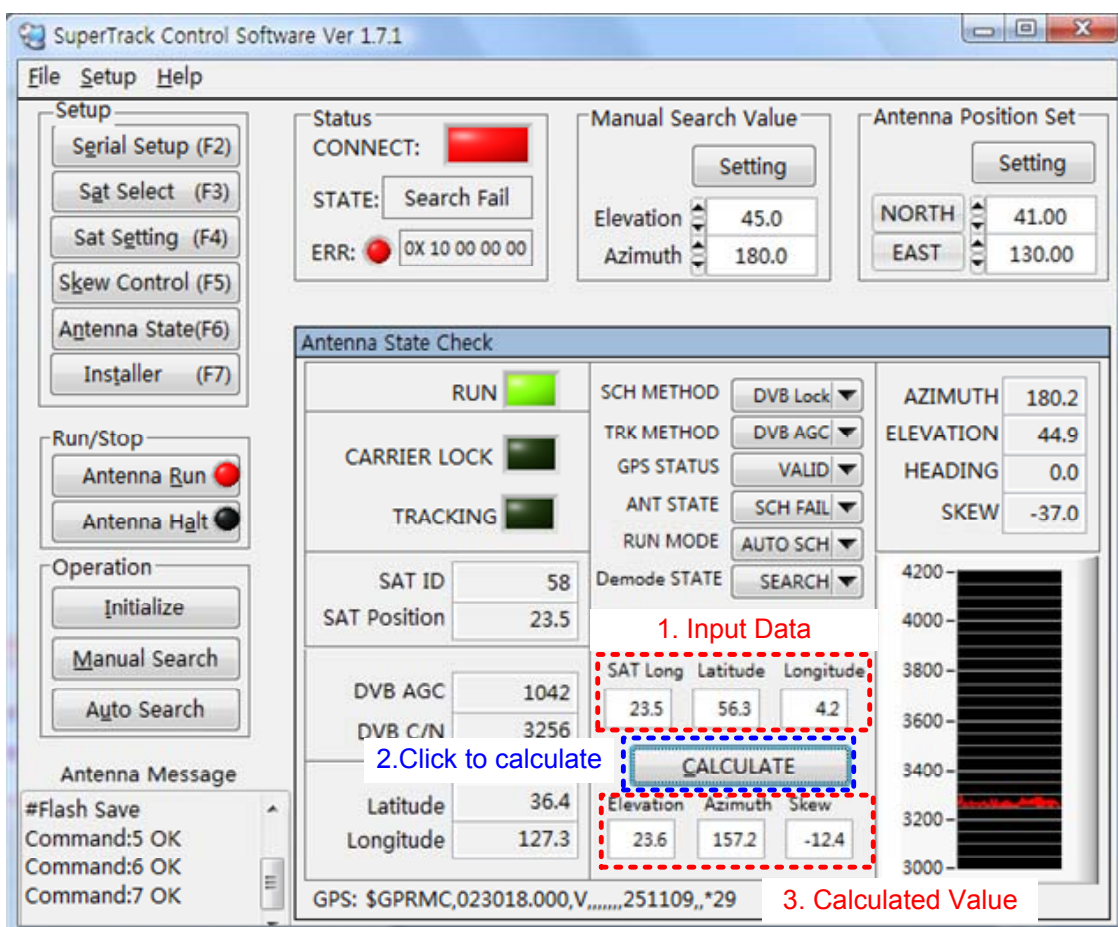


Figure 5-12 Calculating the Skew Angle, Elevation and Azimuth of the Antenna

C/N Graph

You can see the C/N graph under 'Antenna State'.

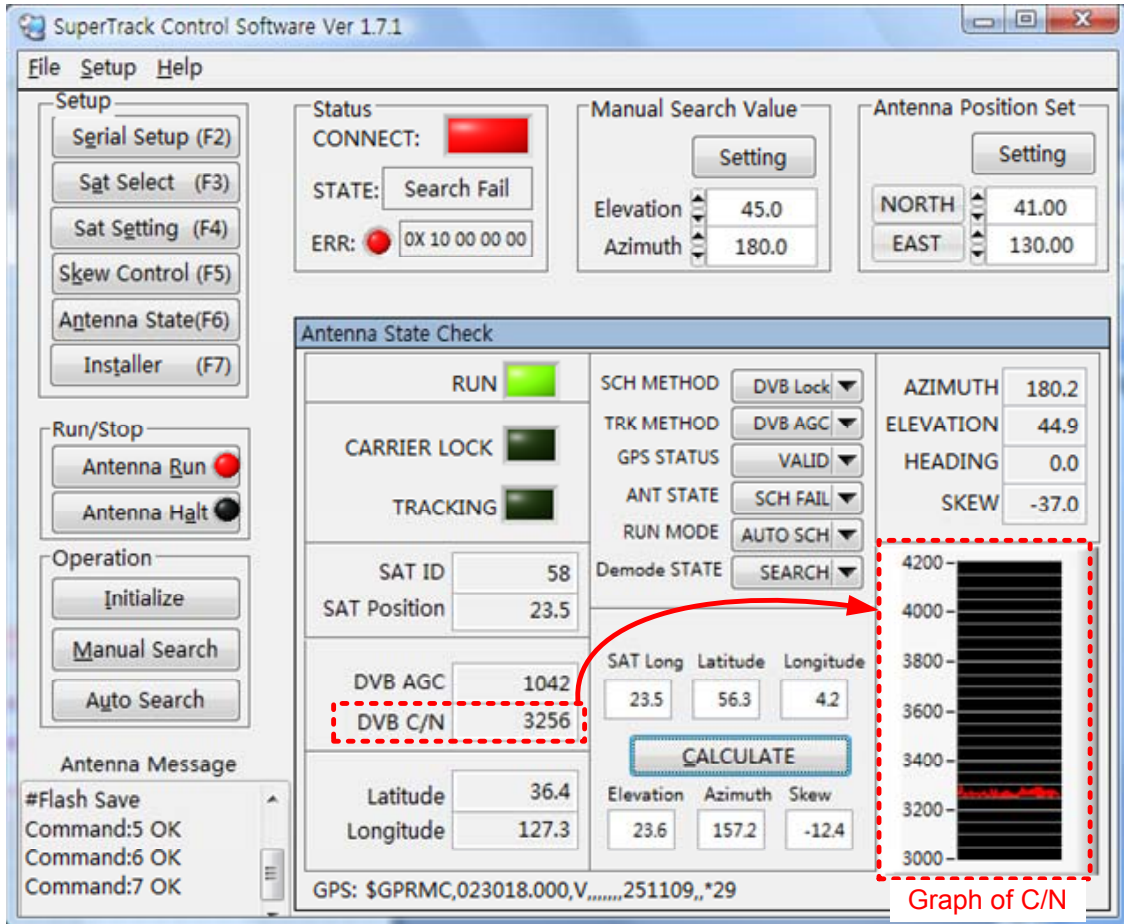


Figure 5-13 C/N Graph

5.5. Installer

The installer or operator can change the initial parameters (tilt offset, heading offset, skew zero setting, compass mode) when replacing the PCU, skew block or sensor board.

Click 'Installer' or press F7.

NOTE: After changing the initial values (tilt offset, heading offset, skew '0' degree position), you must click 'SAVE' to save to the PCU.

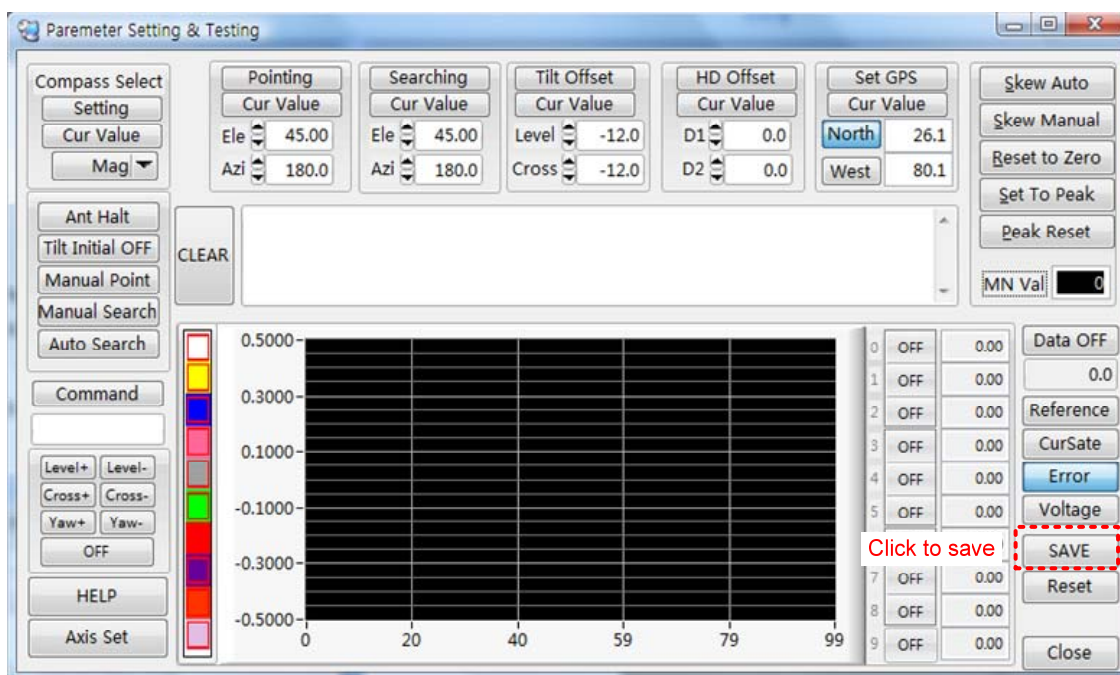


Figure 5-14 Saving the Initial Values

Setting Tilt Offset

You have to re-configure the tilt offset after replacing the PCU or sensor board. When setting the tilt offset, use the bubble inclinometer mounted on the sensor cage, as shown in Figure 5-15.

