INSTALLATION AND OPERATION MANUAL
FOR SEA TEL MODEL
DAC-2202 ANTENNA CONTROL UNIT

⚠	**WARNING:** Antenna Pedestal **must be properly restrained (stowed)** to prevent damage to wire rope isolators, isolator springs and/or antenna pedestal mechanism during underway conditions **when power is removed from the antenna assembly.**

Look to the Leader. Look to Sea Tel.

COBHAM Antennas

Sea Tel Marine Stabilized Antenna systems are manufactured in the United States of America.

Sea Tel is an ISO 9001:2000 registered company. Certificate Number 19.2867 was issued August 12, 2005. Sea Tel was originally registered on November 09, 1998.

The DAC-2202 Antenna Control Unit (exclusively for use with Sea Tel Marine Stabilized Antenna Pedestals) complies with the requirements of European Norms and European Standards EN 60945 (1997) and prETS 300 339 (1998-03). Sea Tel European Union Declaration of Conformity for this equipment is contained in this manual.

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Marine Stabilized Antenna Systems

European Union Declaration of Conformity
Marine Navigational Equipment

The EU Directives Covered by this Declaration:

European Norms and European Standards EN 60945 (1997) and IEC 1000 (1995).

The Product Covered by this Declaration:

DAC-2200 Antenna Control Unit.

The Basis on which Conformity is being Declared:

The product identified above complies with the requirements of the above EU Directives by meeting the following standards:

* EN 60945 (1997) "Marine Navigational Equipment - General Requirements – Methods of Testing and Required Test Results":

- Conducted Emissions (Clause 9.1 & 9.2)
- Radiated Emissions (Clause 9.1 & 9.3)
- Conducted Low Frequency (Audio) Interference (Clause 10.1 &10.2)
- Conducted Radio Frequency Interference (Clause 10.3) & IEC 1000-4-6 (1995)
- Radiated Radio Frequencies (Clause 10.4) & IEC 1000-4-3 (1995)
- Fast Transients on Signal/Control Lines (Clause 10.5) & IEC 1000-4-4 (1995)
- Surges on AC Power Lines (Clause 10.6) & IEC 1000-4-5 (1995
- Power Supply Short-Term Variation (Clause 10.7)
- Power Supply Failure (Clause 10.8)
- Electrostatic Discharge (Clause 10.9) & IEC 1000-4-2 (1995
- Compass Safe Distance (Clause 11.2, Measurement Only)

The technical documentation required to demonstrate that this product meets the requirements of the EMC Directive has been compiled by the signatory below and is available for inspection by the relevant enforcement authorities. The CE mark was first applied in June 8, 2004.

Authority: Mr. J. Patrick Matthews   Signature: _____
             President   Date: _____

Attention

The specifier, purchaser, installer or user is responsible for assuring adherence to special measures and limitations which must be observed when this product is placed into service, or modified, in order to ensure its compliance with the above directives.

All other equipment used with this Antenna Control Unit, and its Marine Stabilized Antenna Pedestal, must be CE marked separately by the manufacturer of those components.

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Doc 122933-A

Revision History

REV	ECO#	Date	Description	By
A	N/A	May 23, 2007	Production release	ECM
A1	N/A	May 30, 2007	Updated Installation Text	MDN
A2	N/A	June 7, 2007	Updated Setup Text	MDN
B	N/A	July 5, 2007	Updated Text per engineering dept. feedback	ECM
C	N/A	October 3, 2007	Updated text and added text as required	ECM
D	N/A	December 12, 2007	Updated text to include SCPC functionality and internal HTML page	ECM
E	N/A	April 18, 2008	Updated text to include new search, new blockage mapping including EL Limits and added SCPC receivers	MDN

1.   Introduction

This manual describes the Sea Tel Model DAC-2202 Series of shipboard Tracking Antenna Control Units (ACU). System information, installation, setup, operating instructions, functional testing and maintenance for the ACU are also contained herein.

This ACU allows you to control the antenna that it is connected to. It also allows you to connect your Gyro Compass to provide heading input to the system for accurate targeting of satellites.

1.1.   General Description of System

The Antenna Control Unit (ACU) has been designed and manufactured so as to be inherently reliable, easy to maintain, and simple to operate. Except for start-ups, or when changing to operate with different transponders or satellites, the equipment essentially permits unattended operation.

This ACU is housed in a standard 1 Unit high, 19-inch rack mount enclosure. The front panel contains function keys used to select the desired information to be displayed, and/or changed. Data is displayed on a 2 line 20 character display. All external connections are interfaced through connectors mounted on the rear panel.

The shipboard gyrocompass input is used as the long-term azimuth reference. The ACU accepts gyro compass input from Step-By-Step OR 1:1, 36:1, 90:1 or 360:1 Synchro OR NMEA 0183 serial interface. A GPS antenna is provided on your antenna pedestal to provide Latitude and Longitude location for the system.

The ACU automatically calculates the Elevation, Azimuth and Polarization pointing angles based on the ships Latitude, Longitude and the desired Satellite Longitude position. A programmable pattern search will automatically scan the area for a desired satellite if no signal is found. These two features make locating a new satellite very easy.

The internal Satellite ID Tracking Receiver (DVB Receiver) uses received satellite signal input to keep the antenna peaked on satellite. This internal digital receiver allows you to tune it to any frequency in the 950 to 2150 MHz range for tracking a wide bandwidth satellite signal.

It is normally connected to an Antenna and other equipment to form a system. The system consists of two major groups of equipment; an above-decks group and a below-decks group. Each group is comprised of, but not limited to, the items listed below. All equipment comprising the Above Decks is incorporated inside the radome assembly and is integrated into a single operational entity. For operation, this system requires only an unobstructed line-of-sight view to the satellite, GPS Latitude & Longitude input (provided with antenna pedestal), Ship's Gyro Compass input and AC electrical power.

The following text provides a basic functional overview of the system components and component interconnection as referred to in the System Block Diagram(s) for your model antenna.

Television Receive Only (TVRO) Systems are comprised of two major sections: The Above-Decks Equipment (ADE) is comprised of the Sea Tel antenna & radome assembly which is mounted outside, on an upper deck location chosen for best satellite reception. The Below-Decks Equipment (BDE) includes the Antenna Control Unit and will have satellite receiver(s), TV set(s) and all other ancillary equipment that is mounted in various locations throughout the interior of the ship. Refer to your antenna manual for more specific configuration information.

Transmit/Receive (TXRX) Systems are also comprised of two major sections: The Above-Decks Equipment (ADE) is comprised of the Sea Tel antenna & radome assembly which is mounted outside, on an upper deck location chosen for best satellite reception. The Antenna inside the radome has Transmit & Receive RF equipment mounted on it. The Below-Decks Equipment (BDE) includes the Antenna Control Unit and will have satellite modem, multiplexer and all other ancillary communications equipment that is mounted in various locations throughout the interior of the ship. Refer to your antenna manual for more specific configuration information.

1.2.   General Scope of This Manual

This manual describes operation and installation of this Antenna Control Unit.

1.3.   Quick Overview of Contents

The information in this manual is organized into chapters; Operation, Installation, Setup, Functional Testing, Maintenance & Troubleshooting, Technical Specifications and Drawings.

2. Operation

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.

2.1. 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 most 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. 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 System Type parameter includes value 1, 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 a satellite signal is found: 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.

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.

2.2. Front Panel Layout
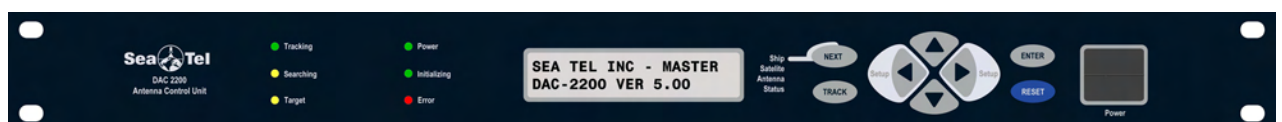
2.3.   Basic Function of Front Panel Keys

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.

2.4.   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).

ON also indicates UNWRAP in limited azimuth antennas.

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.

2.5. 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.

DAC-2202 Operation Menus
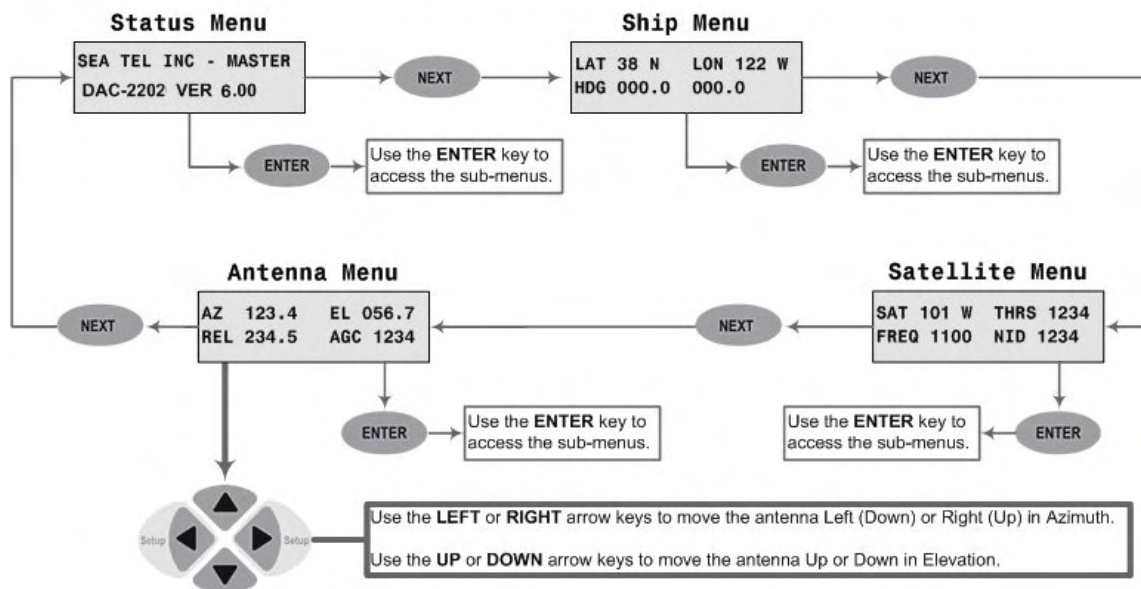
2.5.1. Ship Information Menus.

