OPERATOR MANUAL
FOR SEA TEL DAC-2202 ANTENNA CONTROL UNIT

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R&TTE

CE

The Sea Tel DAC-2202, or DAC-2302, Antenna Control Unit used with the Sea Tel Antenna complies with the requirements for Radio and Telecommunication Terminal Equipment. A copy of the R&TTE Declaration of Conformity for this equipment is contained in the Antenna Manual for your system.

The Sea Tel DAC-2202, or DAC-2302, Antenna Control Unit contains FCC compliant supervisory software to continuously monitor the pedestal pointing accuracy and use it to control the "Transmit Mute" function of the satellite modem to satisfy the provisions of FCC 47 C.F.R. § 25.222(a)(l)(iii). A copy of the FCC Declaration of Conformity for this equipment is contained in the Antenna Manual for your system.

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Revision History

REV	ECO#	Date	Description	By
X	N/A	September 8, 2009	PRELIMINARY Release.	MDN
A	N/A	September 21, 2009	Production Release	MDN
B	6990	December 7, 2009	Update text to include GSR2 software functions	MDN
C	N/A	June 30, 2010	Update text to include GSR3 software functions	MDN
D	N/A	April 21, 2011	Updated text to include GSR4 software functions and added Setup – CommIF and HTML Pages chapter	MDN
E	N/A	June 5, 2012		

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1.   Quick Start Operation – Introduction

When power is turned ON, the ACU Display will initially show "**SEA TEL INC - MASTER**" and the ACU software version (ie **DAC-2202 VER 6.xx**). 10 seconds later, the display will switch to "**SEA TEL INC - REMOTE**" and "**INITIALIZING**" for approximately two minutes while the Pedestal Control Unit (PCU) completes initialization of the antenna pedestal and then reports its Model & Software version.

1.1.   Quick Start Operation

If your system has been set up correctly and the ship has not moved since the system was used last. Operation of the system from a cold start involves the following steps.

1. Turn on the AC power switches for the Antenna Control Unit (ACU) and other Below Decks Equipment..

2. Press **NEXT** until the *Ship* menu is displayed to check the Latitude, Longitude and Heading values. Latitude and Longitude should still be correct, but may be updated if necessary. Heading, in some cases, will be 000.0 and you will have to enter the *initial* value of the ships *current* heading. Entry of ships heading is not required when your system is connected to a 1:1 Synchro or NMEA 0183 Heading Gyro Compass output. To correct the Heading value, press **ENTER 3 times** to select ship's heading (HDG) entry mode. Use the **LEFT** arrow to bring the cursor up under the ones digit, then if desired, increment/decrement it using the **UP/DOWN** arrow keys. Use the **LEFT/RIGHT** arrow keys to select other digits to modify and the **UP/DOWN** arrow key to modify them as needed to enter the current ships gyro heading. Press **ENTER** to save the value. Press **NEXT** to return to the Ship display menu.

3. If setup correctly, the ACU should automatically target the last satellite that was used. If it does not, press **NEXT** to the *Satellite* display menu so you can manually target the satellite. If you are targeting the SAME satellite longitude as was used last; Press **ENTER**, then the **LEFT** (or **RIGHT**) arrow and then **ENTER** to target the same satellite. If you are targeting a different satellite you will need to change the tracking parameters and then target the desired satellite, refer to the operation section for the Satellite menu below.

A. If no signal is found: The Tracking LED will flash for a short period of time (per the SEARCH DELAY parameter) followed by the Search LED coming **ON**. The ACU will automatically move the antenna in a spiral SEARCH pattern until the ACU receives a signal (AGC) value that is greater than the threshold value. Tracking will take over (Tracking LED **ON**) and automatically peak the antenna position for highest receive signal level from the satellite which has been acquired.

B. If satellite signal is found AND network lock is achieved: The received signal level (AGC) will be higher than the threshold value. Tracking will take over (Tracking LED **ON**) and automatically peak the antenna position for highest receive signal level from the satellite and the satellite modem will get modem lock/receive sync. When the ACU has signal above threshold AND modem has network lock the antenna will continue to track the satellite.

B. If satellite signal is found but network lock is NOT achieved: If you're system has been setup to use the network lock/satellite ID output from the satellite modem; When signal above threshold is found but the modem does NOT get network lock (receive sync), the ACU will *re-target* in an attempt to find the satellite which has signal AND network lock. This could be due to the antenna targeting the wrong satellite, polarization failure, modem failure (not getting receive sync) or network failure (not allowing the modem to get receive sync). The ACU will continue to re-target.

Upon completion of the above, the system will continue to operate automatically indefinitely until; AC power to the system is interrupted *OR* The satellite signal is blocked *OR* The ship sails into an area of insufficient satellite signal level.

1.2.Front Panel Layout
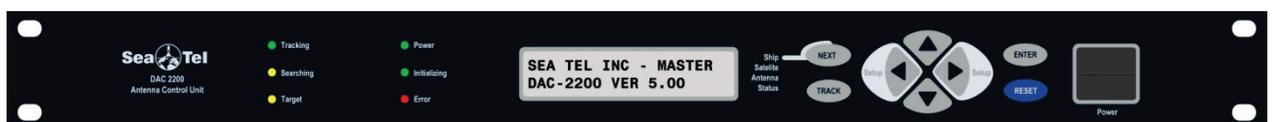
1.3.   Basic Function of Front Panel Keys

Keyboard operation is very simple and straightforward. Basic function of each key is:

NEXT	Press NEXT to cycle through the four main menus; Ship, Satellite, Antenna and Status (refer to the Operation Flowcharts).
TRACK	Press TRACK key to *toggle* the state of Tracking, ON/OFF. If SEARCH is ON, pressing the TRACK key will turn search OFF.
Setup ◀ ▶ Setup	When the Antenna main menu is displayed, pressing the LEFT arrow moves the antenna left (CCW or down in azimuth). Pressing the RIGHT arrow to move the antenna right (CW or up in azimuth). In any sub-menu, pressing the LEFT or RIGHT arrow enters editing mode and brings up a cursor in the display. When the cursor is under a character, it is selected and can be changed (see UP/DOWN arrow below). **(Setup)** - Press and release *BOTH* the LEFT and RIGHT arrow keys to access the save parameters window. Press & Hold for six seconds to access the setup parameters (refer to the Setup section of this manual).
▲ ▼	When the Antenna main menu is displayed, press UP arrow to move the antenna up in elevation or the DOWN arrow to move the antenna down in elevation. Press the UP/DOWN arrow cycle Up and Down through the sub-menus. When a sub-menu item is being edited, use the UP/DOWN to increment/decrement the selected character. This steps the selected entry one increment per sequential key-press or rapidly increments the selected entry when pressed & held.
ENTER	At any main menu level, press ENTER to access the sub-menu items. When viewing one of the sub-menus, pressing the ENTER key will step down through the sub-menu items, like the DOWN arrow does. When editing, the cursor is visible under a character in a sub-menu (whether it has been changed or not), press ENTER to execute the present value, and return to display mode of that sub-menu. This does NOT save the new value to NVRAM.
RESET	Press RESET to reset all the processors in the Antenna Control Unit. It does NOT reset the antenna.