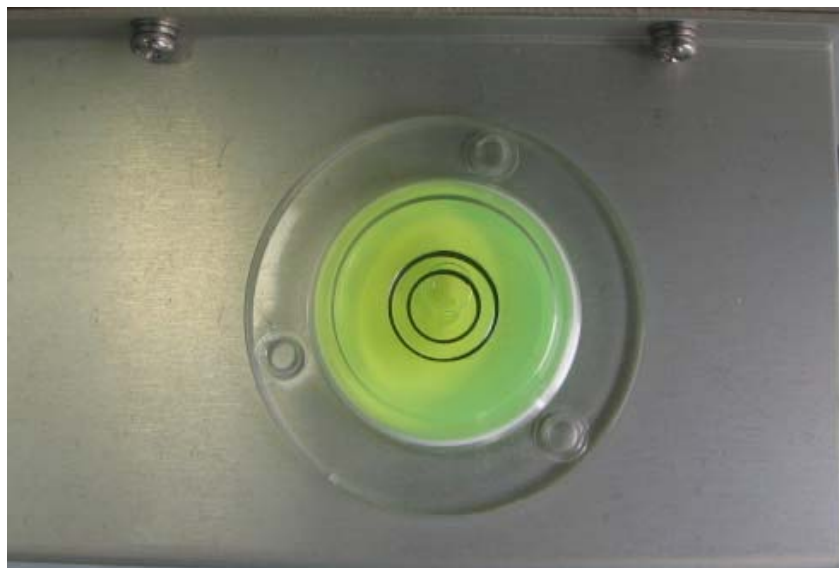


Figure 5-15 *Bubble Inclinometer*

Refer to the steps outlined below.

1. Click 'Tilt Initial OFF', then the button changes to 'Tilt Initial ON' and the sensor cage initializes. Then, the antenna points toward the current position, but the yaw axis is free.

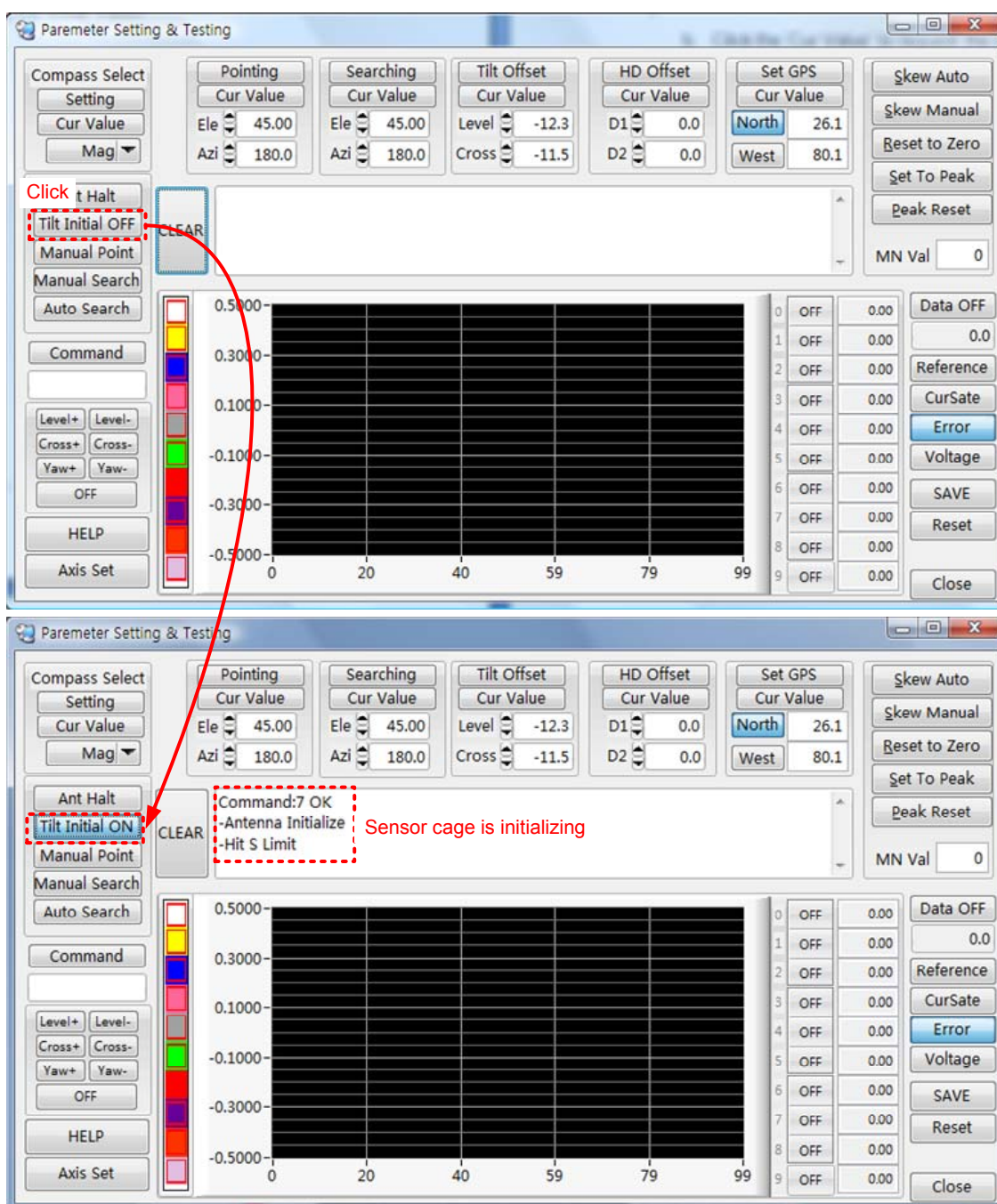


Figure 5-16 Starting Adjustment of Tilt Offset

2. Click the 'Cur Value' to request the current tilt sensor offset from PCU.

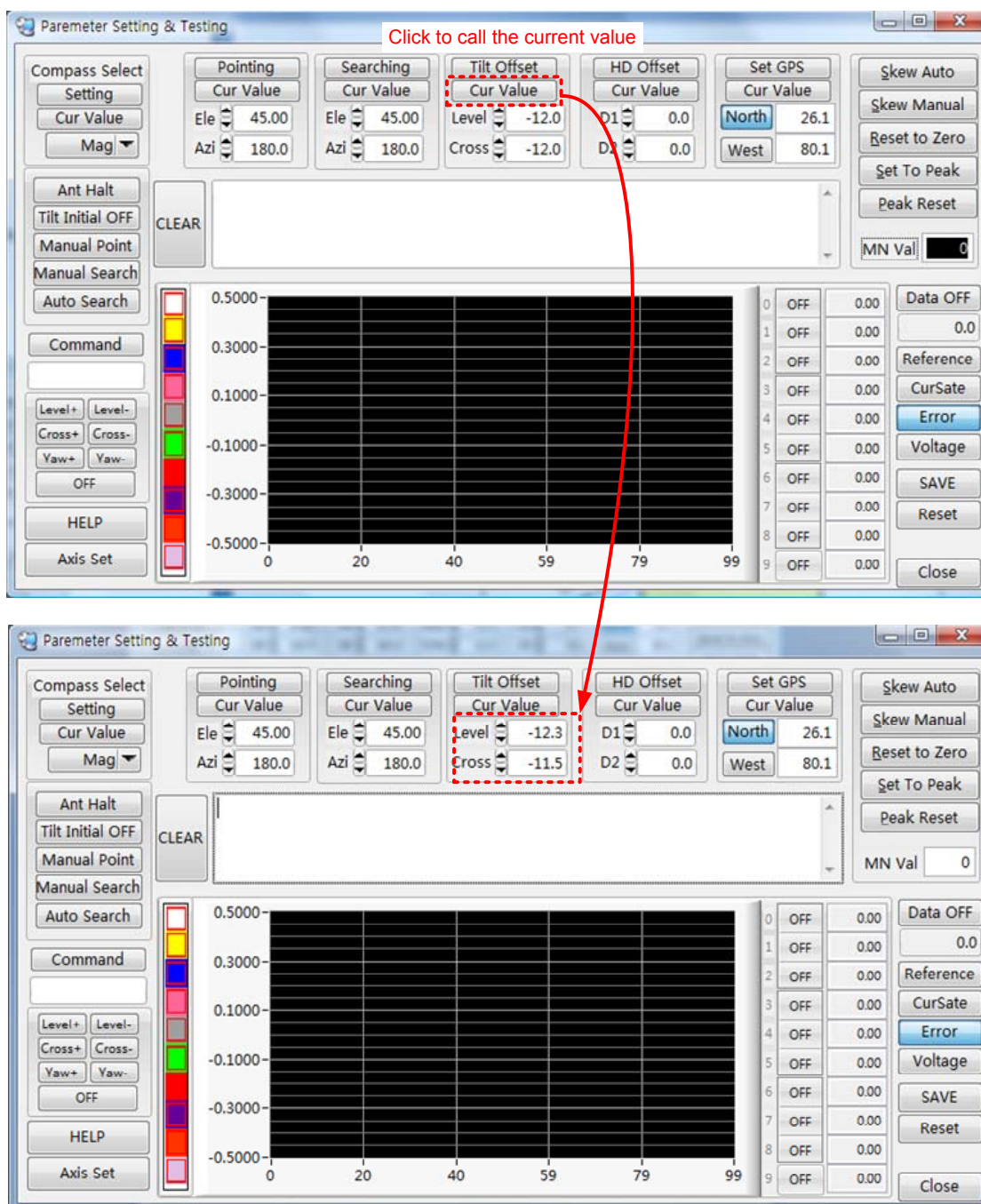


Figure 5-17 Requesting the Current Tilt Offset

3. Change the tilt offset of level and cross axis to place the bubble of the bubble inclinometer in the center
4. Click 'Tilt Offset' to upload to the PCU.