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 38.0 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 122.0 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 000.0   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).

2.5.2. <u>Satellite Information Menus.</u>

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 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 latitude 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	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".
FREQ 110<u>0</u> AGC 1234	
In SCPC Mode	In DVB Mode: **FREQ #### AGC 1234**
	In SCPC Mode: **MHz #### AGC 1234**
MHz 111<u>1</u> 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.
	Look at the label on the rear panel of your ACU to find out what receiver is has installed in it. If you ACU is 125411-1 or -2, it has the DVB receiver installed in it. 125411-3 has an L-Band SCPC receiver, 125411-4 has a 70 MHz SCPC receiver and the 125411-5 has a 140 MHz SCPC receiver.
	If your ACU has an L-Band DVB receiver you will tune FREQ to 950-2150MHz. If your ACU has an L-Band SCPC 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).
	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	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.
`Baud 20000  AGC 1234`	
In SCPC Mode	In DVB Mode: **BAUD 20000 AGC 1234**
	In SCPC Mode: **KHz #### AGC 1234**
`KHz  0999   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 3000-5000 sets the receiver to 15 MHz bandwidth. 6000-30000 sets the receiver bandwidth to 30MHz.
	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 OFF   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 HORZ   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.
NID 00<u>O</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 an external AGC input source 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.

2.5.3. Antenna Information Menus.

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 123.4` `#           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 056.7` `#           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 234.5   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 0000    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

2.5.4. <u>Status information menus.</u>

Display	Meaning
`SEA TEL,INC - MASTER` `DAC-2202 VER 6.01`	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 KuHi_ OFF	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 **LEFT** to bring up a cursor under the current band selection, and then press the **DOWN** arrow to toggle the BAND selection. The **DOWN** arrow key will toggle between C, X, KuLo or KuHi (default selections) or the display selections you have set (refer to TRACK DISP parameter). Band selection controls the ***local*** logic output state of SW1 output terminal on the Terminal Mounting Strip PCB and ***remote*** C/Ku relays (or other switches) on the antenna pedestal. When SW1 output is shorted it will provide a current sink of 0.5 amps ***max*** (to ground)to control below decks band selection tone generators or coax switches. When SW1 output is open it will be a floating ground. If AZ Limits have been set to represent relative position(s) of the antenna that are blocked from receiving satellite signal (Blockage Zone) or where transmit must be disabled to protect people who may congregate in the location of the ship (RF Radiation Hazard – ***TX/RX systems ONLY***), "**BLOCKED**" will appear at the end of the second line when the antenna is within in the described blockage/hazard zone(s) [OR is searching or targeting]. This function controls the logic output state of SW2 output terminal on the Terminal Mounting Strip PCB. When BLOCKED the SW2 output will be shorted to ground (current sink of 0.5 amps ***max***) to control below decks dual antenna coax switches or TX inhibit control to a satellite modem for radiation hazard control or TX mute for FCC compliance. To test the blockage output, press the **RIGHT** arrow key 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 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 OF<u>F</u>	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
	     64 Reserved for future use
	     32 Reserved for future use
	     16 DishScan Pulse Error
	      8 Pedestal Error
	      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 000<u>0</u>	Press **DOWN** or **ENTER** to access the ***Status – Remote Aux*** menu. Diagnostic *display* of Remote auxiliary read. This is typically used to indicate Temperature or EIRP readings from the antenna. Refer to your antenna manual.

2.5.5. <u>SETUP Parameter display and entry menus.</u>

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.

2.6. *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.

2.6.1. <u>DishScan Operation</u>

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. Both DishScan Phase timing mark and Amplitude drive are adjustable by the N7xxxx Remote Command parameter. For more information on this parameters refer to Sea Tel document 123400.

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.

2.7. 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 blow the threshold value before it starts a search.

Search can be initiated manually by pressing the **MODE** button twice to access the SEARCH sub-menu 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.

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.

2.7.1. Default Standard (Box) Search Pattern

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 10 or 20 counts).

> **SEARCH LIMIT** – initially set to the default value. After targeting has been optimized (refer to Ch 5 in your antenna manual), 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 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.
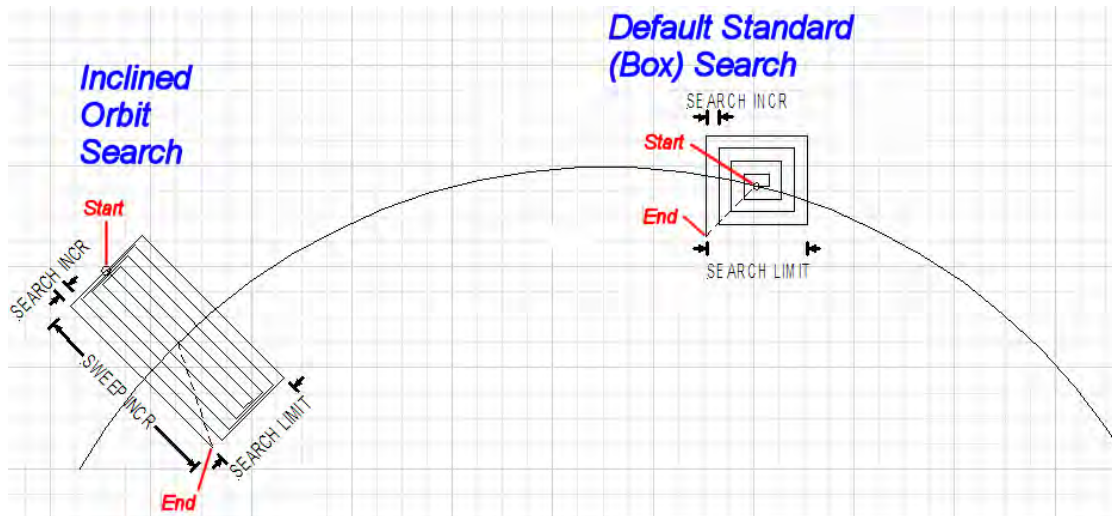
2.7.2. Inclined Orbit Search Pattern

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 10 or 20 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. 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 +/- 4.0 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 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.

2.7.3. <u>No Gyro Search Pattern</u>

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 10 or 20 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** – set to the default value for you antenna (refer to SWEEP INC paragraph in chapter 5 of this manual and FACTORY DEFAULTS in chapter 5 of your antenna manual for more information).

> **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 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.
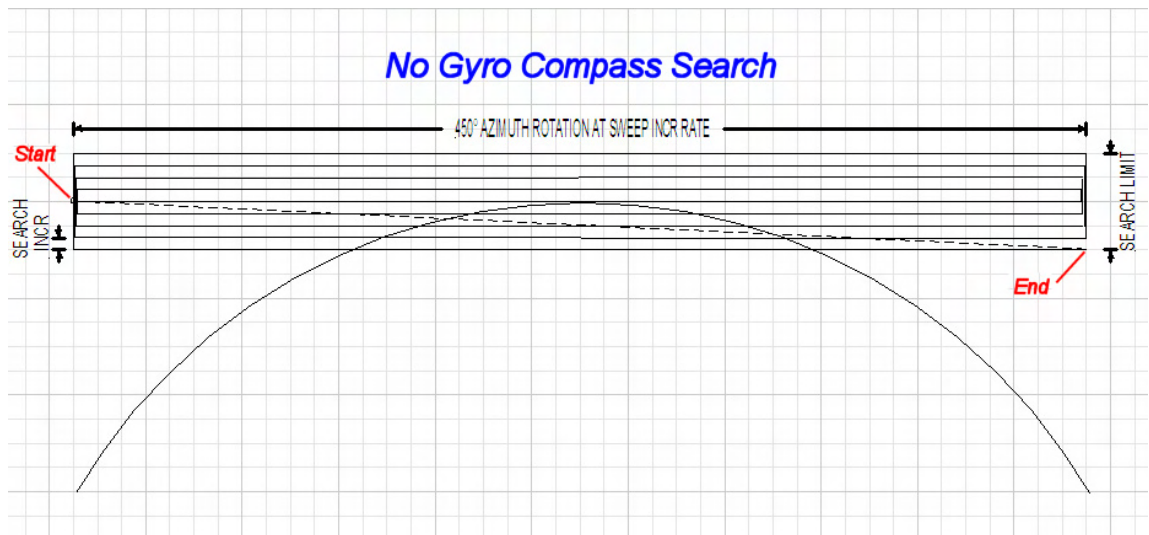
2.8. Auto-Polarization Operation

Another feature of the ACU is auto-polarization. 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.

There is no other operation required when the system is in auto-polarization mode (Polang Type 72). The system may be put into manual polarization mode for diagnostic and troubleshooting purposes (refer to your antenna manual).

2.9. 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. Wind gusts will disturb the antenna pointing.

3. Basic System Information

This section provides you with some additional information about the satellites you will be using, some basics of your satellite antenna system and other equipment within your system configuration. For more information about you specific antenna, refer to its manual.