1.4. Basic Description of Front Panel Status LEDs

The basic description of the front panel LED states are:

Tracking - (Green LED)

ON indicates that the ACU has identified and is actively tracking the desired satellite to optimize the signal level (AGC).

Blinking indicates that the ACU is in search delay or is analyzing a satellite signal.

OFF indicates that Tracking is OFF.

Searching - (Yellow LED)

ON indicates that the ACU is actively searching for your satellite signal.

OFF indicates that SEARCH is OFF.

Target - (Yellow LED)

ON indicates that the antenna is TARGETING (driving) to the specified Azimuth and/or Elevation position(s).

Power - (Green LED)

ON indicates that the Antenna Control Unit is energized.

Initializing - (Green LED)

ON indicates that the Antenna is initializing. Initialization of the antenna will take approximately two minutes.

Error - (Red LED)

ON indicates that one, *or more*, discrete system errors have occurred. Refer to Status – Error Code information menu to determine which error(s) have occurred.

OFF indicates that no errors have occurred.

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2.   Operation

2.1.   Display & Entry Operation Menus

The operation menus are arranged in four groups. Use the NEXT key to cycle through the groups, use the ENTER key to access the sub-menu of a selected group and then use the UP/DOWN arrow keys to move up and down the sub-menu items.
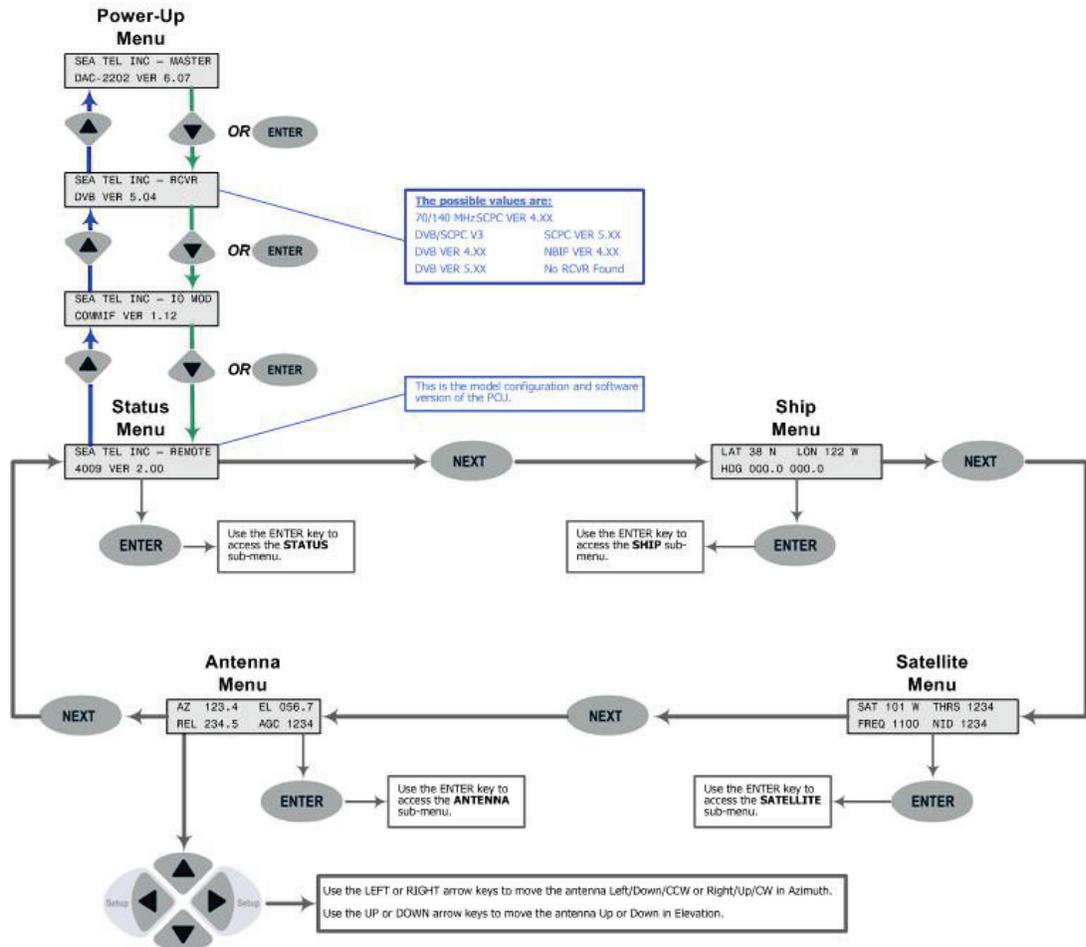
2.2.   Operation Flowchart

The next page is to overall operation flowchart for the DAC-2202

DAC-2202 Operation Flowchart – Version 6.07

Basic button pushing in any one of the sub-menus is; Use the LEFT and RIGHT arrow keys to bring up, and move, the cursor to select a character. Use the UP or DOWN arrow keys to increment or decrement the selected character to the desired value.

Power-Up Menu

```
SEA TEL INC - MASTER
DAC-2202 VER 6.07
```
OR ENTER

```
SEA TEL INC - RCVR
DVB VER 5.04
```
OR ENTER

The possible values are:

70/140 MHz	SCPC VER 4.XX
DVB/SCPC V3	SCPC VER 5.XX
DVB VER 4.XX	NBIF VER 4.XX
DVB VER 5.XX	No RCVR Found

```
SEA TEL INC - IO MOD
COMMIF VER 1.12
```
OR ENTER

Status Menu

```
SEA TEL INC - REMOTE
4009 VER 2.00
```
This is the model configuration and software version of the PCU.