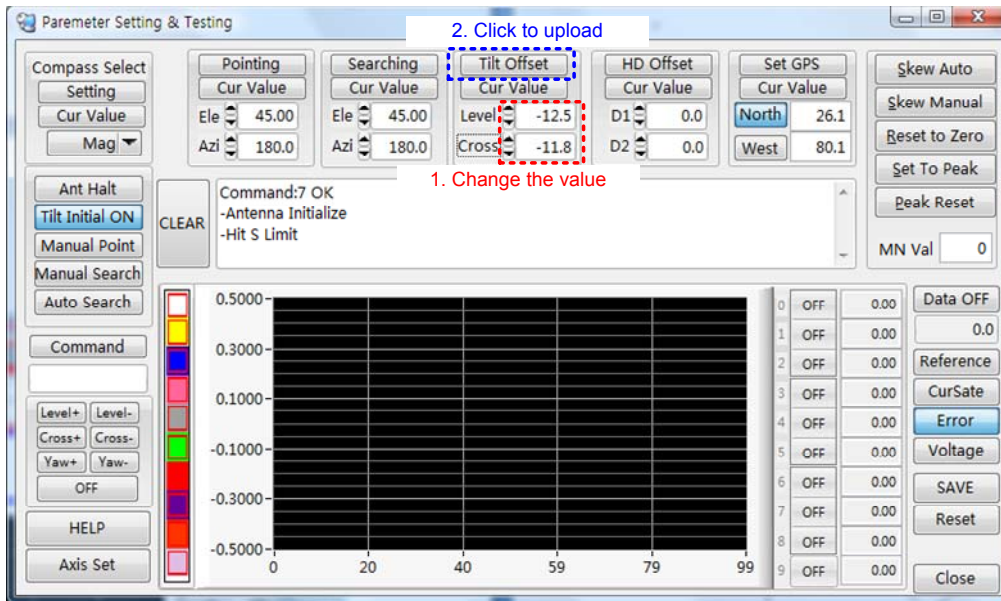


Figure 5-18 Edit the Tilt Offset

5. If the tilt offset is correct, click 'Tilt Initial OFF', whereupon the antenna will start initializing.

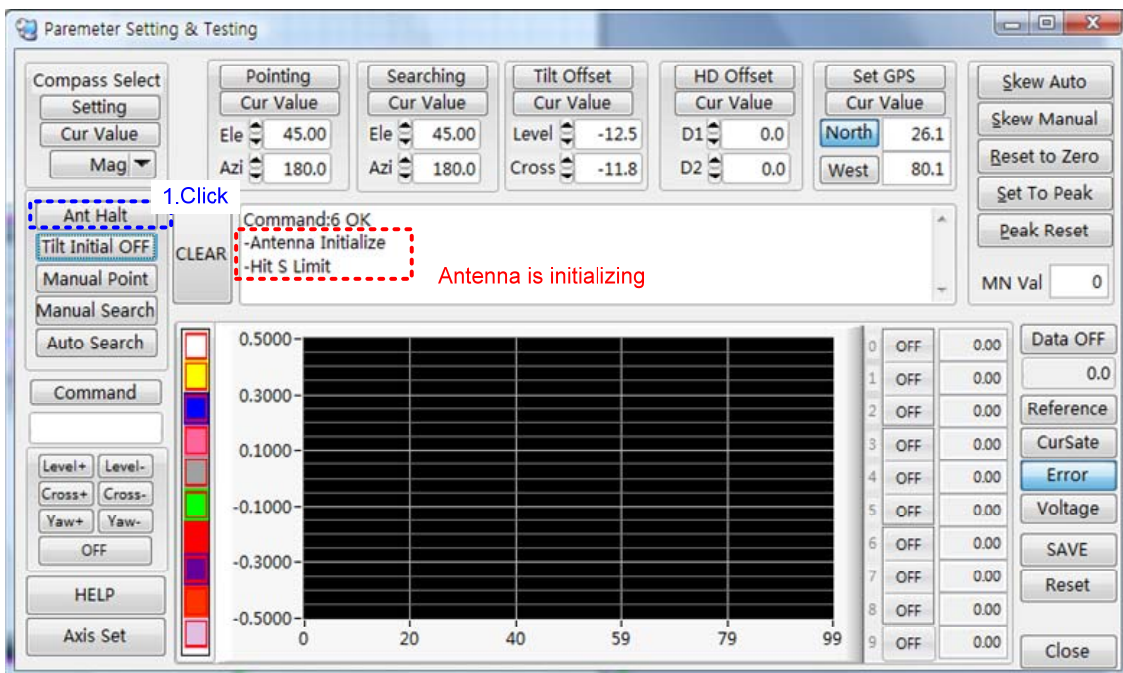


Figure 5-19 Request the Current Tilt Offset Using the 'lbd' Command

Setting the Heading Offset

'Heading offset' refers to the angle between the encoder home index (the Z pulse position of the encoder) and the set position (i.e. arrow mark on the base plate of the A6). 'A6 search for the satellite' refers to the ship's gyro, so the heading offset must be correct (except when using the internal magnetic sensor).

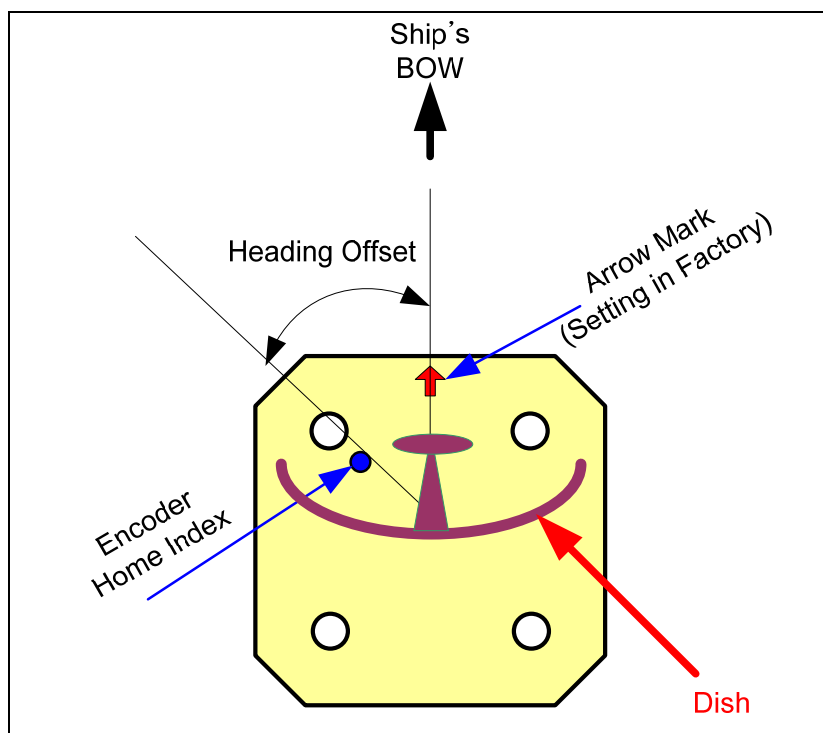


Figure 5-20 Initial Heading Offset

The bow mark of the A6's radome base must be aligned with the ship's bow. If it is not correctly aligned, you must readjust the new heading offset. Refer to the steps outlined below.

1. Input the desired heading offset in 'D1 box'.
2. Click 'HD Offset'.
3. Confirm the new heading offset.

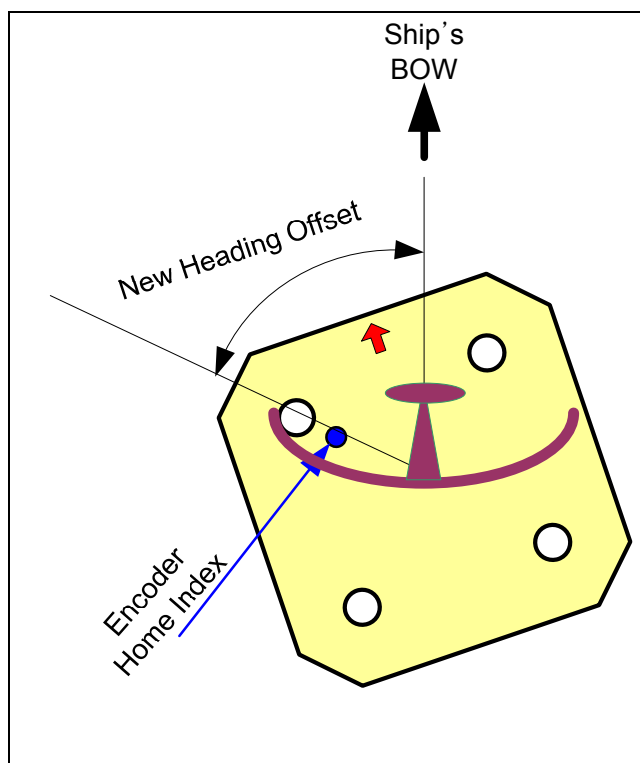


Figure 5-21 New Heading Offset

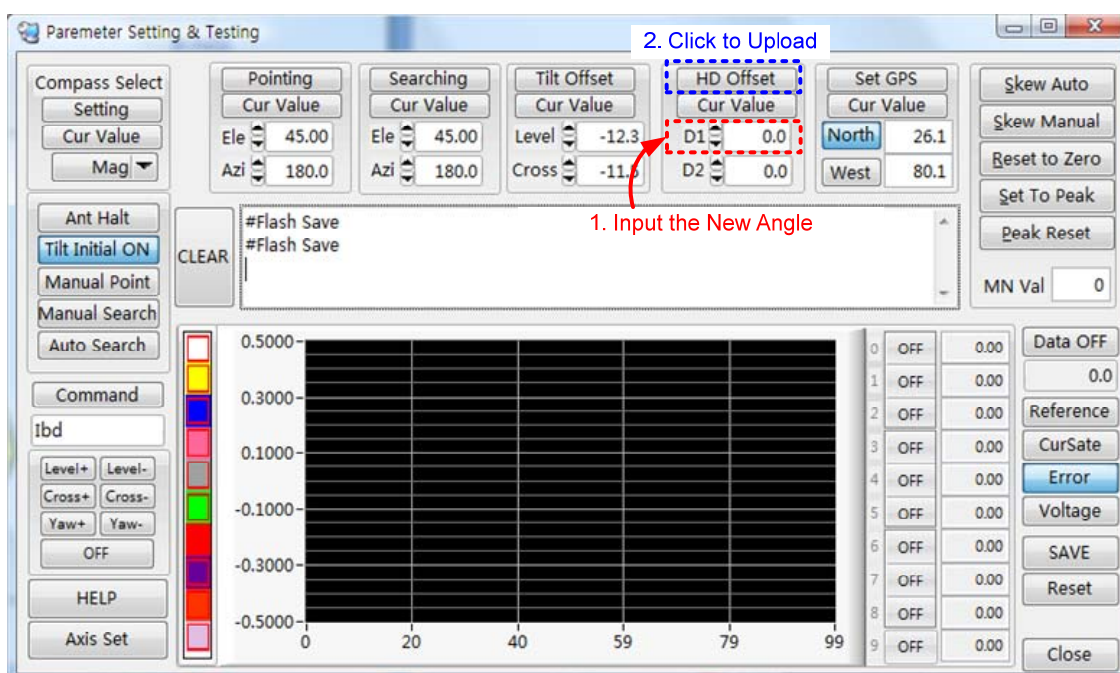


Figure 5-22 Setting the New Heading Offset

NOTE: When setting the heading offset, the feed has to be directed in the desired direction

Skew Setting

After replacing the PCU or skew assembly, you must reset the skew '0' degrees position. Refer to the steps outlined below.