3.1. Satellite Basics

The satellites are in orbit at an altitude of 22,754 miles (36,619 kilometers) and are positioned directly above the equator. Their orbital velocity matches the Earth's rotational speed, therefore, each appears to remain at a fixed position in the sky (as viewed from your location).

Your antenna can be used with any of the satellites in this orbit that have a strong enough receive signal level. Your antenna is capable of being fitted with a Linear or Circular feed assembly. This feed assembly may be designed to operate at, but not limited to, C-Band frequencies, Ku-Band frequencies or be capable of operation in both bands. With the correct feed assembly you will be able to receive the linear or circular signal at the specific frequency range of the desired satellite.

3.1.1. C-Band Receive Frequency (3.7-4.2GHz)

At these frequencies the signal from the satellite travels only in a straight line and is affected by weather changes in the atmosphere. There are several conditions that can cause a temporary loss of satellite signal, even within an area where the signal level is known to be adequate. The most common of these *normal* temporary losses are **blockage** and **rain fade**. They will interrupt services only as long as the cause of the loss persists.

3.1.2. Ku-Band Receive Frequency (10.95-12.75GHz)

At these frequencies the signal from the satellite travels only in a straight line and is affected by weather changes in the atmosphere. There are several conditions that can cause a temporary loss of satellite signal, even within an area where the signal level is known to be adequate. The most common of these *normal* temporary losses are **blockage** and **rain fade**. They will interrupt services only as long as the cause of the loss persists.

3.1.3. Blockage

Blockage is loss due to an object in the path of the signal from the satellite to the reflector. If an object that is large and dense and is positioned in the path of the signal from the satellite, it will prevent sufficient signal from arriving at the dish. Satellite signals can not bend around, or penetrate through, these objects and the reception will be degraded or completely interrupted. The reflector is actively driven to remain pointed at the satellite (which is generally pointed towards the equator) so, as the ship turns a mast or raised structure of your ship may become positioned between the satellite and the dish. Blockage may also be caused by anything located between the radome and the satellite, which may include but not limited to, tall mountains, buildings, bridges, cranes or other larger ships near your ship. Moving or rotating the ship to position the antenna where it has an unobstructed view to the desired satellite will restore the antennas' ability to receive the satellite signal.

3.1.4. Rain Fade

Atmospheric conditions that may cause sufficient loss of signal level include rain, snow, heavy fog and some solar activities (sun spot and flare activity).   The most common of these is referred to as "rain fade". Rain drops in the atmosphere reduce the signal from the satellite. The heavier the rain the higher the amount of signal loss. When the amount of loss is high enough, the antenna will not be able to stay locked onto the satellite signal. When the amount of rain has decreased sufficiently, the antenna will re-acquire the satellite signal. In a strong signal area, at Ku-Band rain fall of about four inches per hour will cause complete loss of signal. In weaker signal areas the effects would be more pronounced.

3.1.5. Signal level

The level of the receive signal is dependant upon how powerful the transmission is and how wide the signal beam coverage area is. Focusing the signal into a narrower beam concentrates its energy over a smaller geographic area, thereby increasing the signal level throughout that area of coverage. This makes it possible for you to use a smaller antenna size to receive that satellite signal. The antenna system must be geographically located in an area where the signal level from the satellite meets (or exceeds) the minimum satellite signal level required for your size of antenna (refer to the Specifications section of your antenna manual) to provide suitable reception. This limits the number of satellites that can be used and the geographic areas where the ship can travel where the signal level is expected to be strong enough to continue providing uninterrupted reception. When traveling outside this minimum signal coverage area, it is normal for the system to experience an interruption in its ability to provide the desired satellite services until entering (or re-entering) an area of adequate signal level.

3.1.6. Satellite Footprint Charts

The focused beam(s) from the satellites are normally aimed at the major land masses where there are large population centers. Footprint charts graphically display the signal level expected to be received in different geographic locations within the area of coverage.

You can refer to satellite footprint charts (coverage maps) in World Satellite Almanacs or on the Internet (www.SatCoDX.com or www.Lyngsat.com). Many satellites have their own web sites to provide programming and footprint information. The coverage areas are intended to be a guide to reception, however, the actual coverage area and signal level may vary. Also the signal strength is affected by weather.

To use these footprint charts you will need to know the minimum EIRP signal level required for your antenna (refer to the Specifications section of your antenna manual).

3.1.7. Linear Satellite polarization

Satellites may transmit their signals in one of two different polarization modes. The feed installed on your antenna must be designed to operate with linear polarized satellite transmissions.

Circular polarized satellite transmissions do not require polarization adjustment to optimize the reception.

Figure 3-1 Satellite Signal Polarization

Linear polarized satellite transmissions require periodic adjustment of "polarization" while the ship is in transit to optimize the alignment of the LNB to the angle of the signal from the satellite.

When you are at the same longitude as the satellite, its' horizontal and vertical signals will be aligned to your local horizon. When you are east or west of the satellite, the signals will appear to be rotated clockwise or counter-clockwise from your local horizontal and vertical. Both horizontal and vertical signals from a satellite will appear to be rotated the same amount and are always perpendicular to each other. The amount of rotation is dependent on how far east or west you are form the satellite and how close you are to the Equator.

3.2. *Antenna Basics*

The following information is provided to explain some of the basic functions of the antenna:

3.2.1. Stabilization

The Sea Tel antennas are stabilized in all three axes of motion. **Stabilization** is the process of de-coupling the ships' motion from the antenna. Simply put, this allows the antenna to remain pointed at the satellite while the boat turns, rolls or pitches under it. To accomplish this, the **P**edestal **C**ontrol **U**nit (PCU), along with multiple sensors mounted on the antenna pedestal assembly senses the motion and applies drive to the appropriate motor(s) in opposition to the sensed motion. Azimuth (AZ), Elevation (EL) and Cross-Level (left-right tilt) are actively *stabilized* automatically by the PCU as part of its normal operation.

3.2.2. Azimuth

The CW / CCW rotation of the antenna is known as Azimuth. Azimuth drive, provided by the azimuth motor, is required during stabilization, searching, tracking, and unwrap operations of the antenna. When the boat turns, azimuth is driven in the opposite direction to remain pointed at the satellite. The actual azimuth pointing angle to the satellite is determined by your latitude, longitude, Heading and the longitude of the satellite. It is important to know that in normal operation on a satellite, or when trying to acquire a satellite, the antenna should be pointed generally toward the equator.

In the Northern Hemisphere, the azimuth angle to the satellite will be 180 degrees **true** (relative to true north) if the satellite is at the same longitude that you are on. If the satellite is east, or west, of your longitude the azimuth will be less than, or greater than 180 degrees respectively.

When checking for blockage you can visually look over the antenna radome toward the equator to see if any objects are in line of site between the antenna and the satellite. If you are not able to find any satellites it may also be useful to remove the radome top to see if the dish is aimed in the correct direction (towards the equator).

3.2.3. Elevation

The antenna can be driven in elevation from 0 degrees (horizon) to 90 degrees (zenith). Elevation drive, provided by the elevation motor, is required during stabilization, searching and tracking operations of the antenna. The actual elevation pointing angle to the satellite is determined by your latitude & longitude and the longitude of the satellite. In general, the elevation angle will be low when you are at high latitudes and will increase as you get closer to the equator.

Refer to figure 3-1 above and note that from any given latitude, the elevation will be highest when the satellite is at the same longitude that you are on. If the satellite is east, or west, of your longitude the elevation angle will be lower.

3.2.4. <u>Antenna polarization</u>

If you have a circular polarization LNB installed, you do not need to adjust the "polarization" of the antenna. If you have a linear polarization LNB installed, the system should have been adjusted properly and set-up in Auto-Polarization mode. Auto-Polarization makes small polarization adjustments periodically as the boat changes geographic locations by a significant amount of latitude and longitude. It also adjusts the polarization of the feed when changing from one satellite to another.
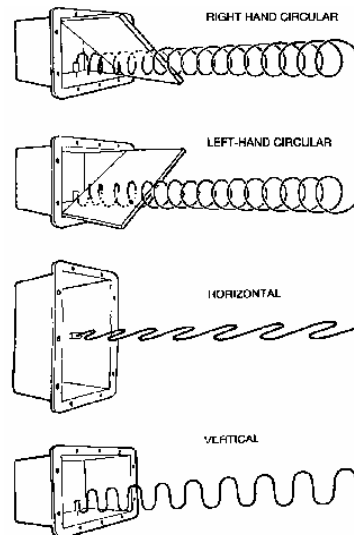
Figure 3-2 Circular and Linear Polarization

Once polarization adjustment has been optimized, it is NOT necessary to readjust it as long as the boat remains in the same geographic area and stays on the same satellite.

3.2.5. <u>Tracking Receivers</u>

Satellite Identification Receiver - The Satellite Identification Receiver located in the Antenna Control Unit (ACU) is used to acquire, identify and track a specific satellite by its unique hexadecimal ID code. When properly setup, the settings for the satellite are saved to expedite future acquisition of the desired satellite.

When searching for the selected satellite this receiver compares the programmed satellite ID to the received satellite ID code. If the ID code does not match the antenna will continue searching until the correct satellite ID is found. The system must have adequate satellite signal level (on the frequency you are tuned to and at the baud rate & FEC rate you have the receiver set to), AND the matching NID, to stop searching (and begin tracking the desired satellite).

If you have the optional Touch Screen Controller (TSC-10) you can setup multiple "favorite satellites" and subsequently switch to different "favorite" satellite in two touches on the screen.

3.2.6. <u>Tracking</u>

The ACU actively optimizes the pointing of the dish for maximum signal reception. This process is called **tracking** and is accomplished by continuously making small movements of the dish while monitoring the level of the received signal. Evaluation of this information is used to continuously make minor pointing corrections to keep the signal level "peaked" as part of normal operation.