NEXT

Control Menu

```
CONTROL
TRACKING  OFF  KuLo
```
Bring up the cursor. Then press the UP arrow key, or the TRACK key, to toggle the Tracking ON/OFF. Press the DOWN arrow key to toggle through the list of possible BAND selections (the selections displayed are dependent on the parameter value entered for TRACK DISP).
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
CONTROL
SEARCH  2  OFF
```
Use the UP arrow key to turn the search pattern ON. Use the DOWN arrow key to turn search OFF.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
STATUS
ERROR  LLLL  RRRR
```
LLLL - Comms Error Count - display (only).
RRRR - Error Code - indicates the SUM of the discrete error(s) that have occurred. Pressing LEFT then press UP arrow key clears error count, status code and extinguishes the Error LED.
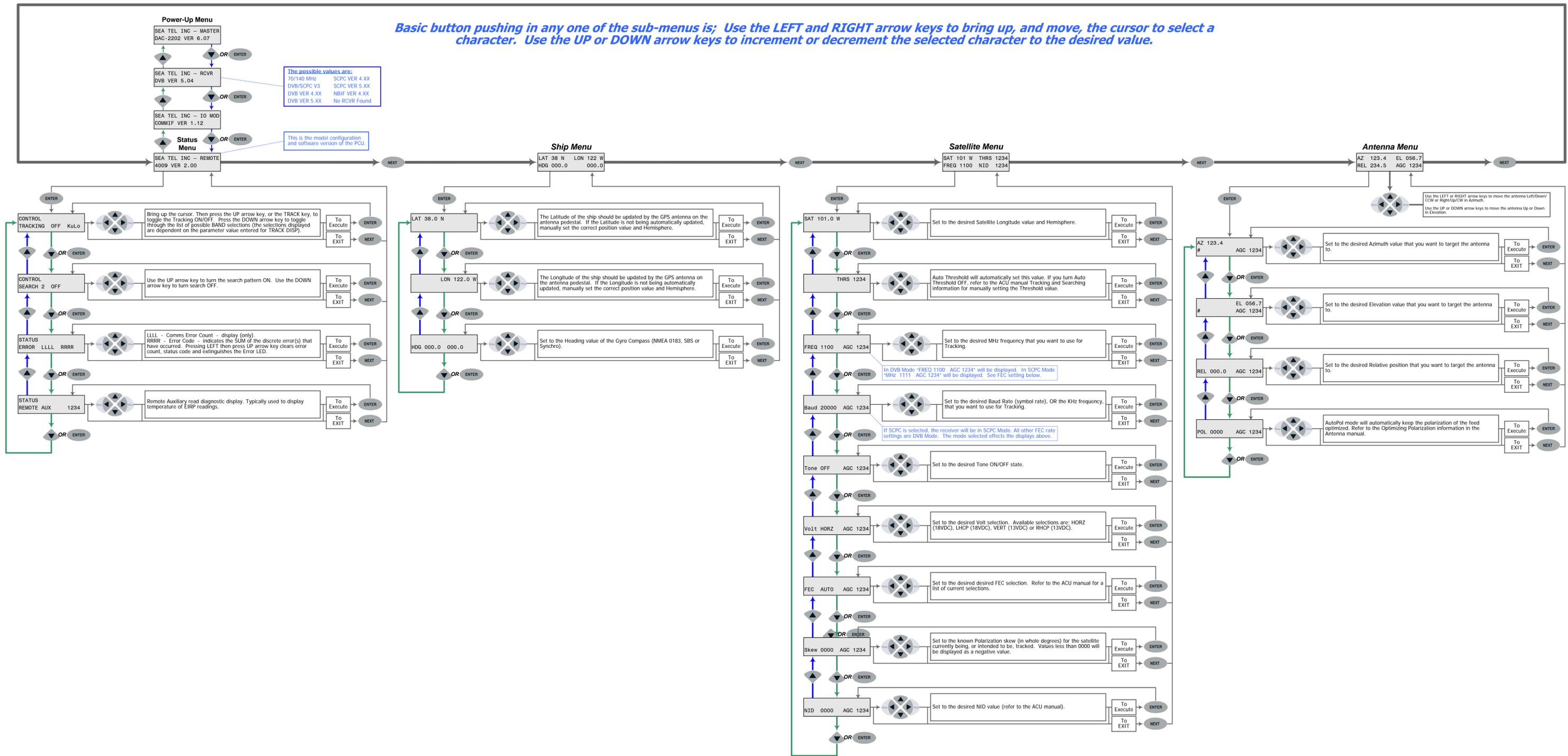To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
STATUS
REMOTE AUX   1234
```
Remote Auxiliary read diagnostic display. Typically used to display temperature of EIRP readings.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

Ship Menu

```
LAT 38 N   LON 122 W
HDG 000.0      000.0
```
NEXT

ENTER

```
LAT 38.0 N
```
The Latitude of the ship should be updated by the GPS antenna on the antenna pedestal. If the Latitude is not being automatically updated, manually set the correct position value and Hemisphere.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
LON 122.0 W
```
The Longitude of the ship should be updated by the GPS antenna on the antenna pedestal. If the Longitude is not being automatically updated, manually set the correct position value and Hemisphere.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
HDG 000.0   000.0
```
Set to the Heading value of the Gyro Compass (NMEA 0183, SBS or Synchro).
To Execute — ENTER
To EXIT — NEXT

OR ENTER

Satellite Menu

```
SAT 101 W   THRS 1234
FREQ 1100   NID  1234
```
NEXT

ENTER

```
SAT 101.0 W
```
Set to the desired Satellite Longitude value and Hemisphere.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
THRS 1234
```
Auto Threshold will automatically set this value. If you turn Auto Threshold OFF, refer to the ACU manual Tracking and Searching information for manually setting the Threshold value.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
FREQ 1100   AGC 1234
```
Set to the desired MHz frequency that you want to use for Tracking.
To Execute — ENTER
To EXIT — NEXT

In DVB Mode "FREQ 1100   AGC 1234" will be displayed. In SCPC Mode "MHz 1111   AGC 1234" will be displayed. See FEC setting below.

OR ENTER

```
Baud 20000  AGC 1234
```
Set to the desired Baud Rate (symbol rate), OR the KHz frequency, that you want to use for Tracking.
To Execute — ENTER
To EXIT — NEXT

If SCPC is selected, the receiver will be in SCPC Mode. All other FEC rate settings are DVB Mode. The mode selected effects the displays above.

OR ENTER

```
Tone OFF    AGC 1234
```
Set to the desired Tone ON/OFF state.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
Volt HORZ   AGC 1234
```
Set to the desired Volt selection. Available selections are: HORZ (18VDC), LHCP (18VDC), VERT (13VDC) or RHCP (13VDC).
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
FEC  AUTO   AGC 1234
```
Set to the desired desired FEC selection. Refer to the ACU manual for a list of current selections.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
Skew 0000   AGC 1234
```
Set to the known Polarization skew (in whole degrees) for the satellite currently being, or intended to be, tracked. Values less than 0000 will be displayed as a negative value.
To Execute — ENTER
To EXIT — NEXT

OR ENTER

```
NID  0000   AGC 1234
```
Set to the desired NID value (refer to the ACU manual).
To Execute — ENTER
To EXIT — NEXT

OR ENTER

Antenna Menu

```
AZ  123.4   EL 056.7
REL 234.5   AGC 1234
```
NEXT

Use the LEFT or RIGHT arrow keys to move the antenna Left/Down/CCW or Right/Up/CW in Azimuth.
Use the UP or DOWN arrow keys to move the antenna Up or Down in Elevation.

ENTER

```
AZ 123.4
#          AGC 1234
```
Set to the desired Azimuth value that you want to target the antenna to.
To Execute — ENTER
To EXIT

OR ENTER

```
EL  056.7
#          AGC 1234
```
Set to the desired Elevation value that you want to target the antenna to.
To Execute — ENTER
To EXIT

OR ENTER

```
REL 000.0   AGC 1234
```
Set to the desired Relative position that you want to target the antenna to.
To Execute — ENTER
To EXIT

OR ENTER

```
POL 0000    AGC 1234
```
AutoPol mode will automatically keep the polarization of the feed optimized. Refer to the Optimizing Polarization information in the Antenna manual.
To Execute — ENTER
To EXIT

OR ENTER

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2.2.1. Ship Information Menus.