1. Input the desired new skew angle in the manual value box.
2. Click 'Skew Manual', whereupon the skew will move to the desired position.
3. Confirm the new skew '0' degrees position.
4. If it is correct, click 'Reset to Zero', or, if it is incorrect, re-try the steps outlined above.

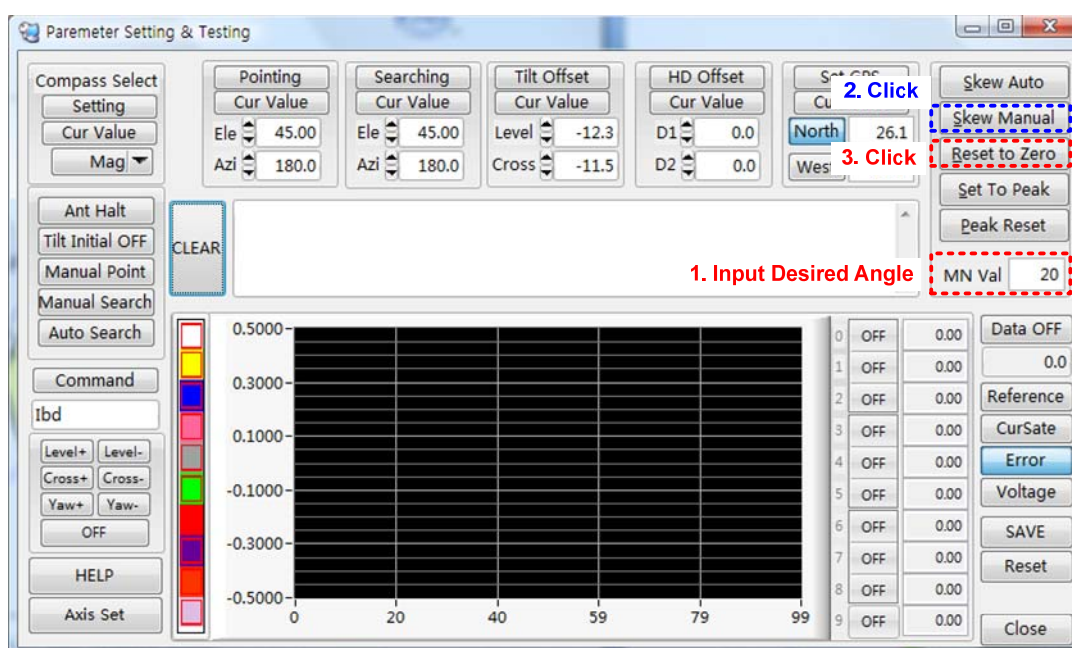


Figure 5-23 Setting the New Skew '0'degrees Position

NOTE: The '0' degrees position should be aligned with the top side of the LNB using a cross pulley.

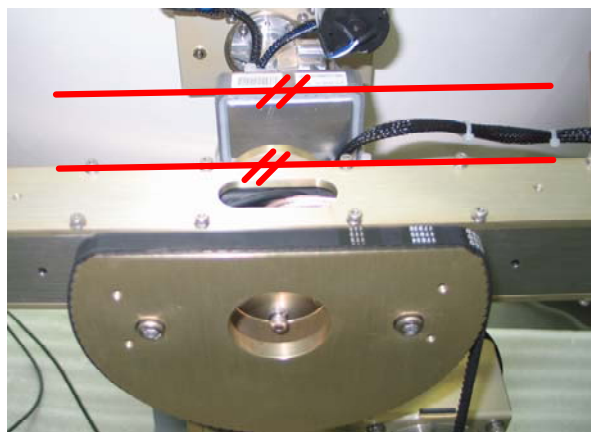


Figure 5-24 *Setting the New Heading Offset*

NOTE: The skew angle range of the A6 is within $\pm 110^\circ$. If the skew angle is out of range, the skew will not move. In this case, click 'Reset to Zero' to change the current position to '0' degrees, whereupon the skew will be able to move.

Compass Mode

When want change the compass mode, you can select the compass mode by SCS. Firstly, click the 'Cur Value' to request current compass mode from PCU. A6 has 4 compass mode(Gyro, Gyro Fail, Internal Magnetic, and Internal Magnetic Fail). Secondly, then select the compass mode after click the '▼', and click the 'Setting' to upload to PCU. Then A6 is initializing and compass mode is changed.

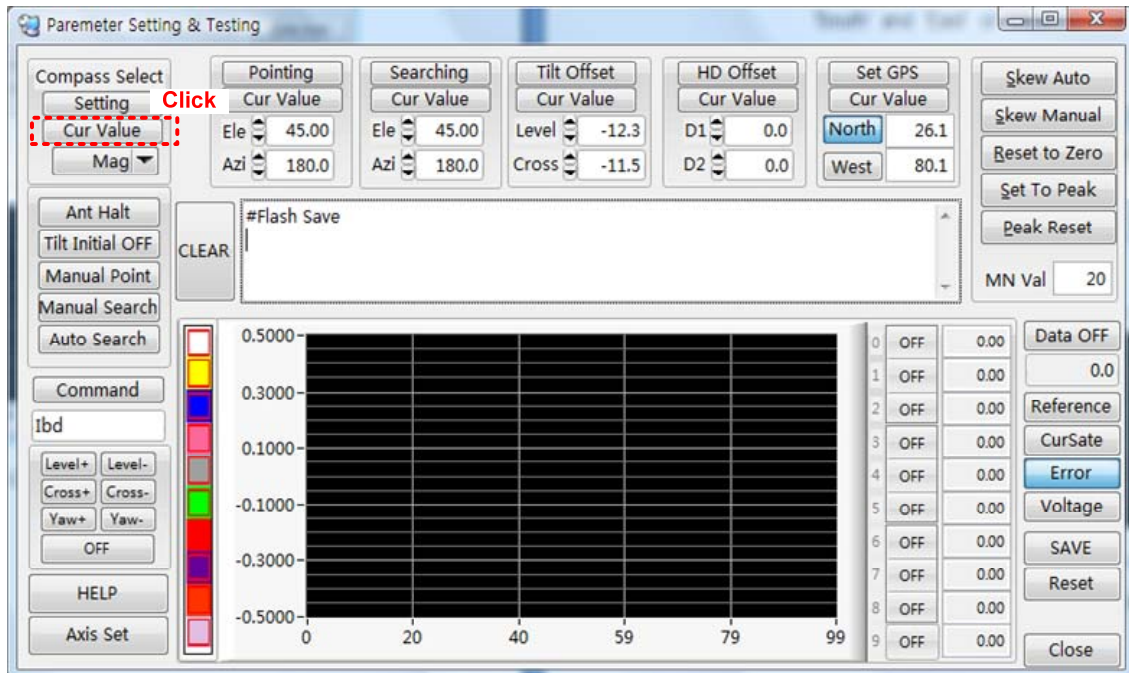


Figure 5-25 Requesting the Current Compass Mode

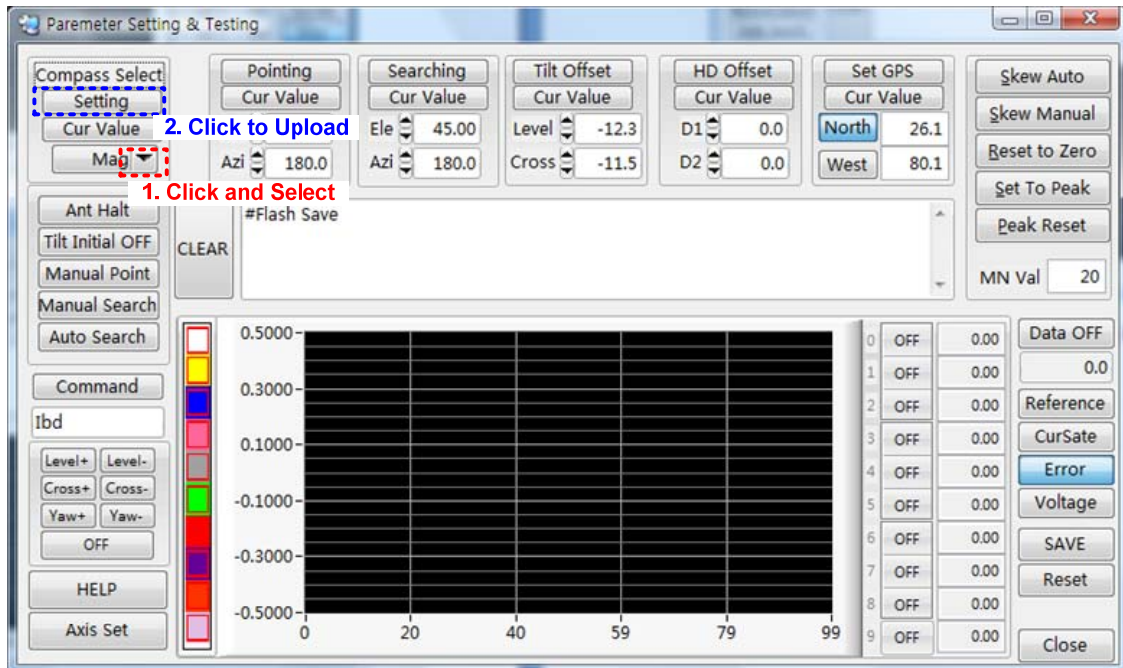


Figure 5-26 Setting the Compass Mode

Set GPS

SCS sets the GPS data when the GPS data is invalid or when GPS fails.