3.3. Components of the System Configuration

The following text provides a basic functional overview of the system components and component interconnection as referred to in the System Block Diagram for your model antenna.

Television Receive Only (TVRO) Systems are comprised of two major sections: The Above-Decks Equipment (ADE) is comprised of the Sea Tel antenna & radome assembly which is mounted outside, on

an upper deck location chosen for best satellite reception. The Below-Decks Equipment (BDE) comprises of an Antenna Control Unit and will have satellite receiver(s), TV set(s) and all other ancillary equipment that is mounted in various locations throughout the interior of the ship.

Transmit/Receive (TXRX) Systems are also comprised of two major sections: The Above-Decks Equipment (ADE) is comprised of the Sea Tel antenna & radome assembly which is mounted outside, on an upper deck location chosen for best satellite reception. Transmit & Receive RF equipment will be mounted on the Antenna pedestal inside the radome. The Below-Decks Equipment (BDE) comprises of an Antenna Control Unit, a satellite modem, Multiplexer and all other ancillary communications equipment mounted in various locations throughout the interior of the ship.

3.3.1. <u>Antenna ADE Assembly</u>

Refer to your Antenna manual for specific information about your antenna, radome and interconnecting cables.

3.3.2. <u>Antenna Control Unit</u>

The Antenna Control Unit allows the operator to control and monitor the antenna pedestal with dedicated function buttons, LED's and a 2 line display. The ACU and its Terminal Mounting Strip are normally mounted in a standard 19" equipment rack. The ACU should be mounted in the front of the equipment rack where it is easily accessible. The Terminal Mounting Strip is normally mounted on the rear of the equipment rack. It is recommended that the antenna control panel be mounted near one of the Satellite Receiver locations where you can see the television screen while you are controlling the antenna.

The Antenna Control Unit is connected to the antenna, ships Gyro Compass and to the *optional* Touch Screen Controller.

Figure 3-3 DAC-2202 Antenna Control Unit

3.3.3. <u>Below Decks AC Power Supply</u>

AC Voltage - An appropriate source of AC Voltage (110 VAC 60 Hz OR 220 VAC 50 Hz) will also be required for all of the below decks equipment. The AC voltage source should be conditioned and surge protected. Uninterrupted Power Supplies are frequently installed to provide power for the below decks equipment, and in some cases it supplies the above decks equipment too. Refer to the Specifications section of this manual for the power consumption of the ACU. Refer to the manuals for your other below decks equipments for voltage and power consumption of each of these devices. Total power consumption will depend on the number of components connected to this power source.

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4. Installation

Below are basic steps to guide you in installing this equipment, but you may choose to complete installation steps in a different order. Read this complete section before starting.

The following instructions describe the installation procedures for installing the Antenna Control Unit.

The installation procedures for the Antenna Pedestal (ADE) is outlined in the Pedestal Installation and Operation manual

4.1. General Cautions & Warnings

*CAUTION - **Electrical Shock Potentials exist on the Gyro Compass output lines.** Assure that the Gyro Compass output is turned **OFF** when handling and connecting wiring to the Terminal Mounting Strip.*

*CAUTION - Allow only an **authorized dealer** to install or service the your Sea Tel System components. Unauthorized installation or service can be dangerous and may invalidate the warranty.*

4.2. Site Survey

Find the best location for the ACU and other Below Decks Equipment. Assure that each piece of equipment is properly mounted. They should have sufficient cable to pull the equipment out of its mounting location and disconnect the cables attached to it. There should be plenty of air space between units to allow heat to vent off of the equipment. If the mounting location is a closed space, assure that the equipment will not be damaged by trapped heat, install vents and/or fans to evacuate the heat. Refer to the Specifications of the equipment installed for acceptable operating temperature.

4.3. Preparing For The Installation

Always prepare for the installation before you actually start.

4.3.1. Unpack Shipping Crates and Inspect / Inventory

Unpack the crates. Inspect everything to assure that all materials have been received and are in good condition.

4.3.2. Preparing BDE Location

Prepare the Rack (or other location) for the ACU, Terminal Mounting Strip and base multiplexer panel. Prepare the mounting locations for the other Below Decks Equipment throughout ship.

4.3.3. Read the Installation Information

Read the Installation section of the ACU and Antenna Pedestal manuals to be familiar with the installation before attempting.

4.3.4. Plan The Install

Plan your installation. You may wish to follow a different order of installation steps than is outlined in this manual.

4.3.5.   The Installing Cables

Installing appropriate cables from location to location. Refer to the System Block Diagram in your Antenna manual.

4.4.   Install the ACU

Install the ACU in the front of the standard 19″ equipment rack or other suitable location.

4.5.   Install the Terminal Mounting Strip (TMS)

Install the TMS in the rear of the standard 19″ equipment rack or other suitable location.

Connect the TMS to the ACU.

1. Connect the 25 pin ribbon cable from the Terminal Mounting Strip to J1 "Ships Gyro" DB25 on the rear panel of the ACU.
2. Connect the 9 pin ribbon cable (or NMEA serial cable) from the Terminal Mounting Strip to J2 "NMEA" DB9 on the rear panel of the ACU.

Figure 4-1 Rear Panel DAC-2202 ACU

4.6.   Install the Base Multiplexer Panel

If your antenna system includes a base multiplexer panel, install the panel in the rear of the standard 19″ equipment rack or other suitable location.

4.7.   Terminal Mounting Strip (TMS) Connections

There are several functional connections that may be made on the TMS connectors. Although you may not need to make all of these connections, they are listed here for clarification during the installation process. Connect the 9 pin ribbon cable from this PCB to J2 "NMEA" DB9 on the rear panel of the ACU. Connect the 25 pin ribbon cable from this PCB to J1 "Ship Gyro" DB25 on the rear panel of the ACU.

> ⚠️ ***CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip. DO NOT HOTPLUG THIS CONNECTION***

TS1 Control Interface Connections.

SW2 - The ***Blockage/TX Mute*** Control output is driven by Blockage and RF Radiation Hazard functions. This output will short to ground whenever the antenna is within the programmed AZ LIMIT zone(s) or is Searching, Targeting, Unwrapping or is mispointed 0.5 degrees from satellite peak. This output is commonly used to (but not limited to:

- Drive a Dual or Quad Antenna Arbitrator coax switches in dual antenna configurations. The coax switches select which antenna is feeding signal to the below decks equipment.
- Mute the Transmit output of the Satellite Modem used in TX/RX antenna configurations when the antenna is
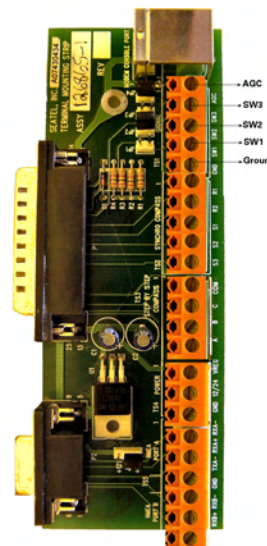
positioned where people may be harmed by the transmit power emanating from the antenna (RF Radiation Hazard).

- Mute the Transmit output of the Satellite Modem used in TX/RX antenna configurations when the antenna is mispointed by 0.5 degrees, or more, and keep it muted until the antenna has been within 0.2 degrees of peak pointing to the satellite for a minimum of 5 seconds (FCC part 25.221 & 25.222 TX Mute requirement).

SW1 - **Band Selection control output**. This output is used to control below decks tone generator(s), or coax switch(s), for band selection functions. The band selection control output is driven by the band selected in the MODE – TRACKING display.

- Tone generators are used to provide a 22 kHz tone, tone ON when hi band is desired and tone OFF selects low band. The tone generators are commonly used to provide band control of an Americas LNB or Port (Band) selection of a 5 input multi-switch.
- Coax switches might be used to select which signals are to be routed to the matrix switch.

AGC & GND - **External AGC, or Modem Lock, input**.

- External AGC input to the DAC-2202 must be 0 to 15 Volts DC analog signal, positive going voltage proportional to satellite signal input level and must be real-time in its response to antenna pointing.
- External Modem Lock from a satellite modem is used as a positive ID that the antenna is on the desired satellite. **This input is NOT used for Tracking purposes**, it is only used for satellite identification to acquire the correct satellite during search. To enable the external modem input you must include a 2 in the SYSTEM TYPE parameter (If your system type is presently 76 or 77, then change it to 78 or 79) and **NID MUST be set to 0000**.

  - **Connections**   The modem lock signal connects to EXT AGC and a ground reference from the modem. The expected signal from the modem allows 0VDC to +15VDC. Low voltage indicates modem lock, high voltage indicates modem unlock.

  - **Testing**   The input connections from the modem can be tested by selecting the external AGC input and monitoring the displayed value. To select external AGC, set the tuning frequency to 0000. Normally, AGC readings below 2048 are considered a low condition and indicate modem lock and AGC readings above 2048 are considered a high condition and indicate modem unlock. ***[If you find the AGC reading for locked and unlocked conditions to be reversed you must add 128 to your current SYSTEM TYPE parameter].*** Turn tracking OFF when checking the external AGC inputs. Be sure to properly retune the receiver frequency when you are finished testing the external input.

  - **Operation** - In *NORMAL* operation, AGC must be above Threshold AND external MODEM Lock input must be locked to Track the satellite. If you are tracking a satellite signal and the AGC is above threshold (Tracking light on solid) but the external AGC signal rises above 2.5 volts for more than 20 seconds (external MODEM input **UNLOCKED**) the ACU will automatically retarget the selected satellite.