Display	Meaning
LAT 38 N LON 122 W HDG 000.0 000.0	Press the **NEXT** key until the ***Ship*** menu is displayed. This is the display of the current *Ship* information.
LAT 3<u>8</u>.0 N	Press **ENTER** to access the ***Latitude*** sub-menu. Latitude is used to calculate Azimuth, Elevation and Polarization for the desired satellite position. Latitude is updated automatically by the GPS mounted on the pedestal. To manually update Latitude, press the LEFT/RIGHT arrow to enter edit mode. This will display a cursor under character to be modified. Press the UP/DOWN arrow to increment/decrement this character. Press the LEFT or RIGHT arrow again to select another digit, or the North/South character, to edit. Press ENTER when you are finished editing the Latitude position.
LON 12<u>2</u>.0 W	Press **DOWN** or **ENTER** to access the ***Longitude entry mode***. Longitude is used to calculate Azimuth, Elevation and Polarization for the desired satellite position. Longitude is updated automatically by the GPS mounted on the pedestal. To manually update Longitude, press the LEFT/RIGHT arrow to enter edit mode. This will display a cursor under character to be modified. Press the UP/DOWN arrow to increment/decrement this character. Press the LEFT or RIGHT arrow again to select another digit, or the East/West character, to edit. Press ENTER when you are finished editing the Longitude position.
HDG 00<u>0</u>.0 000.0	The displayed heading is comprised of two values. The left is the integrated response from the antenna pedestal and right is the local input from the gyrocompass. Press **DOWN** or **ENTER** to access the ***Heading entry mode***. Heading is used to provide "True" Azimuth antenna position. This must be True north input, NOT Magnetic north. If the heading input source is NMEA0183 data, or 1:1 Synchro, no initial heading entry is required. For all other acceptable Gyro Compass input types the HDG **MUST** be initially set whenever the ACU power is turned ON. To manually update, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the character to the left, or right, of the decimal point respectively. Continue to move the cursor until the desired character to be edited is underscored (selected). Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character. Press **ENTER** to set the new heading value and return to heading display *OR* Press **NEXT** to abort and return to the main Ship display During subsequent normal operation, the HDG value should automatically follow the Ships Gyro Compass correctly (HDG value should agree exactly with the value observed on the Gyro Compass).

2.2.2. Satellite Information Menus.

Display	Meaning
SAT 101 W THRS 1234 FREQ 1100 NID 1234	Press the **NEXT** key until the main *Satellite* menu is displayed. This is the display of the current *Satellite* tracking information.
	NID value displayed is the Network ID which is ***currently being received*** from the satellite that the antenna is pointed to. If your ACU has an L-Band SCPC receiver in it, "ABCD" will be displayed here. If your ACU has an L-Band NBIF receiver in it, "1234" will be displayed here. If your ACU has a 70, or 140, MHz SCPC narrow band receiver in it, 0000 will always be shown.
SAT 101.0 <u>W</u>	Press **ENTER** to access the *Satellite Longitude sub-menu*. Satellite longitude is used to calculate antenna Elevation, Azimuth and Polarity pointing angles from the ships current location and heading.
	To manually update, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the tenths digit to the left, or the E/W character to the right respectively. Continue to move the cursor until the desired character to be edited is underscored (selected). Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character.
	Range of acceptable longitude values is 000.0 East to 180.0 East/West to 000.0 West, however longitude may be entered as 000.0-359.9 East if you prefer (181.0 East is the same as 179.0 West). Tenths may be entered (and will be used internally) but the display will round off to nearest whole degree.
	When the hemisphere character is selected press the **UP** or the **DOWN** key to toggle **E**ast/**W**est hemisphere.
	Press **ENTER** to target the displayed satellite position *OR* Press **NEXT** to abort and return to the main Satellite menu.
THRS 123<u>4</u>	Press **DOWN** or **ENTER** to access the *Threshold sub-menu*. Threshold is a minimum AGC value for the ACU to determine if satellite signal has been located or has been lost.
	Default setup is *Automatic Threshold,* which sets the Threshold value to nnnn counts of AGC above the average off satellite AGC value whenever the ACU Searches, Targets or Unwraps (refer to your antenna manual for the default setting for AUTO THRES parameter).
	To manually set threshold; Note the Peak "on satellite" AGC value, move AZ or EL and note the "off satellite" (Noise Floor) AGC value. Calculate the difference between Peak AGC and Noise Floor AGC. Threshold should be set to 1/3 (to ½) of the Difference above Noise Floor.

In DVB Mode FREQ 110<u>0</u> AGC 1234 **In SCPC Mode** MHz 111<u>1</u> AGC 1234	Press **DOWN** or **ENTER** to access the *Sat ID Receiver Frequency entry mode.* The individual settings of the Satellite Identification tracking receiver and the current signal level (AGC) will be displayed in each of the sub-menus below. To enable SCPC mode you must first set the FEC parameter to "SCPC". In DVB Mode: **FREQ #### AGC 1234** In SCPC Mode: **MHz #### AGC 1234** To manually set, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the character to the left, or right, of the decimal point respectively. Continue to move the cursor until the desired character to be edited is underscored (selected). Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character. If your ACU has an L-Band DVB receiver you will tune FREQ to 950-2150MHz. If your ACU has an L-Band SCPC or NBIF receiver you will tune the MHZ to 950-2150MHz (and then tune the KHZ value in the next step). If your ACU has a 70MHz SCPC receiver you will tune the MHZ to 52-88MHz (and then tune the KHZ value in the next step). If your ACU has a 140MHz SCPC receiver you will tune the MHZ to 104-176MHz (and then tune the KHZ value in the next step). Contact your dealer and/or Service Provider for the correct tracking parameters. **If your system is configured to use an external AGC input, you must set Frequency to 0000.** This will cause the ACU to read the input from the "AGC" & "GND" terminal connections on the Terminal Mounting Strip Assembly. Press **ENTER** to tune the receiver to this frequency and return to the frequency display *OR* Press **NEXT** to abort and return to the main Satellite display.
In DVB Mode Baud 2000<u>0</u> AGC 1234 **In SCPC/NBIF Mode** KHz 099<u>9</u> AGC 1234	Press **DOWN** or **ENTER** to access the *Sat ID Receiver Baud entry mode.* This is used to input the numeric value of Baud Rate (symbol rate) OR of the KHz value of the desired the **I**ntermediate **F**requency (950-2150) you want to use for Tracking. This setting of the Satellite Identification tracking receiver and the current signal level (AGC) will be displayed. In DVB Mode: **BAUD 20000 AGC 1234** In SCPC Mode: **KHz #### AGC 1234** To manually update, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the character to the left, or right, of the decimal point respectively. Continue to move the cursor until the desired character to be edited is underscored (selected). Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character. DVB: Current receivers can be set to any desired Baud Rate between 3000 and 30000. It should be set to the symbol/baud rate of the digital carrier you chose to use for tracking. This setting also changes the bandwidth of the receiver. Baud setting of equal to or less than-5000 sets the receiver to 7.5 MHz bandwidth. A Baud Rate of 5001 and greater sets the receiver bandwidth to 20MHz. SCPC: Key in the desired KHz frequency value you wish to use for tracking. Press **ENTER** to set the desired Baud/KHz and return to the Baud/KHz display *OR* Press **NEXT** to abort and return to the main Satellite display.
Tone OF<u>F</u> AGC 1234	Press **DOWN** or **ENTER** to access the **Tone sub-menu**. This setting is used to turn ON or OFF a continuous 22 KHz Tone output from the tracking receiver. Press the **LEFT** or **RIGHT** arrow key to display a cursor underneath the current state. Use the **UP** or **DOWN** arrow key to change states. ON is used to select High Band frequencies and OFF is used to select Low Band frequencies from the matrix switch. Press **ENTER** to set the desired tone setting *OR* Press **NEXT** to abort and return to the main Satellite display.