1. Input the latitude and longitude.
2. If changing 'North' or 'South' and 'East' or 'West', click ' North' or 'South' and 'East' or 'West'
3. Click 'Set GPS'

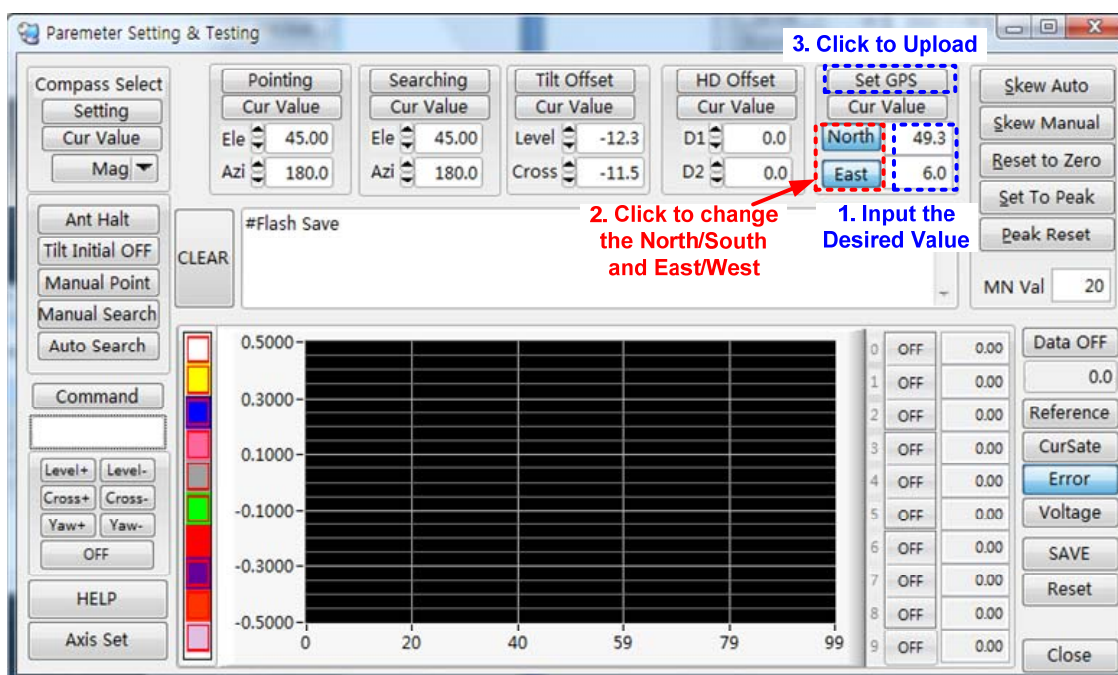


Figure 5-27 Setting the GPS Data

Graph

You can see the graph showing the antenna's parameters by SCS. Refer to the steps outlined below.

1. Select an item ('Reference', 'CurSate', 'Error', 'Voltage').
2. Select from the sub-menus(1~9), and then click the 'on' button of the selected sub-menus.
3. Click "Axis Set" to set the axis, and then change the maximum and minimum values of the graph.
4. Click 'Data OFF' to see the graph.
5. Click 'Data ON' to stop display of the graph.

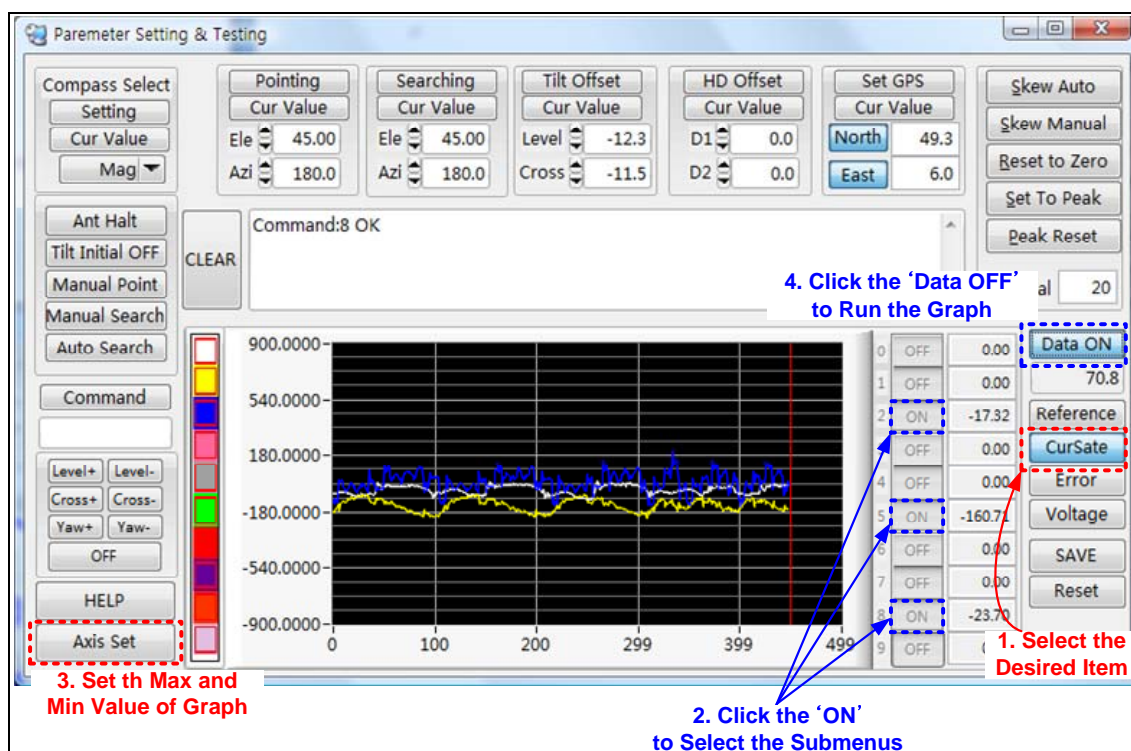


Figure 5-28 View of the Graph

NOTE: Click the 'HELP' button to see the index of the graph.

Appendix A: Parameters for Satellite Connection of A6

You can select 3 satellites for satellite connection like below Table B-1. A6 already has parameters of 3 satellites at User1 ~ User3(Sat ID 58~60).

***Europe region only**

Sat ID	Satellite	Longitude	RF Frequency	Symbol Rate	Polarity
58	Astra2Connect	E23.5	10,891MHz	22,000KHz	Horizontal
59	Astra2Connect	E23.5	12,148MHz	27,500KHz	Horizontal
60	IPcopter	E39.0	11,151.4MHz	3,000KHz	Vertical

Table A-1 Satellite Parameters for Using Internet

Appendix B: Satellite Parameters Setting

Example by SCS

If you change the satellite parameters of Astra2Connect, following below steps.

Satellite	Longitude	RF Frequency	Symbol Rate	Polarity
Astra2Connect	E23.5	12.148MHz	27,500KHz	Horizontal

Table B-1 Existing Satellite Parameters of Astra2Connect/High band

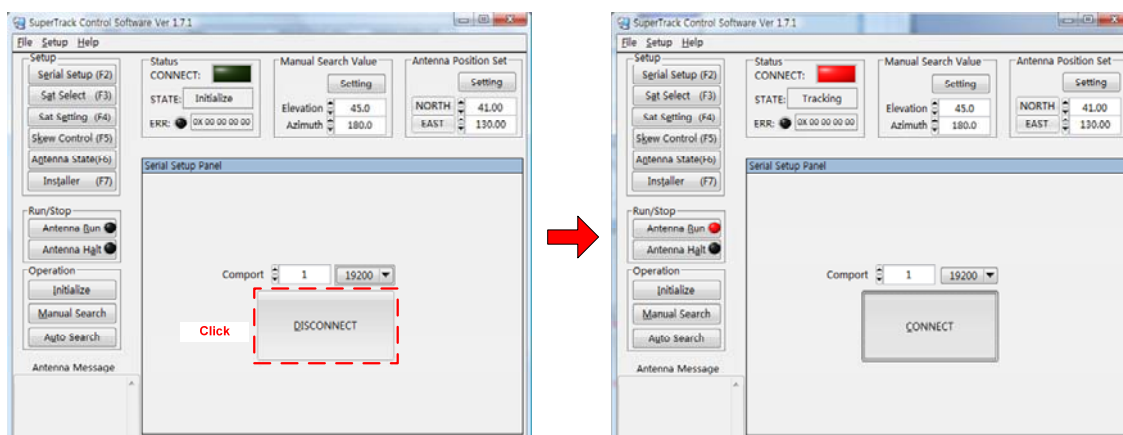
Satellite	Longitude	RF Frequency	Symbol Rate	Polarity
Astra2Connect	E23.5	12,304MHz	27,500KHz	Horizontal

Table B-2 New Satellite Parameters of Astra2Connect/High band

1. Connect ACU with PC and press and hold 2~3 seconds the 'M/C' of AC U front panel
2. Run the SCS Ver. 1.7.1 or 1.7.2.
3. Select the A6/A6 and click the 'OK'.