TS2 Synchro Gyro Compass Input. Use the R1, R2, S1,S2 and S3 screw terminals to connect the Synchro Gyro Compass to the ACU.

TS3 Step-By-Step (SBS) Gyrocompass Input. Use the COM, A, B and C screw terminals to connect the SBS Gyrocompass to the ACU. Some SBS Gyro distribution boxes have terminals which are labeled S1, S2 & S3 instead of A, B and C.

TS4 Power

- **VREG** Screw terminal is used to provide a regulated DC operating voltage to ancillary equipment. Voltage out is dependant upon which terminal mounting strip assembly is provided. 126865-1 supplies 8Vdc @ 1Amp, while the 126865-2 assembly supplies 5Vdc @ 2Amps.

- **GND** Screw terminal is the ground reference for the regulated and unregulated power terminals.

- **12/24** Screw terminal is commonly used to provide operating voltage to a external GPS, Dual Antenna Arbitrator or other below decks tone generators or switches. Voltage output is based on the T.M.S assemblies JP5 jumper settings.

TBS5 NMEA A/B, GPS output.

- *RxA- and RxA+-* screw terminals, which are defined as the NMEA A connection is used to connect to the ships Gyro Compass (Heading). The NMEA0183 compliant inputs are then connected via a 9 pin ribbon cable to the ACU's J2 NMEA communications port. A GPS (Latitude and Longitude) input may also be connected, but is not required because there is a GPS device already installed in your antenna..

- *RxB- and RxB+* screw terminals, which are defined as the NMEA B connection is used to connect to the ships Gyro Compass (Heading). The NMEA0183 compliant inputs are then connected via a 9 pin ribbon cable to the ACU's J2 NMEA communications port. A GPS (Latitude and Longitude) input may also be connected, but is not required because there is a GPS device already installed in your antenna.

- *TxA-* screw terminal is used to provide a Pseudo GPS (xxGGA format) to other system components such as a Satellite Modem.

4.8. AC Power To The ACU

Assure Power switch on the front panel of the ACU is turned OFF. Connect AC Power cord to the ACU and to the AC Power outlet. It is recommended that a UPS be installed.

4.9. AGC Tracking Connection

Connect the IF Coax from one of the available outlets on the FSK Modem, splitter or matrix switch to "RF IN" jack on the rear panel of the ACU.

For external AGC, connect a cable between the AGC or TM output of the master receiver or modem and the terminals labeled "AGC" and " GND" on TS1 of the Terminal Mounting Strip.

4.10. Monitor And Control Connections

- **J2 NMEA** - The NMEA Port allows 2 simultaneous NMEA-0183 input connections on the same DB9 connector, defined as NMEA A and NMEA B. Both ports have selectable baud rates independent of each other. In addition, NMEA A Tx- Line (J2- Pin 3) outputs a pseudo NMEA string (GGA format) which can be connected to an external device, such as a satellite modem, to provide Latitude and Longitude position.

- **J3 M&C** - The Monitor and Control port allows external control from a PC using a communications program such as Sea Tel ProgTerm or DacRemP via a straight 9 wire serial cable. This Port is used in conjunction with a diagnostic software connection to configure all communications settings, and/or for an **Authorized Sea Tel Dealer** to perform software uploads to the PCU, ACU Main PCB, and DVB Receiver.
- **Ethernet** - The Ethernet Port allows use of a LAN connection to login into the ACU's internal webpage's to view or change system parameters using a web browser such as Internet Explorer or Mozilla Firefox and a standard CAT5 Ethernet patch cable. This 10BaseT Ethernet Port has a configurable static IP address with 2 TCP/IP connections for diagnostic software connections and a UPD Port for an **Authorized Sea Tel Dealer** to perform a software upload to the Comm IF Module.

4.11. Install Other BDE Equipment

Install and connect the other below decks equipment as required.

4.12. Final Checks

4.12.1. Visual/Electrical inspection

Do a visual inspection of your work to assure that everything is properly connected and all cables and wires secure.

4.13. Power-Up

Refer to the Antenna and Touch Screen Controller to complete installation of those items **BEFORE** turning the ACU Power ON.

When all equipment has been installed, turn ACU Power ON. If the ACU does not provide power to the antenna, turn antenna power ON. The ACU will initially display "SEA TEL – MASTER and DAC-2202 VER 6.xx". If the Antenna is energized, approx. 10 seconds later the display will change to "SEA TEL – REMOTE and INITIALIZING". After initialization, the bottom line of the remote display will display the antenna model number and the software version from the PCU.

Energize and check the other Below Decks Equipment to verify that all the equipment is operating. You will need to assure that the ACU is setup correctly and that the antenna acquires the correct satellite before you will be able to completely check all the satellite receivers for proper operation.

4.14. Setup

If your system includes the Touch Screen Controller, refer to the Setup chapter in the TSC-10 manual to setup the ACU. If not, refer to the Setup instructions in the next section of this manual to assure that the ACU settings and parameters are set correctly for your desired satellite.

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5. Setup

Below are basic steps to guide you in setting up the ACU. Assure that the Antenna Pedestal (ADE) has been properly installed.

If your system includes the OPTIONAL Touch Screen Controller, refer to the Operation & Setup chapters in the TSC-10 manual to setup the ACU.

5.1. Operator Settings

Refer to the Operation chapter of this manual to set the Ship information. Latitude and Longitude should automatically update when the GPS engine mounted on the antenna pedestal triangulates an accurate location, but you may enter this information manually to begin. Except when integrating NMEA-0183 Gyro source, you will have to enter the initial Heading of the ship, subsequently the ACU will then increment/decrement as the Gyro Compass updates.

Next, set the Satellite information. Longitude of the desired satellite you wish to use and the receiver settings for it are especially important.

At this point you should be able to target the desired satellite. Continue with the setup steps below to optimize the parameters for your installation.

5.2. Default Setup Parameters For Your Antenna

Refer to the Setup section of your antenna manual for the Default Setup Parameters which were entered into your ACU at the Factory. When your system was installed, your dealer will have changed some of these parameters so that the ACU will read your Gyro compass input properly, optimize azimuth and elevation targeting, optimize polarization and to assure that Tracking is in DishScan mode. In normal operation you should **NOT** need to change these parameters.

CAUTION: Improper setting of these parameters will cause your system to not perform properly.

If you need to set, or change, a parameter refer to the Flow-Charts and individual parameter setting information below to optimize you settings.

5.3. SETUP Parameter display and entry menus.

 Press and hold BOTH the LEFT and the RIGHT arrow keys **for 6 seconds** to access to the system setup parameters (at the **EL TRIM** selection). **Press** BOTH the LEFT and the RIGHT arrow keys **momentarily** to access to the **SAVE NEW PARAMETERS** parameter.

Access is only required after installation or repairs of your antenna system. These parameters should only be changed by an authorized service technician.

CAUTION: Improper setting of these parameters will cause your system to not perform properly. Also refer to the SETUP section of your Antenna manual.

5.4. EL TRIM

Elevation trim offset parameter is entered in tenths of degrees. Adjusts display to correct for antenna alignment errors or imbalances in the antenna system. Increase number to increase display. Refer to "Optimizing Targeting" in the Setup section of your antenna manual.

To update: While in the EL TRIM sub-menu, press the LEFT arrow key to bring the cursor under the ones digit. Press the UP or DOWN arrow key to increment or decrement the selected digit. Minus values are entered by decrementing below zero. Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

Continue with Azimuth trim, then re-target the satellite several times to verify that targeting is now driving the antenna to a position that is within +/- 1.0 degrees of where the satellite signal is located.

5.5. AZ TRIM

Azimuth trim offset parameter is entered in tenths of degrees. Offsets true azimuth angle display to compensate for installation alignment errors when used with Ships Gyro Compass input reference. **Azimuth Trim does not affect REL azimuth reading**. Increase number to increase displayed value. Refer to "Optimizing Targeting" in the Setup section of your antenna manual.

To update: While in the AZ TRIM sub-menu, press the LEFT arrow key to bring the cursor under the ones digit. Press the UP or DOWN arrow key to increment or decrement the selected digit. Minus values are entered by decrementing below zero. Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

Then re-target the satellite several times to verify that targeting is now driving the antenna to a position that is within +/- 1.0 degrees of where the satellite signal is located.

5.6. AUTO THRES

Sets offset of AGC tracking threshold above the average noise floor. Units are in A/D counts, approximately 20 counts/dB. A setting of 0 disables auto threshold, therefore, the operator would have to manually enter a threshold value.

When AUTO THRESHOLD is enabled, the ACU automatically re-sets the AGC tracking threshold whenever the antenna Targets (AZ, EL or SAT), Searches or Unwraps. The new AGC threshold is set to the average signal level input (approximate background noise level) *plus* the AUTO THRES offset value. EXAMPLE: If the Noise Floor off satellite is 1000 counts of AGC and Auto Threshold is set to 100, Threshold will be set to approximately 1100 after the antenna has finished targeting, Searching or Unwrapping. If you wish to change this parameter, refer to the Setup Flowchart to key in and save the desired value.

To change the Automatic Threshold value *OR* manually set threshold; Note the Peak "on satellite" AGC value, move EL and note the "off satellite" (Noise Floor) AGC value. Calculate the *Difference* between Peak AGC and Noise Floor AGC. AUTO THRES should be set to 1/3 (to ½) of the *Difference.* This will usually be around 100 counts (3 dB) for a typical antenna configuration. Changes to this parameter may be required based on carrier tracking frequency, possible adjacent satellite, or ambient interference with desired satellite.