Volt HOR<u>Z</u> AGC 1234	Press **DOWN** or **ENTER** to access the **Volt sub-menu**. This setting is used to select the Voltage output from the tracking receiver, based on the desired received transponder polarity. Available selections are; HORZ (18VDC), LHCP (18VDC), VERT (13VDC) or RHCP (13VDC).
	To change selection, press the **LEFT** or **RIGHT** arrow key to display a cursor underneath the current selection. Use the **UP** or **DOWN** arrow key to scroll through the selections.
	Press **ENTER** to set the desired Voltage setting *OR* Press **NEXT** to abort and return to the main Satellite display.
FEC AUT<u>O</u> AGC 1234	Press **DOWN** or **ENTER** to access the **FEC sub-menu**. Select the **F**orward **E**rror **C**orrection rate of the desired tracking signal. 1/2, 2/3, 3/4, 5/6, 6/7, 7/8 , AUTO or SCPC. AUTO automatically scans through all the standard DVB & DSS FEC rates.
	NOTE: When SCPC is selected, the FREQ parameter changes to read MHz and the BAUD parameter changes to read KHz.
	Continue pressing the **UP/DOWN** arrow key to toggle through the available forced ***** (star'ed) FEC rates. If the satellite does not generate an NID but does have a unique combination of FREQ, BAUD and FEC lock, select the appropriate *FEC** choice from this list. The ACU will then generate its own unique forced NID (FFFE for DSS signals or FFFD for DVB signals) to represent the desired satellite. You will need to enter this pseudo NID in the *NID* setting below.
	FEC *MUST* be set to SCPC if you have any one of the SCPC narrow band receivers installed in your ACU (L-Band SCPC, 70MHz SCPC or 140MHZ SCPC).
	To manually update, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the current setting. Use the **UP** or **DOWN** arrow keys to scroll through the available FEC selections.
	Press **ENTER** to set the desired selection *OR* Press **NEXT** to abort and return to the main Satellite display.
SKEW 000 AGC 1234	Press **DOWN** or **ENTER** to access the **SAT SKEW sub-menu**. This setting is used to add or subtract Polarization skew for the satellite currently being or intended to be tracked.
	Each increment equals one degree of polarization rotation. Increment to "+02" for a satellite with a total positive 2 degree polarization skew (The intentional satellite skew +/- required skew for X-Pol isolation). Likewise decrement down to "-02" for a satellite with a total negative 2 degree polarization skew. Use of this parameter requires mechanical feed calibration for proper operation. Refer to Polang Adjustment procedure in the maintenance section of your antenna manual for detailed instructions on how to perform this calibration procedure (POL OFFSET).
	Adjustments of this parameter is required while running Cross-Pol isolation tests during the commissioning of a VSAT system (apparent skew) or is entered as an absolute satellite skew angle value (intentional) when switching between satellites.
	Press the **LEFT** or **RIGHT** arrow key to display a cursor underneath the current value. Use the **UP** or **DOWN** arrow key to increment or decrement value.
	Press **ENTER** to set the desired SKEW setting OR *Press* **NEXT** to abort and return to the main Satellite display.

NID 00<u>0</u>0 AGC 1234	Press **DOWN** or **ENTER** to access the **NID sub-menu**. This setting, a *four digit HEX* value with a valid range of 0000-FFFF, is based on the desired received transponders' Network ID (NID). If this parameter is provided in decimal format, it will have to be converted to hexadecimal for entry.
	Set the NID value to *0000* if;
	• The signal you intend to track does not contain a valid NID.
	• You do not want to use satellite identification function.
	• *You are using the external AGC input source from the satellite modem (**most commonly used in the 09 Series antennas**) which has been provided to you in your system configuration.*
	• You are experiencing a hardware/software issue which is preventing the ACU from decoding the NID and you want to temporarily disable this function.
	To manually update, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under a character. Continue to move the cursor until the desired character to be edited is underscored (selected). Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character.
	Press **ENTER** to set the desired NID *OR* Press **NEXT** to abort and return to the main Satellite display.

2.2.3.   <u>Antenna Information Menus</u>.

Display	Meaning
AZ 123.4 EL 056.7 REL 234.5 AGC 1234	Press the **NEXT** key until the ***Antenna*** main menu is displayed. This is the display of the current *Antenna* information.
	While in the antenna main menu pressing the **UP**, **DOWN**, **LEFT** or **RIGHT** arrows moves the antenna in those respective directions. Quick pres & release the desired arrow key will *step* the antenna in small individual increments. Press & Hold the desired arrow key to *slew* the antenna in rapid steps.
AZ 12<u>3</u>.4 # AGC 1234	Press **ENTER** to access the ***Azimuth sub-menu***. This allows you to target the antenna to desired Azimuth position. The current IF signal level (AGC) is displayed to assist you in manually peaking AZ for best signal level. Range of input is 000.0-359.9.
	To target a new azimuth position, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the character to the left, or right, of the decimal point respectively. Continue to move the cursor until the desired character is selected. Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character.
	Press **ENTER** to *target* the antenna to the new Azimuth position OR Press **NEXT** to abort and return to the main Antenna display.
	The number (**2**, **4**, **6 or 8**) you see periodically flashing in the lower left of the display are normal DishScan tracking signals.
EL 05<u>6</u>.7 # AGC 1234	Press **DOWN** or **ENTER** to access the ***Elevation sub-menu***. This allows you to target the antenna to a desired Elevation position. Range of input is 00.0-90.0.
	To target a new elevation position, press the **LEFT** or **RIGHT** arrow key to bring the cursor up under the character to the left, or right, of the decimal point respectively. Continue to move the cursor until the desired character is selected. Use the **UP** or **DOWN** arrow keys to increment or decrement the selected character.
	Press **ENTER** to *target* the antenna to the new elevation position OR Press **NEXT** to abort and return to the main Antenna display.
	The number (**2**, **4**, **6 or 8**) you see periodically flashing in the lower left of the display are normal DishScan tracking signals.