4. Click the 'DISCONNECT'

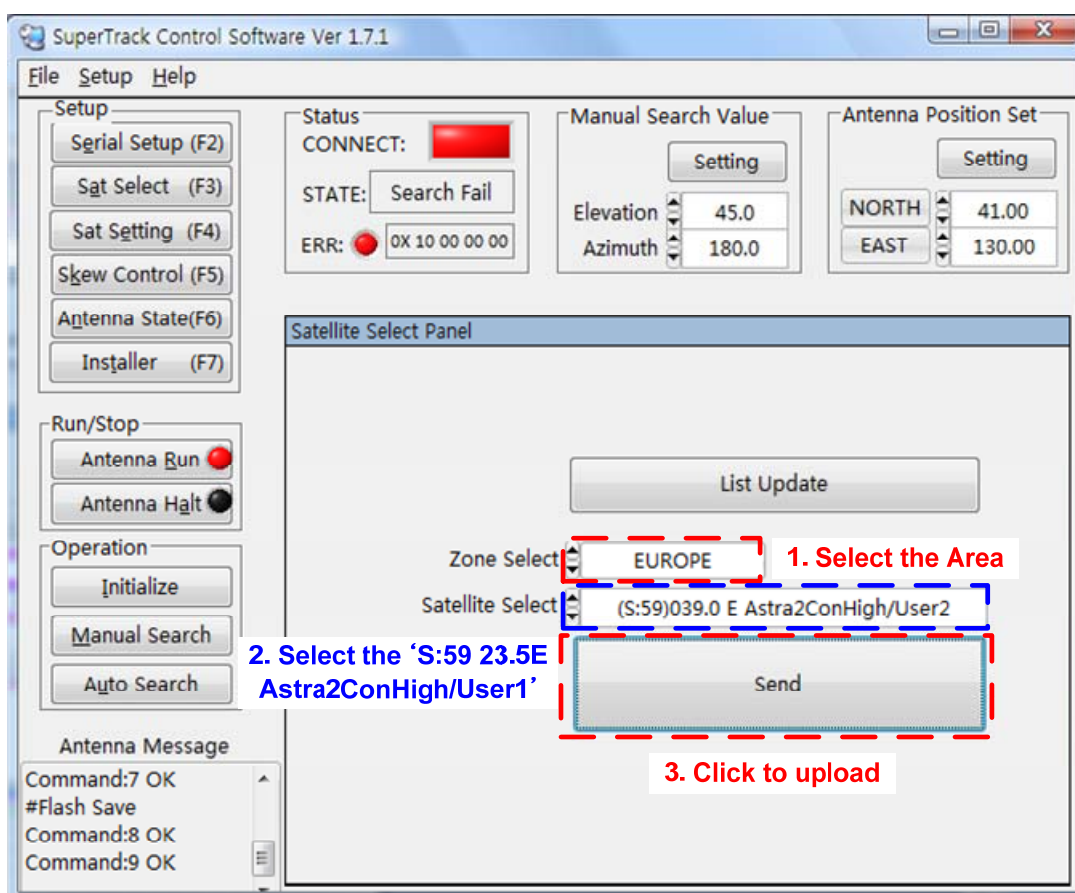


5. Click the 'Sat Select' or press 'F3'

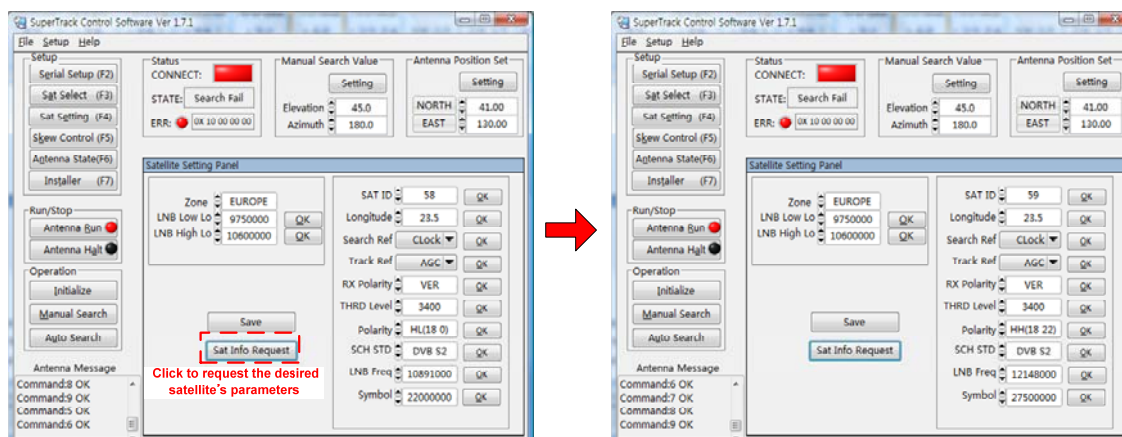
6. Select the 'EUROPE' in 'Zone Select'

7. Select the '(S:59)023.5E Astra2ConHigh/User1' in 'Satellite Select'

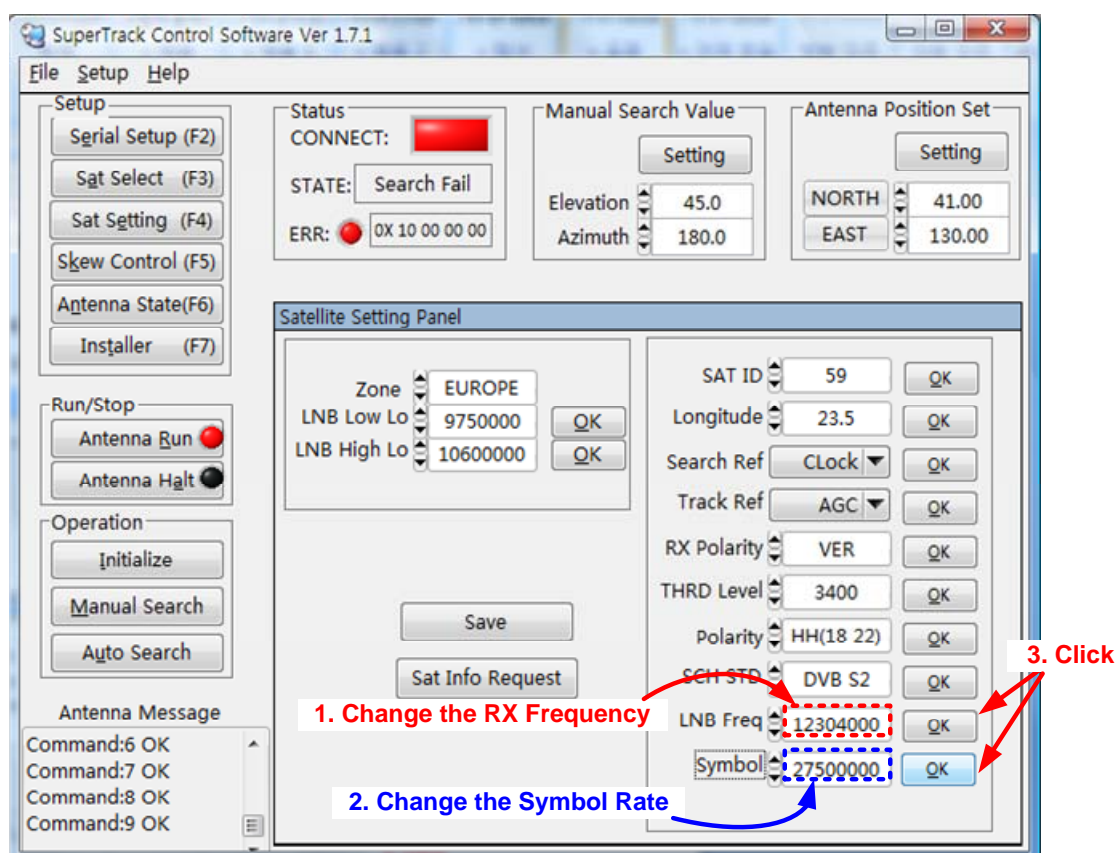
8. Click the 'Send' to upload to PCU.



9. Click the 'Sat Setting' or press the 'F4'
10. Click the 'Sat Info Request' to request the desired satellite's parameters, then sat ID 59 satellite's parameters is updating in 'Satellite Setting Panel'

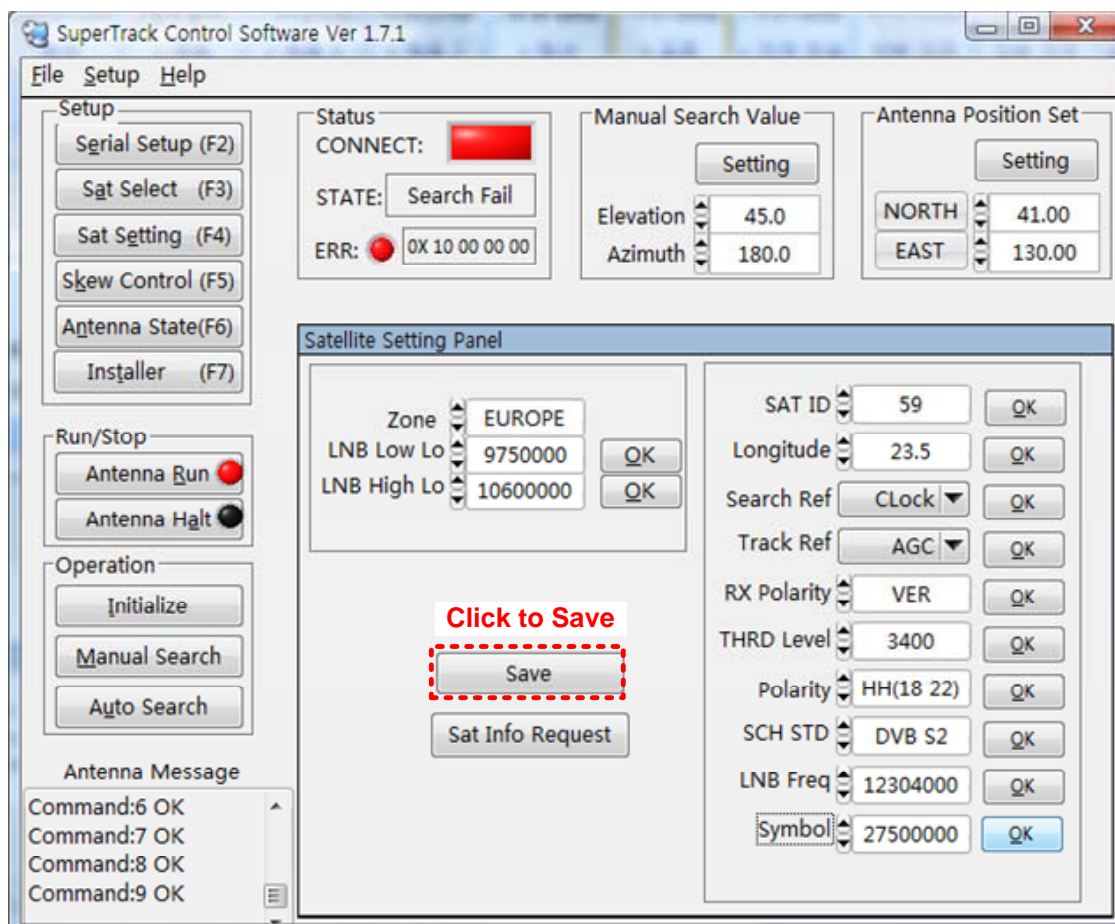


11. Change the 'LNB Freq', 'Symbol' like below Figure.
12. Click the 'OK' in right side of changed parameters to upload to PCU.