To manually update, press the LEFT arrow key to bring the cursor up under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.7.   EL STEP SIZE

Sets elevation sensitivity for *DishScan Tracking Mode*. Units are in pedestal step resolution. For proper DishScan operation this parameter **must** be set to **factory default value of 0000**. If not already set to the correct value for your antenna, key in the value and press ENTER.

To manually update, press the LEFT arrow key to bring the cursor up under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.8.   AZ STEP SIZE

Sets azimuth sensitivity for *DishScan Tracking Mode*. Units are in pedestal step resolution. For proper DishScan operation this parameter **must** be set to **factory default value of 0000**. If not already set to the correct value for your antenna, key in the value and press ENTER.

To manually update, press the LEFT arrow key to bring the cursor up under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.9.   STEP INTEGRAL

Sets the integration time for *Tracking Mode*. Units are in processor timing cycles and should be left at your antennas' default value of 0000 for *DishScan Tracking Mode*. Refer to your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.10.   SEARCH INC

Sets size of search pattern increment. Units are in pedestal step resolution. The suggested setting is equal to 1/2 the 3dB beamwidth of your antenna. Refer to your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.11.   SEARCH LIMIT

Sets the overall peak to peak size of the search pattern. Units are in pedestal step resolution. After you have optimized your Targeting (TRIM settings above) and have verified that you are able to accurately Target you may wish to reduce the size of the Search pattern to avoid Tracking on an adjacent satellite (ie set to 50% of its default value to only search half as far from your targeted position). Refer to your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.12. SWEEP INC

This parameter should be set for the desired azimuth sweep speed of a No Gyro search or the Sweep Increment dimension of an Inclined Orbit search (refer to the search pattern information in paragraph 2.7).

When the GYRO TYPE parameter is 0000 the ACU is in "No Gyro" mode (no heading input is available for the ACU). A SWEEP INC setting of 0040 = 9 degrees/second, 0060 = 13 degrees/second or 0080 = 18 degrees/second. Larger antennas should have slower speeds and smaller antennas should have faster speeds. Refer to your antenna manual for factory default setting for your antenna. If Gyro Type is set to 0000, you must set SWEEP INC correctly and SATELLITE REFERENCE MODE **MUST** also be turned **ON**.

If you want the ACU to conduct an Inclined Orbit search pattern you must set SWEEP INC to 192 if your antenna is a Series 04 or Series 06. Set to 193 if your antenna is a Series 97, Series 00 or Series 07. This parameter sets the sweep increment dimension of the search pattern.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.13. SYSTEM TYPE

Selects system options according to the following table. Add together all the desired options to determine the proper entry. Refer to your antenna manual.

128	Reverse External Modem Lock input polarity (logic hi = lock)
64	Enables LNB voltage output
32	Display Relative in the Azimuth entry display
16	Reverse blockage output logic (SW2 logic hi = blocked)
8	-- Reserved --
4	Auto SAT load after SEARCH failure
2	Enable External Modem Lock Input (logic low = lock)
1	Auto SAT load on "hot" RESET and ACU Power-Up

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.14. GYRO TYPE

Selects the type of gyro compass interface for ship turning compensation.

362	for 360:1 Synchro with S/D Converter
360	for 360:1 Synchro with SBS Converter
90	for 90:1 Synchro with S/D Converter
36	for 36:1 Synchro with S/D Converter
2	for Step-By-Step gyro or NMEA gyro
1	for 1:1 Synchro with S/D Converter
0	for No Gyro linear AZ Search Mode (No Heading input available)

If Gyro Type will be set to 0000, you must set SWEEP INC correctly and SATELLITE REFERENCE MODE **MUST** also be turned **ON**.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.15. POLANG TYPE

Default setting is 0072 for Auto-Polarization mode. This automatically adjusts the polarization of the feed by calculating the required polarization angle for the feed every 2 seconds based on ship's Latitude, Longitude and the Satellite Longitude. If the feed is not properly oriented, the ACU will send a command to the PCU to adjust the feed. The system will function with all 24V DC motor driven feeds assemblies.

Set to 0009 (Manual Polarization) for troubleshooting or polarization alignment purposes OR if you desire to manually adjust the polarization of the feed as the ship travels. Refer to your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.16. POL OFFSET

CCW 24V Polang pot position reference. May be incremented to adjust polarization while in Auto-Pol mode to optimize cross-pol isolation. Each increment equals one degree of polarization rotation (0038 = +8 degrees), decrement below 30 for minus polarization (0022 = -8 degrees). Refer to Optimizing Auto-Polarization in the setup section of your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.17. POL SCALE

90 degree 24V Polang pot motion scale factor. Leave at factory default (0090).

5.18. Radiation Hazard and Blockage Mapping (AZ LIMIT parameters)

The ACU can be programmed with relative azimuth sectors (zones) where blockage exists or where transmit power would endanger personnel who are frequently in that area. Your ACU software may allow you to set four zones or it may only three zones and include +5 volt polarization.

When the AZ LIMIT parameters are set to create these *ZONES,* up to four, several things happen when the antenna is within one of the zones:

3. Tracking continues as long as the AGC value is greater than the Threshold value. When the AGC value drops below Threshold, the antenna will wait "Search Delay" parameter amount of time and then re-target the satellite you targeted last (if 4 value is included in SYSTEM TYPE). Timeout and re-target will continue until the satellite is re-acquired and tracking can resume.

4. "BLOCKED" will be displayed in the TRACKING window wherever the antenna is inside one of the zones.

5. A contact closure to ground (or an open if the blockage logic is reversed – See SYSTEM TYPE 16 value) is provided on the SW2 terminal of the Terminal Mounting Strip. This Switch output provides a "Blocked", "RF Radiation Hazard" or "FCC TX Mute" logic output. When the antenna exits the zone it will be on satellite, tracking and the SW2 logic contact closure will open.

The lower and upper limits are user programmable and are stored in NVRAM within the ACU parameter list.

AZ LIMIT 1 is the Lower Relative AZ limit (this is the more counter-clockwise of the two points, even if it is numerically larger). AZ LIMIT 2 is the Upper Relative AZ limit (the more clockwise of the two points) for pattern mapping of ZONE 1. Enter the elevation value that represents the top of the blockage between the two azimuth limit points in the EL LIMIT 12 parameter.

AZ LIMIT 3 is the Lower Relative AZ limit (CCW point) and AZ LIMIT 4 is the Upper Relative AZ limit (CW point) for pattern mapping of ZONE 2. Enter the elevation value that represents the top of the blockage between the two azimuth limit points in the EL LIMIT 34 parameter.

AZ LIMIT 5 is the Lower Relative AZ limit (CCW point) and AZ LIMIT 6 is the Upper Relative AZ limit (CW point) for pattern mapping of ZONE 3. Enter the elevation value that represents the top of the blockage between the two azimuth limit points in the EL LIMIT 56 parameter.

AZ LIMIT 7 is the Lower Relative AZ limit (CCW point) and AZ LIMIT 8 is the Upper Relative AZ limit (CW point) for pattern mapping of ZONE 4. Enter the elevation value that represents the top of the blockage between the two azimuth limit points in the EL LIMIT 78 parameter. If your ACU software includes 5 volt polarization you will not see these AZ & EL LIMIT parameters.

> **CAUTION:** The **Lower** Relative AZ limit is the more **counter-clockwise** of the two points (even if it is numerically larger) and the **Upper** Relative AZ limit is the more clockwise of the two points. If you enter the two relative points incorrectly, Tracking and Searching will be adversely affected.

The ACU provides a contact closure to ground on the SW2 terminal of the Terminal Mounting Strip when the antenna is pointed within any one of the blockage/hazard zones or the system is searching, targeting, unwrapping or is mis-pointed by 0.5 degrees or more (FCC TX Mute function for Transmit/Receive systems **only**). The contact closure is a transistor switch with a current sinking capability of 0.5 Amp. Pressing the 5 key when the TRACKING window is selected can **simulate** a manual BLOCKED condition to test SW2 logic output. UP arrow key is pressed to turn the simulated blocked condition OFF.

When used as simple "**BLOCKED**" logic output for a single Sea Tel antenna, this output could be used to light a remote LED and/or sound a buzzer to alert someone that the antenna is blocked, and therefore signal is lost.

In a "Dual Antenna" installation, this logic output(s) is used to control Dual Antenna Arbitrator panel of coax switch (or switches) to switch the source inputs to the matrix switch from Antenna **"A"** to Antenna **"B"**, and vice versa.

When used as simple "**RF Radiation Hazard**" logic output for a single Sea Tel TXRX antenna, this output could be used to suppress RF transmissions while the antenna is pointed where people would be harmed by the transmitted microwave RF power output. The SW2 output would be interfaced to the satellite modem to **disable** the TX output signal from the Satellite TXRX Modem whenever the antenna is within the RF Radiation Hazard zone(s).

When used for "**FCC TX Mute**" logic output for a single Sea Tel TXRX antenna, this output is used to suppress RF transmissions whenever the antenna is mis-pointed 0.5 degrees or more, is blocked, searching, targeting or unwrapping. The SW2 output would be interfaced to the satellite modem to **disable/mute** the TX output signal from the Satellite TXRX Modem. When the mute condition is due to antenna mis-pointing, it will not **un-mute** until the pointing error of the antenna is within 0.2 degrees. The default output is contact closure to ground when the antenna is mis-pointed, therefore provides a **ground** to "Mute" the satellite modem from the SW2 terminal of the Terminal Mounting Strip. If your satellite modem requires an **open** to "Mute", refer to SYSTEM TYPE parameter 16 value to reverse the output logic from the ACU.