REL 23<u>4</u>.5 AGC 1234	Press **DOWN** or **ENTER** to access the *Relative Azimuth sub-menu*. This sub-menu displays the current Relative azimuth position of the antenna.
	If this ACU is connected to a LIMITED azimuth antenna (has cable "UNWRAP"), the value displayed here is the antenna position relative to the bow of the ship, ranging from 020.0-700.0, with 360.0 indicating when antenna is pointed in-line with the bow. UNWRAP should occur at REL 023.0 & 697.0.
	If this ACU is connected to a UNLIMITED azimuth antenna (no mechanical stops in azimuth rotation), the value displayed here is the antenna position relative to the bow of the ship, ranging from 000.0-359.9, with 000.0 indicating when antenna is pointed in-line with the bow.
	The REL position of the antenna is also used to set Radiation Hazard & Blockage Mapping points (refer to Setup chapter of your antenna manual).
POL 000<u>0</u> AGC 1234	Press **DOWN** or **ENTER** to access the *Polarization sub-menu*. Auto-Polarization is the DEFAULT method of polarization adjustment. To optimize, or manually adjust, polarization refer to the Setup and Maintenance sections of this manual
REFLECT <u>A</u> AGC 1234	Press **DOWN** or **ENTER** to access the *Reflector sub-menu*. All single reflector antenna systems must be set **ONLY** to Reflector **A**.

2.2.4. Status information menus.

Display	Meaning
SEA TEL,INC - MASTER DAC-2202 VER 6.05t	Press the **NEXT** key until the *Status* menu is displayed. This is the power-up display of the Master (ACU) and Remote (PCU) Model & Software Version(s) information.
CONTROL TRACKING OFF C	Press the **ENTER** key once to display the *Status – Control Tracking sub-menu*. This is the display of the current *Tracking and Band Selection* information.
	To turn the Tracking status On or Off, press the **Track** key, or press the **RIGHT** arrow to bring up a cursor under the current tracking condition and then Press the **UP** arrow to toggle status ON/OFF. Press **Enter** to exit the selection mode.
	To toggle the Tracking band selection, Press the **RIGHT** or **LEFT** arrow and then press the **DOWN** arrow to toggle through the list of possible BAND selections (i.e. **KuLo**, **KuHi**, **DLA or DSS**). The actual band selections available are dependent on the parameter value entered for TRACK DISP. Press **ENTER** to submit and exit the selection entry mode.
	Band selection controls the *local* logic output state of **SW1** output terminal on the 25 pin Terminal Mounting Strip PCB and if configured, *remote* C/Ku relays on the antenna pedestal. When KuHi/DSS band is selected the **SW1** output will be shorted to ground (current sink of 0.5 amps *max* or when KuLo/DLA band is selected the SW1 output is open (floating).) to control (but not limited to):
	• Band selection tone generators • Coax switches.
	If AZ Limits have been set to define a known blockage zone "**BLOCKED**" will appear in place of ON/OFF tracking status when the antenna is in the described blockage zone(s). This Tracking condition controls the *local* logic output state of **SW2** output terminal on the 25 pin Terminal Mounting Strip PCB.
	If the Antenna Pedestal, during normal operation fails to meet FCC stabilization compliance "**MUTE**" will be appear in the place of the ON/OFF tracking status Whenever in the "BLOCKED" or "MUTE" tracking condition, the **SW2** output will be shorted (or open, if SYSTEM TYPE is set to reverse this logic state) to ground, providing a current sink of 0.5 amps *max*, to control (but not limited to):

	• Below decks dual antenna coax switches
	    • TX inhibit control to a satellite modem for radiation hazard control
	    • TX mute for FCC compliance.

	To test the blockage output, press the **RIGHT** arrow key 5 times (to bring up and move the cursor to the far right). Press the **UP** arrow to simulate BLOCKED condition and short (or open, if SYSTEM TYPE is set to reverse this logic state) on SW2. Press the LEFT arrow key twice and then press the **UP** arrow key to turn the BLOCKED condition OFF and open (or short, if SYSTEM TYPE is set to reverse this logic state) on **SW2**.
CONTROL SEARCH 2 OFF	Press **DOWN** arrow or **ENTER** to access the *Control Status – Search sub menu*. This is a display of the current Search condition.
	To initiate an automated SEARCH, press the **RIGHT** arrow to bring up a cursor under the current Search status, and then press the **UP** arrow.
	To terminate a SEARCH in process, press the **RIGHT** arrow to bring up a cursor under the current Search status, and then press the **DOWN** arrow or press the **TRACK** key
	Press **Enter** to exit the Search Control mode.

STATUS ERROR LLLL RRRR	Press **DOWN** or **ENTER** to access the ***Status – Error*** menu. This is a display of errors that have been detected by the system
	LLLL - **Comms Error Count** - The first four numeric digits indicates the number of times that a Pedestal M&C communication message (between the ACU and PCU) was not received correctly. Occasional counts are acceptable but more than 10 per minute indicates a problem that needs attention (refer to Troubleshooting section).

	RRRR - **Error Code** - The second set of four numeric digits indicates the SUM of the discrete error(s) that have occurred. It does **not** indicate *how many* of a particular error have occurred.
	
	    128 Satellite Out Of Range
	    16 DishScan Pulse Error
	    8 Pedestal Error (NOTE: An error code 8 requires an additional PCU Query to determine fault type, refer to the maintenance section of this manual for further information
	    4 ACU-PCU Communication Failure
	    2 Wrong Synchro Converter Type
	    1 Gyro Read Error

	Refer to the Maintenance section of this manual for troubleshooting frequent or constant errors.
	Pressing **UP** arrow key and then the **ENTER** key clears error count, status code and extinguishes the Error LED. Refer to troubleshooting section of manual if error does not clear.
STATUS REMOTE AUX 0000	Press **DOWN** or **ENTER** to access the ***Status – Remote Aux*** menu. Diagnostic *display* of Remote auxiliary read. Typically, this display is to indicate Temperature or EIRP readings from the antenna, if properly configured to do so; otherwise, there are no operational or diagnostic uses of this sub-menu.

2.2.5. SETUP Parameter display and entry menus.

Access to system setup parameters is only required during installation or repair of your antenna system. These parameters should only be changed by an authorized service technician.

CAUTION: *Improper setting(s) of these parameters can and will cause your system not to perform properly.*

Refer to the SETUP information in the Installation section of this manual.

2.3. Tracking Operation

Tracking, which is controlled by the ACU, is fine pointing angle adjustments to the antenna pedestal to maximize the level of the satellite signal being received. You can, as described in the Status Information Menu's section of this manual, toggle Tracking ON or OFF by pressing the **Track** key regardless of what current menu or sub-menu is being displayed.

2.3.1. DishScan Operation

To control tracking this system uses a variation of Conical scanning, called DishScan, which continuously drives the antenna in a ***very*** small diameter circle (defined by DishScan Amplitude) at 60 RPM. This circle is defined in 4 "quadrants", UP, DOWN, LEFT, and RIGHT (by the DishScan Phase). The received signal is evaluated throughout each full circle rotation of the antenna, by referencing timing pulses issued by the PCU in each of the 4 quadrants (defined by DishScan Phase), to determine where the strongest signal level is and will issue the appropriate Azimuth and/or Elevation steps to the antenna, as needed, 60 times per minute towards that quadrant.