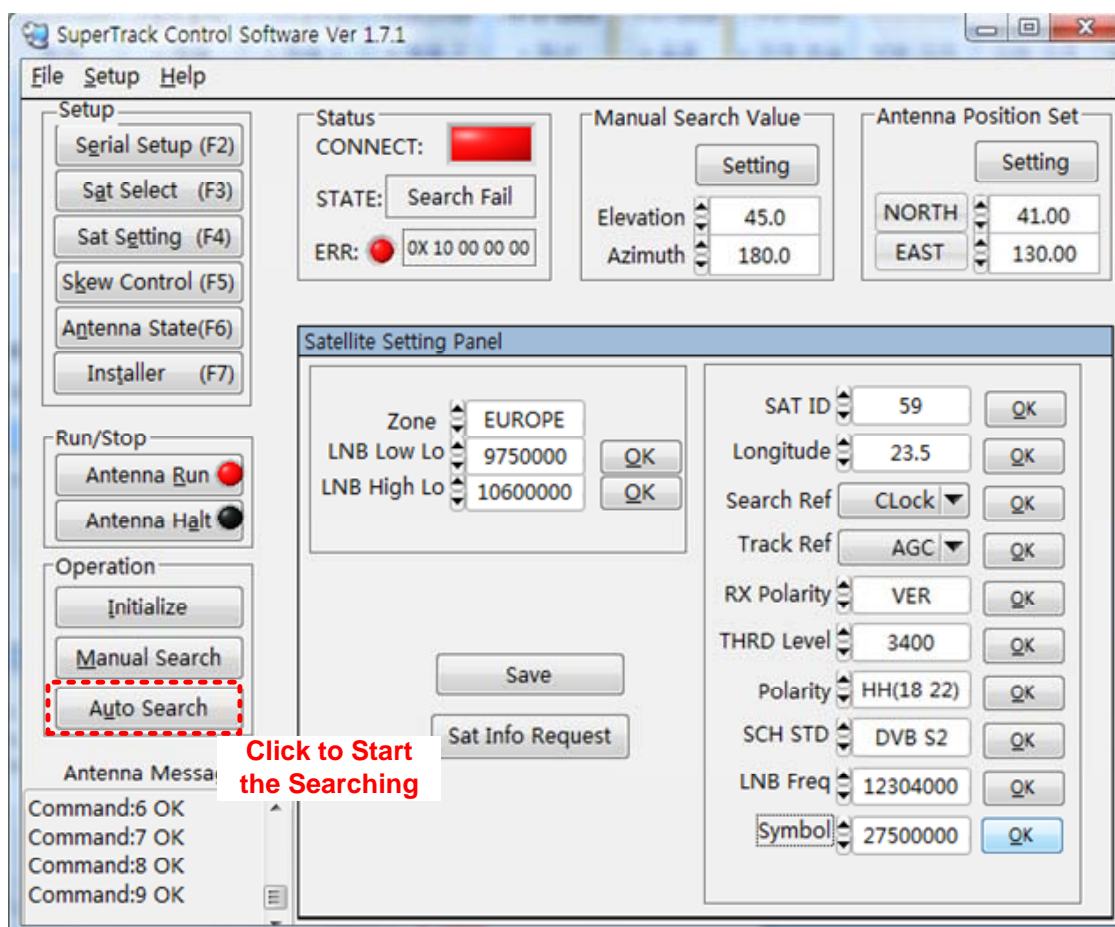


NOTE: Polarity of Astra2Connect is Horizontal, but you have to set the 'VER(vertical)' in 'RX Polarity' to using iLNB.

13. Click the 'SAVE' to save to PCU.



14. Click the 'Auto Search' to search the satellite



15. Then A6 search and track the Astar2Connect

Appendix C: Error Code Definition

If there is a problem with the antenna, you can check the error code on the ACU and SCS. Press the 'MENU' button on the front panel of the ACU when the error LED is on. Then, you will see the hexadecimal error code, as shown in Fig C-1 below.

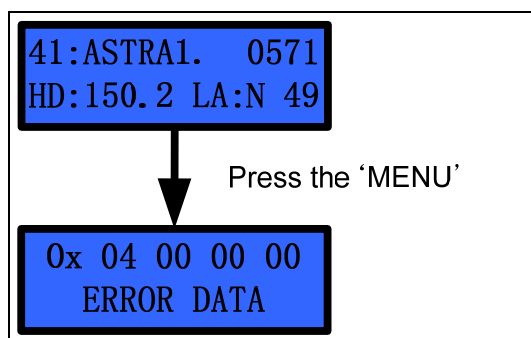


Figure C-1 Error Code on ACU

You will also be able to see the hexadecimal error code on the SCS V 1.7.1, as shown in Figure C-2 below.

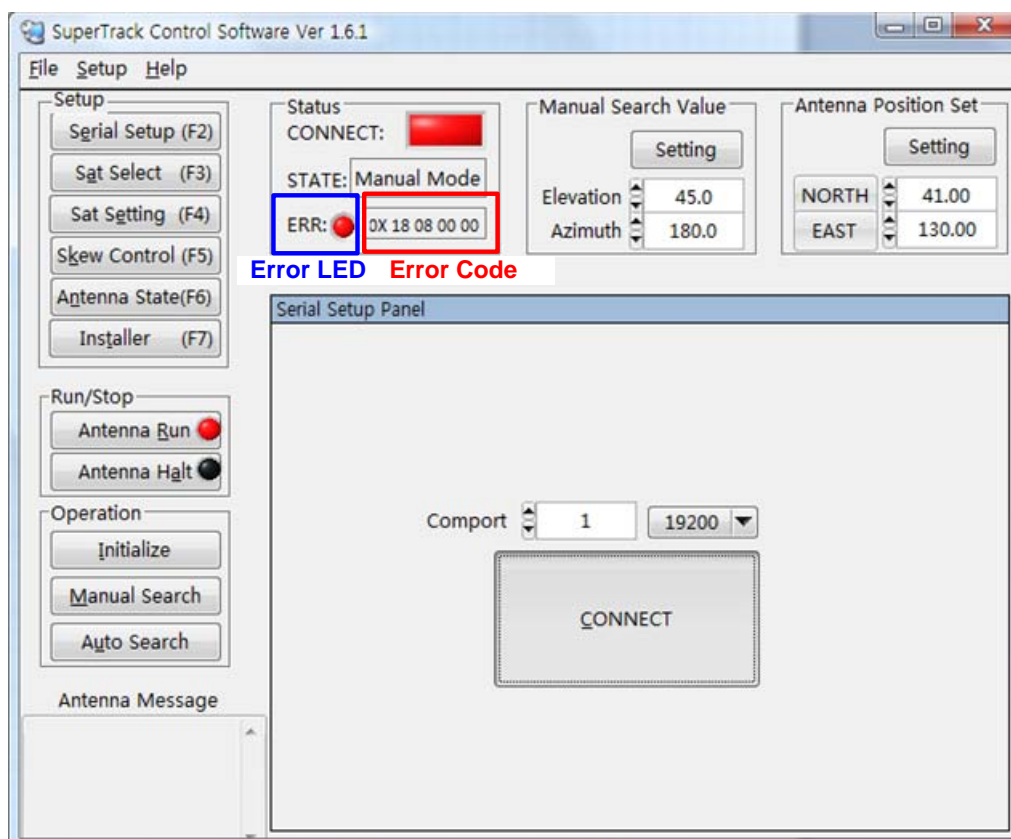


Figure C-2 Error Code on SCS

Table C-1 shows the error code definition, but this is a binary code. Thus, you must convert the hexadecimal code to a binary code to confirm the error.

EX 1) Hexadecimal error code: '0X 18 08 00 00'

Convert to binary error code: 0X 00011000 00001000 00000000 00000000

1₅ error of FF⁽¹⁾ means that the satellite information is not acceptable (i.e. the satellite longitude or current antenna latitude and longitude information is not acceptable).

1₄ error of FF⁽¹⁾ refers to indicate that GPS fails in receiving in time (when GPS normally receives the signal, the error message disappears)

1₄ error of FF⁽²⁾ means that there is no gyro input.

EX 2) The hexadecimal error code: '0X 20 00 00 07'

Convert to the binary error code: 0X 00100000 00000000 00000000 00000111

Error refers to the 7th error of the DBS tuner error.

Error Code Define

PCU Version: after 2.11

Syntax: 0x: FF⁽¹⁾ FF⁽²⁾ FF⁽³⁾ FF⁽⁴⁾

0x FF⁽¹⁾ = 1₈1₇1₆1₅ 1₄1₃1₂1_{1b}

1₁: Level motor driving error(clear if normal state in time)

1₂: Cross motor driving error(clear if normal state in time)

1₃: Yaw motor driving error(clear if normal state in time)

1₄: GPS non valid error in time(clear if return to valid)

1₅: Satellite information is not acceptable (satellite longitude or current antenna

latitude, longitude information)(clear if normal state)

- 1₆: DBS tuner error
- 1₇: Stopper not exist during initialization
- 1₈: Not used

0x FF⁽²⁾ = 1₈1₇1₆1₅ 1₄1₃1₂1_{1b}

- 1₁: Home Index during initialization
- 1₂: There is unknown satellite(when NID lock used for searching)
- 1₃: Searching fail(clear if normal state)
- 1₄: No gyro input (means communication error)(clear if normal state)
- 1₅: PCU DSP flash writing error

1₆: PCU DSP EEPROM writing error

1₇: Not used

1₈: Not used

0x FF⁽³⁾ = 1₈1₇1₆1₅ 1₄1₃1₂1_{1b}

1₁: Not used

1₂: Not used

1₃: Not used

1₄: Not used

1₅: Not used

1₆: Not used

1₇: Not used

1₈: Not used

0x FF⁽⁴⁾

0x01: System has restarted

0x02: Unknown RS232 error has occurred

0x03:	Unknown or invalid command has been received
0x04:	Unknown or invalid data has been received.
0x05:	The 'TS:' command must be sent prior to the command. This is for programming the transponder/satellite data.
0x06:	A tuner I2C bus failure has occurred. This could indicate that the tuner has gone bad.
0x07:	The LNB polarity voltage is not within the LNB polarity range. This could indicate that the LNB voltage is not switching or that the LNB voltage is shorted.
0x08:	the LNB signal level is below a valid range. This could indicate no lnb connected.
0x09:	The E2Ram has failed

Table C-1 Error Code Definition

NOTE: To clear the error by perforce after checking the error, press the 'NEXT' button on the ACU. If using the SCS, click the 'ERR' LED.