Programming instructions:

Determine the Relative AZ positions **where** blockage, or RF Radiation Hazard, exists. This may be done by monitoring the received signal level and the REL display readings while the ship turns or by graphing the expected blockage pattern. Elevation of the antenna in normal use also must be taken into consideration. A Mast or other structure may cause blockage at low elevation angles, but **may not** cause blockage when the antenna is at higher elevation angles where it is able to look over the structure. Up to four zones may be mapped. Only zones which are needed should be mapped (in AZ LIMIT pairs).

In unlimited antenna systems the Relative position of the antenna must have been calibrated by properly setting the Home Flag Offset (HFO) value in the PCU. The HFO calibrates Relative to display 0000 when the antenna is pointed in-line with the bow of the boat/ship (parallel to the bow).

Convert the relative readings to AZ LIMIT/EL LIMIT values by multiplying by 10. Enter the beginning of the **first** blockage region as AZ LIMIT 1 and the end of the region (clockwise direction from AZ LIMIT 1) as AZ LIMIT 2 parameters in the ACU. If needed, repeat setting AZ LIMIT 3 & 4 for a **second** ZONE and then AZ LIMIT 5 & 6 if a **third** ZONE is needed. All **unneeded** zone AZ LIMIT pairs **must** be set to 0000. Set the upper elevation limit of each blockage zone (also entered in degrees multiplied by 10).

EXAMPLE 1 -   Three blockage Zones: A ship has a Sea Tel antenna mounted on the port side and an Inmarsat antenna mounted on the starboard side. A mast forward, the Inmarsat antenna to starboard and an engine exhaust stack aft form the three zones where satellite signal is blocked (as shown in the graphic). In this example zone 1 is caused by the mast, zone 2 is from the Inmarsat antenna, zone 3 is from the stack and zone 4 is not needed:

> ZONE 1 begins (AZ LIMIT 1) at 12 degrees Relative and ends (AZ LIMIT 2) at 18 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 1 value of 0120 and AZ LIMIT 2 value of 0180. In this case the mast height only causes blockage up to an elevation of 50 degrees, so we set EL LIMIT
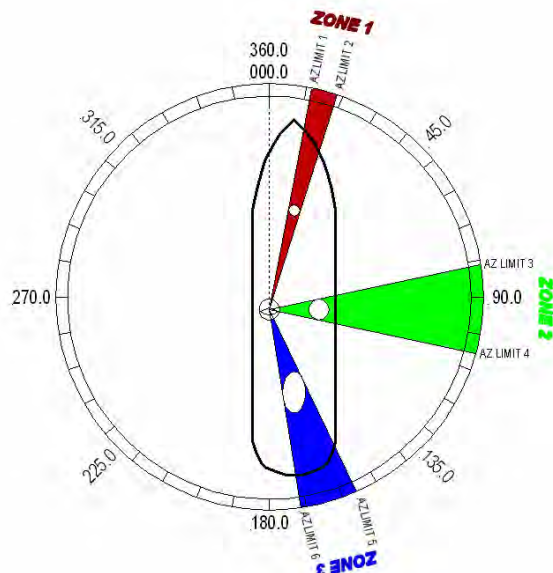
12 to 0500. If the antenna is between these two AZ Limit points but the elevation is greater than 50 degrees, the antenna will no longer be blocked.
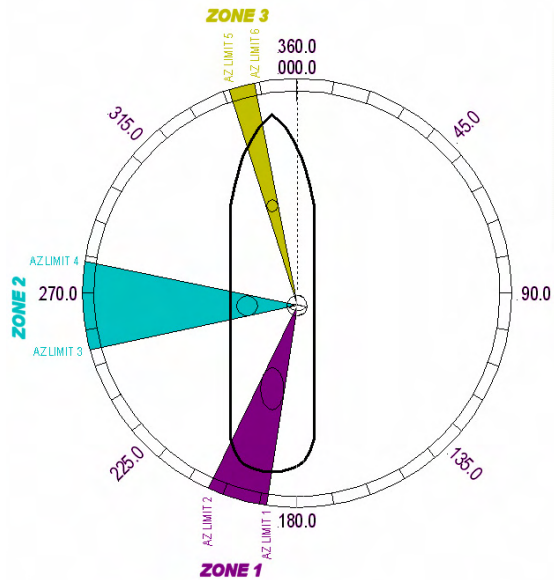
ZONE 2 begins (AZ LIMIT 3) at 82 degrees Relative and ends (AZ LIMIT 4) at 106 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 3 value of 0820 and AZ LIMIT 4 value of 1060. In this case the Inmarsat antenna height only causes blockage up to an elevation of 12 degrees, so we set EL LIMIT 34 to 0120. If the antenna is between these two AZ Limit points but the elevation is greater than 12 degrees, the antenna will no longer be blocked.

ZONE 3 begins (AZ LIMIT 5) at 156 degrees Relative and ends (AZ LIMIT 6) at 172 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 5 value of 1560 and AZ LIMIT 6 value of 1720. In this case the stack antenna height only causes blockage up to an elevation of 36 degrees, so we set EL LIMIT 56 to 0360. If the antenna is between these two AZ Limit points but the elevation is greater than 36 degrees, the antenna will no longer be blocked.

ZONE 4 is not needed. Enter AZ LIMIT 7 value of 0000 and AZ LIMIT 8 value of 0000. Set EL LIMIT 78 to 0000. If your ACU software includes 5 volt polarization you will not see these AZ & EL LIMIT parameters.

EXAMPLE 2 - Three blockage Zones, Dual Antenna configuration: A ship has 2 Sea Tel antennas, "Antenna A" mounted on the port side and "Antenna B" mounted on the starboard side. Antenna A is designated as the ***master*** antenna. The mast forward, Antenna B to starboard and the engine exhaust stack aft form the three zones where satellite signal is blocked from Antenna A. The SW2 logic output from Antenna A (ACU A) and Antenna B (ACU B) are used to control a "Dual Antenna Arbitrator" panel of coax switches which route satellite signal from the ***un-blocked*** antenna to the inputs of the matrix switch. If both antennas are tracking the same satellite, they will not both be blocked at the same time. The logic output will switch to provide satellite signal to the below decks equipment from Antenna A when it is ***not blocked*** and will switch to provide satellite signal from Antenna B whenever Antenna A ***is blocked***. The switches will not change state if ***both*** antennas are blocked, or if ***both*** are on satellite.

Antenna A is the same as the previous example and its ACU would be set to those AZ LIMIT values.

Antenna B ACU would be set to:

In this example Antenna B zone 1 is caused by the stack, zone 2 is from Antenna A, zone 3 is from the mast and zone 4 is not needed.

ZONE 1 begins (AZ LIMIT 1) at 188 degrees Relative and ends (AZ LIMIT 2) at 204 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 1 value of 1880 and AZ LIMIT 2 value of 2040. In this case the stack height only causes blockage up to an elevation of 42 degrees, so we set EL LIMIT 12 to 0420. If the antenna is between these two AZ Limit points but the elevation is greater than 42 degrees, the antenna will no longer be blocked.

ZONE 2 begins (AZ LIMIT 3) at 254 degrees Relative and ends (AZ LIMIT 4) at 278 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 3 value of 2540 and AZ LIMIT 4 value of 2780. In this case the Antenna B height only causes blockage up to an elevation of 12 degrees, so we set EL LIMIT 34 to 0120. If the antenna is between these two AZ Limit points but the elevation is greater than 12 degrees, the antenna will no longer be blocked.

ZONE 3 begins (AZ LIMIT 5) at 342 degrees Relative and ends (AZ LIMIT 6) at 348 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 5 value of 3420 and AZ LIMIT 6 value of 3480. In this case the mast height only causes blockage up to an elevation of 41 degrees, so we set EL LIMIT 56 to 0410. If the antenna is between these two AZ Limit points but the elevation is greater than 12 degrees, the antenna will no longer be blocked.

ZONE 4 is not needed. Enter AZ LIMIT 7 value of 0000 and AZ LIMIT 8 value of 0000. Set EL LIMIT 78 to 0000. If your ACU software includes 5 volt polarization you will not see these AZ & EL LIMIT parameters.

EXAMPLE 3 -   One blockage Zone: A ship has a Sea Tel antenna mounted on the center line of the ship. A mast is forward and an engine exhaust stack is aft. In this example the Stack does ***NOT*** block the satellite, only the mast forward does. In this example zone 1 is caused by the mast, zone 2, 3 and 4 are not needed:

ZONE 1 begins (AZ LIMIT 1) at 352 degrees Relative and ends (AZ LIMIT 2) at 8 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 1 value of 3520 and AZ LIMIT 2 value of 0080. In this case the mast height only causes blockage up to an elevation of 52 degrees, so we set EL LIMIT 12 to 0520. If the antenna is between these two AZ Limit points but the elevation is greater than 52 degrees, the antenna will no longer be blocked.

ZONE 2 is not needed. Enter AZ LIMIT 3 value of 0000 and AZ LIMIT 4 value of 0000. Set EL LIMIT 34 to 0000.

ZONE 3 is not needed. Enter AZ LIMIT 5 value of 0000 and AZ LIMIT 6 value of 0000. Set EL LIMIT 56 to 0000.