While viewing the AZIMUTH or ELEVATION sub-menu, the DishScan drive commands issued (2, 4, 6 or 8) will be visible in the lower left corner of the display. Each 2 you see flash is a command sent to step Elevation down, each 4 is a command sent to step down in Azimuth (CCW), each 6 is a command sent to step up in Azimuth (CW), each 8 is a command sent to step Elevation up.

When Tracking is turned **OFF** these commands indicate drive that is required, but will not be sent to the antenna to be carried out.

If the antenna is already perfectly pointed, the signal received (AGC) throughout each of the 4 quadrants will be equal and no tracking decision is made. If the dish is slightly mispointed, a portion of the circle movement will have higher signal level than the rest of the circle. DishScan will then issue a step in Azimuth, and/or Elevation, to move the antenna in the direction of the stronger signal. [**EXAMPLE:** If the dish is mispointed slightly to the LEFT of the satellite peak; as DishScan drives the antenna through one circle rotation it will evaluate that the signal is slightly higher to the RIGHT, therefore, a Azimuth UP (RIGHT) step will be issued to the antenna].

For proper Tracking performance, the **EL STEP SIZE**, **AZ STEP SIZE**, **STEP INTEGRAL** parameters *must* all be set to **Factory Default value of 0** and **DishScan** must be turned on. You must also correctly set the internal tracking receiver settings. Refer to the "Satellite" menu operation in the above section for adjustment instructions.

2.1.   *Searching Operation*

The ACU will initiate an automated search pattern after AGC falls below the current Threshold setting (indicates that satellite signal has been lost). The SEARCH DELAY parameter sets the amount of delay, in seconds, that the ACU will wait after AGC has fallen below the threshold value before it starts a search.

Search can be initiated manually by pressing the **NEXT** button several times to the STATUS menu, then press **ENTER** button twice to access the SEARCH sub-menu. Press the **RIGHT** arrow key and then press the **UP** arrow key (starts a search from the current antenna position). While in the SEARCH sub-menu, pressing the **DOWN** arrow key will stop the current search.

Search is terminated automatically when the AGC level exceeds the threshold value and Tracking begins.

The ACU can be configured to use one of three search patterns. Each of the search patterns are described below. Each description includes information about the settings involved in configuring the ACU to select that particular pattern and the values that those settings would be set to, to optimize the pattern for your antenna model and the frequency band being used.

The dimensions and timing of the search pattern are determined by the SETUP parameters **SEARCH INC**, **SEARCH LIMIT**, **SEARCH DELAY** and **SWEEP INC**. Search is also affected by the *Threshold* and the *internal receiver* settings under the Satellite menu.   To change any one of these parameters, refer to "Changing the Search Parameters" procedures below.

All three search patterns are conducted in a two-axis pattern consisting of alternate movements in azimuth and elevation or along the polarization angle. The size and direction of the movements are increased and reversed every other time resulting in an increasing spiral pattern as shown.

2.1.1.   <u>Default Standard (Box) Search Pattern</u>

The factory default search pattern in the ACU is a standard "box" pattern. You configure the ACU to use this pattern by using the following settings:

> **SEARCH INC** - set to the default value for the frequency band that your antenna model is currently being used for (typically 15 counts).

> **SEARCH LIMIT** – initially set to the default value. After targeting has been optimized, the search limit can be adjusted if desired.

> **SEARCH DELAY** – default, or any number of seconds from 1-255 that you would prefer that the ACU wait before starting an automatic search.

> **SWEEP INC** – default value (this parameter is not used in this search pattern).

> **GYRO TYPE** – must NOT be set to zero.

> **SAT REF** mode – may be **ON** if you are experiencing frequent, or constant, gyro read errors (error code 0001). **Must** be ON if you are using NMEA Gyro input.

Target any satellite longitude value which includes even tenths digit values (ie SAT 101.0 W or SAT 101.2 W). If the desired satellite longitude includes an odd tenths digit, you must round it up, or down, one tenth to make the tenths digit EVEN. The Antenna Control Unit calculates the Azimuth, Elevation and Polarization values it will use to target the antenna. Initially the antenna will go to a position that is 8 degrees above the calculated azimuth, until Azimuth, Elevation and Polarization have had time to complete adjustment. Then the antenna will drive down to the calculated elevation, which is the "Start" of the search pattern in the graphic below.

Then the antenna will search up in azimuth one Search Increment, search up one Search Increment in elevation, search down two Search Increments in azimuth, search down two Search Increments in elevation,

etc until Search Limit is reached. When the end of the search pattern is reached, the ACU will retarget the antenna to the start point shown in the graphic below.

If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the ACU will terminate search and go into Tracking mode. If the desired signal is not found the ACU will wait SEARCH DELAY seconds and then begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.
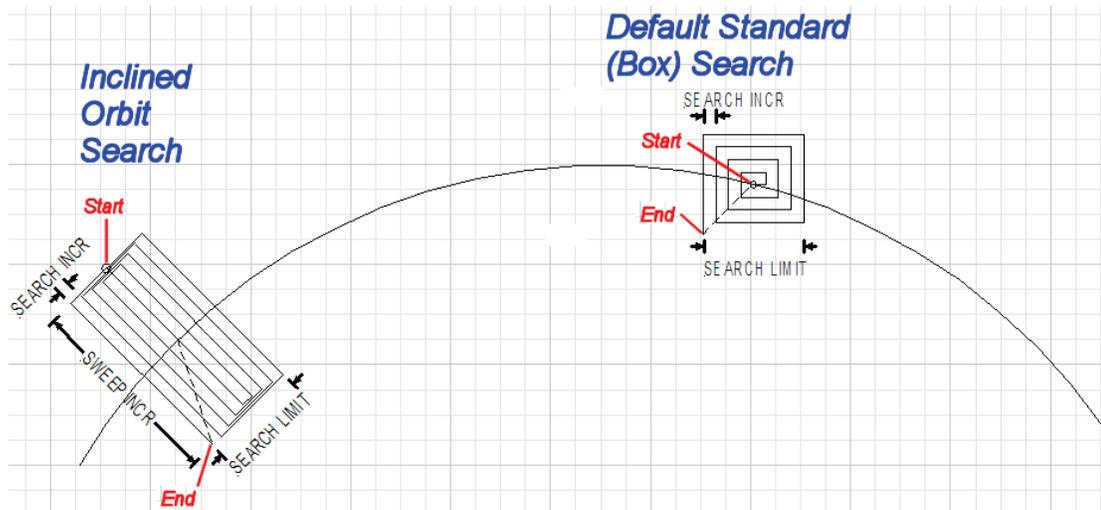
2.1.2.   Inclined Orbit Search Pattern

Some older satellites, in order to save fuel to keep them exactly positioned over the Equator, are in an inclined geosynchronous orbit. The satellite remains geosynchronous but is no longer geostationary. From a fixed observation point on Earth, it would appear to trace out a figure-eight with lobes oriented north-southward once every twenty-four hours. The north-south excursions of the satellite may be too far off the center point for a default box search pattern to find that satellite at all times during the 24 hour period.