Appendix D: Specifications

Above Deck			
Dish Diameter	61cm (24")	Antenna Dimension	82cm(H) x 72cm(D)
Antenna Weight	37kg	Radome Material	Plastic / FRP *(Option)
RX /TX Frequency Band	TX : 14.0 ~ 14.5GHz Ku Band RX : 10.95 ~ 12.75GHz Ku Band	Humidity	Up to 100% @ 40 °C
G/T	14.0dB/K	RX /TX Gain	36dBi / 36.5dBi
BUC	0.5W Only	Operating Platform	3-Axis
LNB	iLNB	Skew Control	Automatic (-110° ~ +110°)
Elevation Angle	-10° ~ +100°	Azimuth Range	640°
Cross Angle	+/- 35°	Tracking Speed	More than 90° /sec
Vibration Damper	Rubber Damper	Temperature	-20 °C to 55 °C
Below Deck			
ACU Size	221 x 153 x 50mm	External I/O	RS232C
Input Power	110/220VAC Free (65W)	Gyro Compass Input	NMEA
Output Power	24VDC 60W		
Packing			
Size	85 x 85 x 112cm	Gross Weight	52kg
Packed by	Paper carton		

Specifications subject to change without notice

Appendix E: Radome and Antenna Mounting Holes Layout

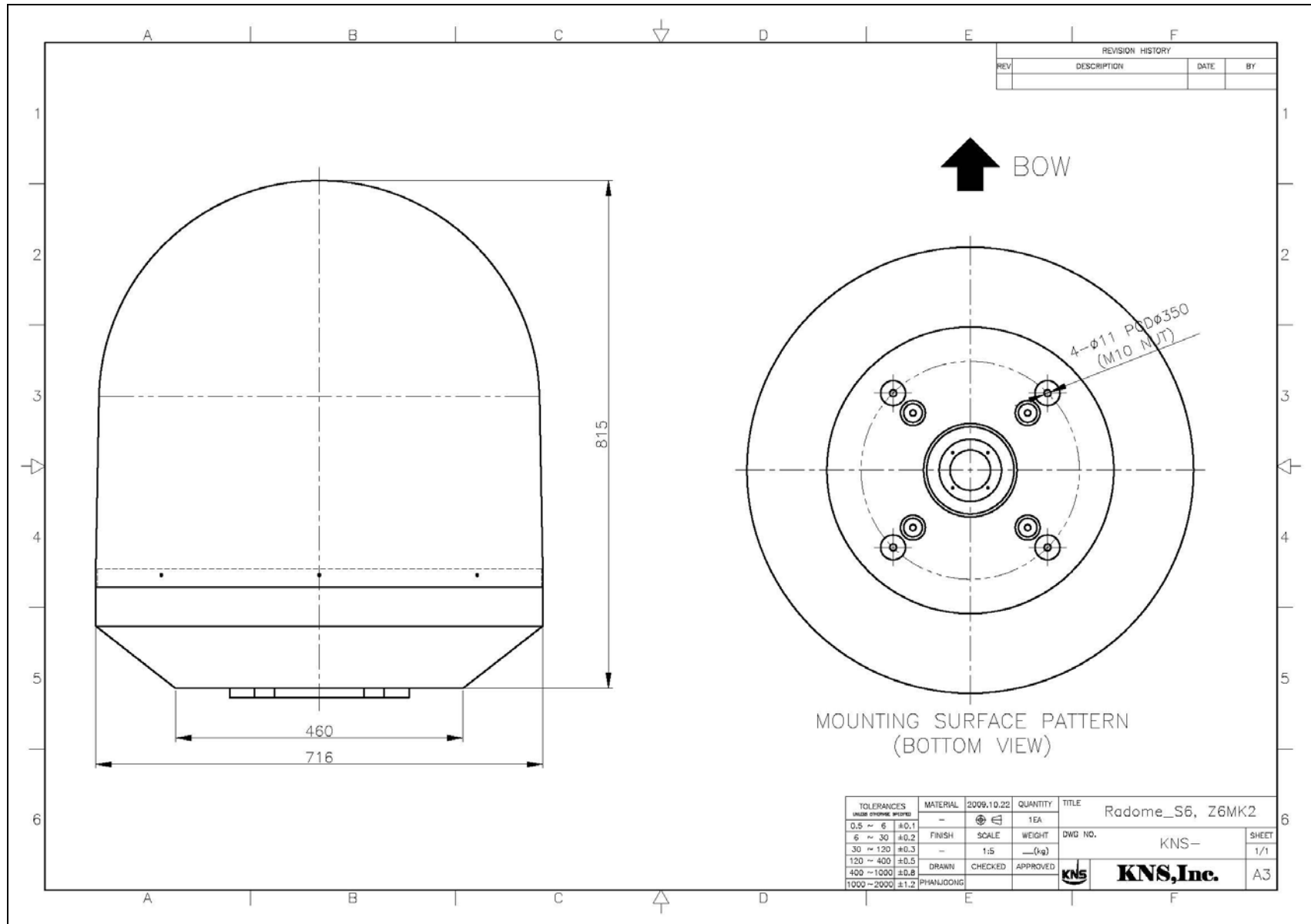


Figure E-1 A6 Plastic Radome Layout

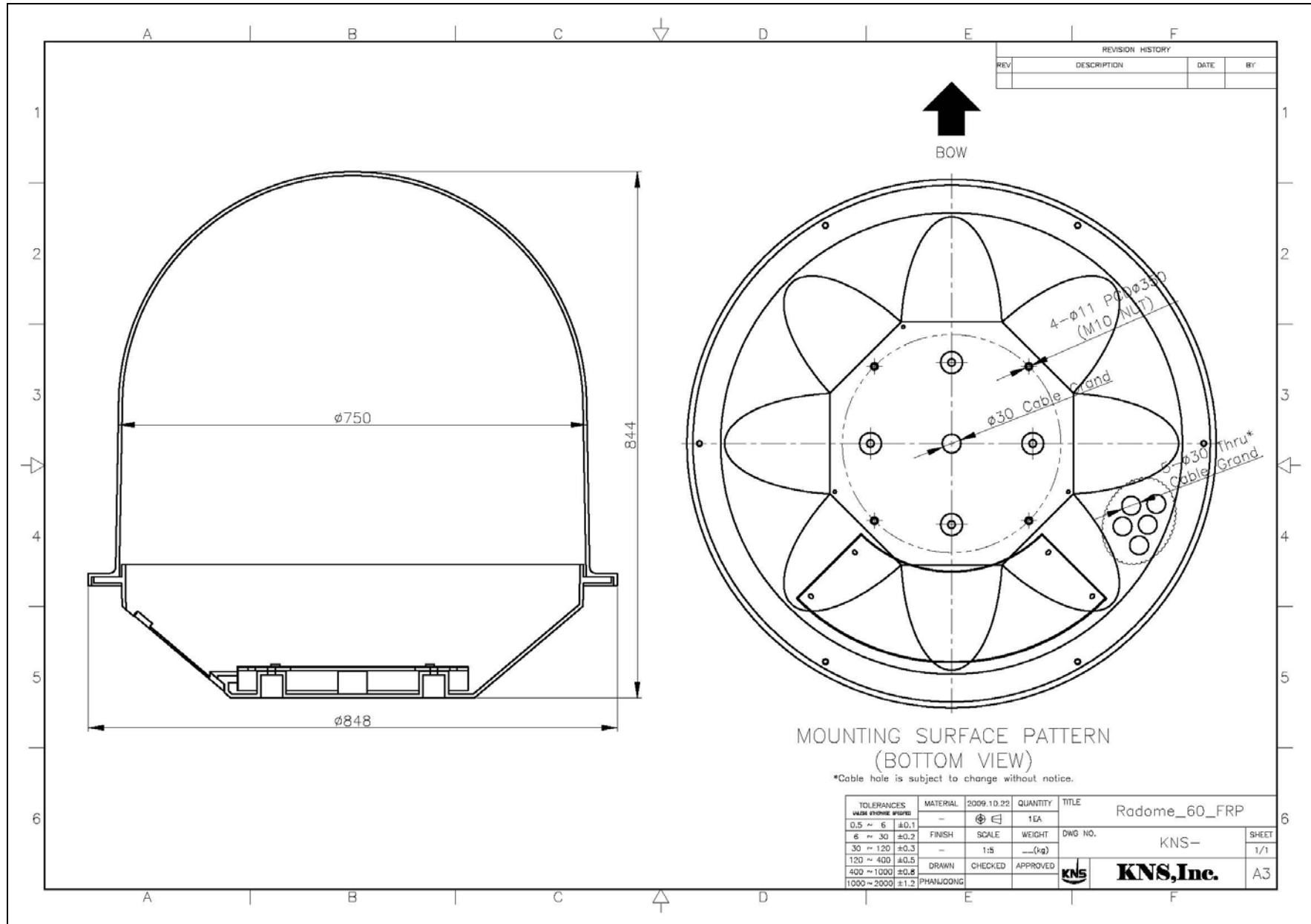


Figure E-2 A6 FRP Radome Layout(Option)