You can configure the ACU to do a special search pattern for a satellite that is in an inclined orbit by using the following settings:

> **SEARCH INC** - set to the default value for the frequency band that your antenna model is currently being used for (typically 15 counts).

> **SEARCH LIMIT** – leave this set to the default value for your antenna model.

> **SEARCH DELAY** – default, or any number of seconds from 1-255 that you would prefer that the ACU wait before starting an automatic search.

> **SWEEP INC** – set to **192** if your antenna is a Series 04 or Series 06 or Series 09. Set to **193** if your antenna is a Series 97, Series 00 or Series 07. This parameter sets the sweep increment (shown in the graphic above) to be +/- 8.0 degrees above/below the satellite arc.

> **GYRO TYPE** – must NOT be set to zero.

> **SAT REF** mode – may be **ON** if you are experiencing frequent, or constant, gyro read errors (error code 0001). **Must** be ON if you are using NMEA Gyro input.

Target the desired satellite longitude value but include an odd tenths digit (ie if you desired to target inclined satellite 186.0 W you would key in SAT 186.1 W for the ACU to do an inclined search). The Antenna Control Unit calculates the Azimuth, Elevation and Polarization values it will use to target the antenna.

Initially the antenna will go to a calculated position that is half of SWEEP INCR degrees above, and perpendicular to, the satellite arc (along the same angle as polarization for the desired satellite). This position is the "Start" of the search pattern in the graphic above. Then the antenna will drive down along the polarization angle SWEEP INCR degrees, step one Search Increment to the right (parallel to the satellite arc), search up along the polarization angle SWEEP INCR degrees, step two Search Increments to the left, search down, etc expanding out in the search pattern until Search Limit is reached. When the end of the search pattern is reached, the ACU will retarget the antenna to the calculated Azimuth and Elevation point.

If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the ACU will terminate search and go into Tracking mode. If the desired signal is not found the ACU will wait SEARCH DELAY, then target the antenna to start point shown in the graphic above and begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

2.1.3.   No Gyro Search Pattern

If the ship does not have a gyro compass to use as heading input to the Antenna Control Unit, you may manually key in the actual heading of the vessel and then re-target the desired satellite, every time you need to re-target a satellite, or configure the ACU to do a "No Gyro Search Pattern".

You configure the ACU to use this pattern by using the following settings:

SEARCH INC - set to the default value for the frequency band that your antenna model is currently being used for (typically 15 counts).

SEARCH LIMIT – leave this set to the default value.

SEARCH DELAY – default, or any number of seconds from 1-255 that you would prefer that the ACU wait before starting an automatic search.

SWEEP INC – Larger antennas should have slower speeds and smaller antennas should have faster speeds:

> **Larger** antennas should have slower speeds set to **0047** (= 5 degrees/second) for **2.4M to 3.6M antenna systems**).

> **Mid size** antennas can be driven a little faster, set to **0063** (= 8 degrees/second) for **2M antennas models**).

> **Smaller** antennas should have faster speeds, set to **0079** (= 18 degrees/second) for **all 0.8M to 1.5M antenna models)**.

GYRO TYPE – **MUST** be set to **zero** for this search pattern.

SAT REF mode – **MUST** be **ON** for this search pattern.

Target any satellite longitude value which includes even tenths digit values (ie SAT 101.0 W or SAT 101.2 W). If the desired satellite longitude includes an odd tenths digit, you must round it up, or down, one tenth to make the tenths digit EVEN. The Antenna Control Unit calculates the Azimuth, Elevation and Polarization values it will use to target the antenna. However, without heading input, the ACU cannot target a "true azimuth" position (relative to true North). It will target the antenna to the calculated elevation and a repeatable "Start" relative azimuth position. In Series 04 antennas this relative position will be 90 degrees away from the nearest mechanical stop. In all other antennas it will be 000 degrees relative.

Initially the antenna will go to the "Start" relative azimuth position at the calculated elevation. Then the antenna will search up 450 degrees in azimuth, search up one Search Increment in elevation, search down 450 degrees in azimuth, search down two Search Increments in elevation, etc until Search Limit is reached. When the end of the search pattern is reached, the ACU will retarget the antenna back to the start point shown in the graphic below.

If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the ACU will terminate search and go into Tracking mode. If the desired signal is not found the ACU will wait SEARCH DELAY seconds and then begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.
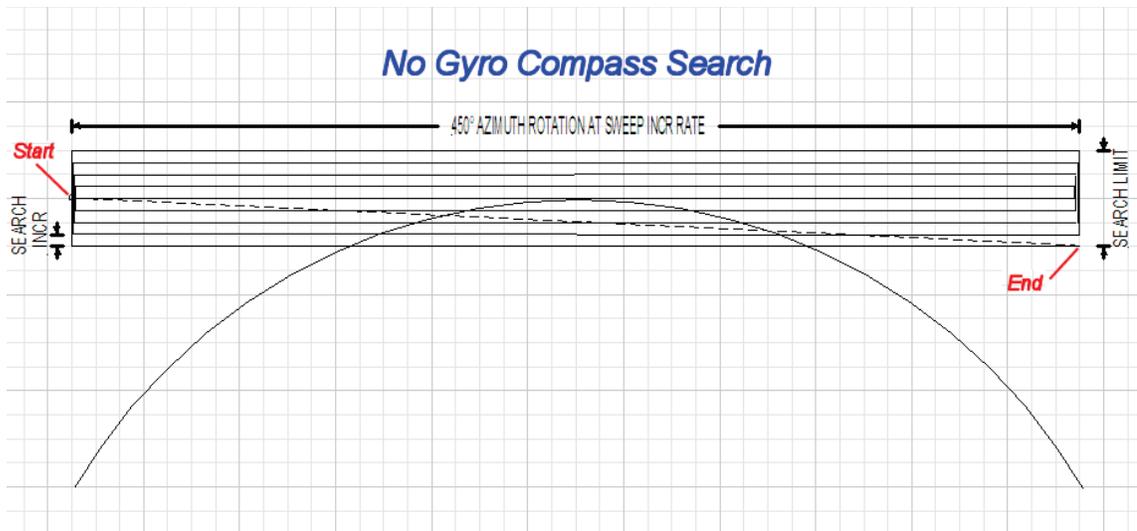
2.2.   *Auto–Polarization Operation*

If your antenna has the hardware to support it, another feature of the ACU is auto-polarization. When the Polang Type parameter set to a value of 72, the ACU automatically calculates the required polarization angle for the feed every 2 seconds based on ship's Latitude, Longitude and the Satellite Longitude. If the polarization of the feed is not properly peaked, the ACU will send a command to the PCU to drive the 24V DC motor drive on the feed to peak the polarization.

If your antenna does not have the hardware to support Auto-Polarization set Polang type to either 0 or 9.

2.3.   *Radome Assembly Operation*

When operating the system it is necessary that the radome access hatch, or door, be closed and secured in place at all times. This prevents rain, salt water and wind from entering the radome (water and excessive condensation promote rust & corrosion of the antenna pedestal and wind gusts will disturb the antenna pointing).