ZONE 4 is not needed. Enter AZ LIMIT 7 value of 0000 and AZ LIMIT 8 value of 0000. Set EL LIMIT 78 to 0000. If your ACU software includes 5 volt polarization you will not see these AZ & EL LIMIT parameters.
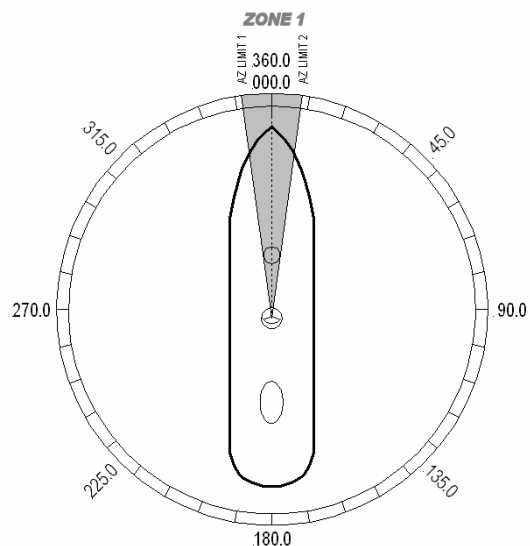
EXAMPLE 4 -   Overlaid Blockage Zones: A ship has a Sea Tel antenna mounted on the center line of the ship. A mast mounted on top of a deckhouse (like the picture below) is forward and an engine exhaust stack, also on a deckhouse, is aft. These two blockage areas have wide azimuth blockage at lower elevations and then a narrower azimuth area of blockage extends up to a higher value of elevation.

ZONE 1 begins (AZ LIMIT 1) at 334 degrees Relative and ends (AZ LIMIT 2) at 026 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 1 value of 3340 and AZ LIMIT 2 value of 0260. In this case the mast height only causes blockage up to an elevation of 40 degrees, so we set EL LIMIT 12 to 0400. If the antenna is between these two AZ Limit points but the elevation is greater than 40 degrees, the antenna will no longer be blocked.
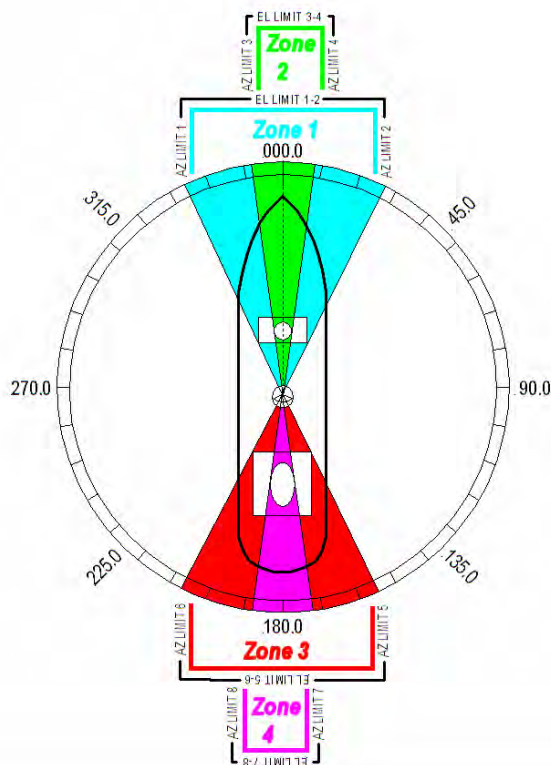
ZONE 2 begins (AZ LIMIT 3) at 352 degrees Relative and ends (AZ LIMIT 4) at 008 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 3 value of 3520 and AZ LIMIT 4 value of 0080. In this case the mast height only causes blockage up to an elevation of 70 degrees, so we set EL LIMIT 34 to 0700. If the antenna is between these two AZ Limit points but the elevation is greater than 70 degrees, the antenna will no longer be blocked.

ZONE 3 begins (AZ LIMIT 5) at 155 degrees Relative and ends (AZ LIMIT 6) at 205 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 5 value of 1550 and AZ LIMIT 6 value of 2050. In this case the mast height only causes blockage up to an elevation of 30 degrees, so we set EL LIMIT 56 to 0300. If the antenna is between these two AZ Limit points but the elevation is greater than 30 degrees, the antenna will no longer be blocked.

ZONE 4 begins (AZ LIMIT 7) at 173 degrees Relative and ends (AZ LIMIT 8) at 187 degrees Relative. Multiply these Relative positions by 10. Enter AZ LIMIT 7 value of 1730 and AZ LIMIT 8 value of 1870. In this case the mast height only causes blockage up to an elevation of 55 degrees, so we set EL LIMIT 78 to 0550. If the antenna is between these two AZ Limit points but the elevation is greater than 55 degrees, the antenna will no longer be blocked. If your ACU software includes 5 volt polarization you will not see these AZ & EL LIMIT parameters.
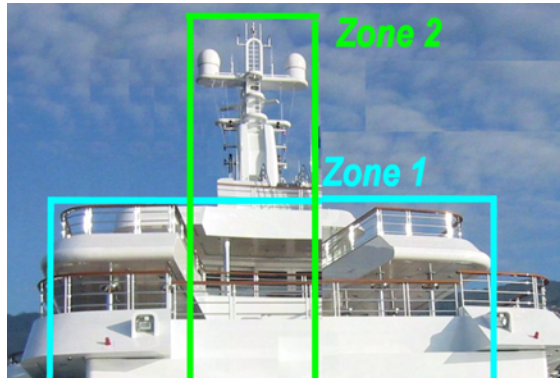
5.19. 5V OFFSET (May not be in your software)

CCW 5v Polang servo position reference. Refer to your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor up under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.20. 5V SCALE (May not be in your software)

90 degree 5V Polang servo motion scale factor. Refer to your antenna manual.

To manually update, press the LEFT arrow key to bring the cursor up under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.21. TX Polarity

Selects TX polarity override to disable Polang selection and coordinate TX polarities, therefore it is NOT used in TVRO antennas).

Refer to your antenna manual for default setting of this parameter.

To manually update, press the LEFT arrow key to bring the cursor up under the least significant 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.

Use the LEFT or RIGHT arrow key to move the cursor left or right to select other characters to modify. When you are finished modifying press ENTER to execute the new value OR press NEXT to abort and exit setup mode.

5.22.   TRACK DISP

This parameter set the selections that the user will see in the Tracking - Band Selection menu. Band Selection **must** be set to the appropriate selection for Tracking to operate properly.

Band selection controls the **local** logic output state of SW1 output terminal on the Terminal Mounting Strip PCB and **remote** C/Ku relays (or other switches) on the antenna pedestal.

The displayed selections and SW1 status are listed in the following table:

Setting	Displayed selection	Tone/Band/Voltage Status	SW1 Status
0000	C	Tone OFF, Band 0, 13V	Open
	X	Tone ON, Band 0, 13V	Short
	KuLo	Tone OFF, Band 1, 13V	Open
	KuHi	Tone ON, Band 1, 13V	Short
0020	CNV1A	Tone OFF, Band 0 , 13V	Open
	CNV1B	Tone ON, Band 0, 13V	Short
	CNV2A	Tone OFF, Band 1, 13V	Open
	CNV2B	Tone ON, Band 1, 13V	Short
0040	CoPol	Tone OFF, Band 0 , 13V	Open
	CoPol	Tone ON, Band 0, 13V	Short
	X Pol	Tone OFF, Band 1, 13V	Open
	X Pol	Tone ON, Band 1, 13V	Short
0100	PAOFF	Tone OFF, Band 0 , 13V	Open
	PAOFF	Tone ON, Band 0, 13V	Short
	PA ON	Tone OFF, Band 1, 13V	Open
	PA ON	Tone ON, Band 1, 13V	Short
0110	PA ON	Tone OFF, Band 0 , 13V	Open
	PA ON	Tone ON, Band 0, 13V	Short
	PAOFF	Tone OFF, Band 1, 13V	Open
	PAOFF	Tone ON, Band 1, 13V	Short
0130	Xp Lo	Tone OFF, Band 0, 13V	Open
	XpMid	Tone ON, Band 0, 13V	Short
	Xp Hi	Tone OFF, Band 0, 18V	Open
	RxOff	Tone ON, Band 0, 18V	Short
0150	Co Lo	Tone OFF, Band 1 , 13V	Open
	CoMid	Tone ON, Band 1, 13V	Short
	Co Hi	Tone OFF, Band 1, 18V	Open
	RxOff	Tone ON, Band 1, 18V	Short
0170	Xp B1	Tone OFF, Band 0 , 13V	Open
	Xp B2	Tone ON, Band 0, 13V	Short
	Xp B3	Tone OFF, Band 0, 18V	Open
	Xp B4	Tone ON, Band 0, 18V	Short

0190	Co B1	Tone OFF, Band 1 , 13V	Open
	Co B2	Tone ON, Band 1, 13V	Short
	Co B3	Tone OFF, Band 1, 18V	Open
	Co B4	Tone ON, Band 1, 18V	Short

When the SW1 output is shorted to ground a current sink of 0.5 amps *max* is provided to control below decks band selection tone generators or coax switches. When SW1 output is open it is a floating output.

5.23. SAVE NEW PARAMETERS

Press RIGHT arrow and then press ENTER to save any recent changes in NVRAM for permanent storage. A "Parameters Saved" message will be displayed. If changes are made and not stored, they will still be effective but will be lost when power is removed or when the RESET is pressed. Press LEFT and RIGHT arrows at the same time to access this sub-menu

5.24. REMOTE COMMAND

Use to enter diagnostic commands to the PCU. Allows sending specific commands to the PCU from the ACU. All the checksums and response strings are handled by the ACU.

The default displayed remote command in the ACU is @0000 which gets the Latitude & Longitude position of the GPS mounted on the pedestal.

To send a different remote command to the PCU;

1. Press the **LEFT** arrow key to bring up the cursor and move it to the left until the current symbol in front of the 0000 is underscored.

2. Increment or decrement the symbol using the **UP & DOWN** arrow keys until the desired character is displayed.

3. Press the **RIGHT** arrow to underscore a digit to change and use the **UP & DOWN** arrow keys until the digit is the desired value. Continue moving the cursor and incrementing/decrementing digits until the desire value has been entered.

4. Press the **ENTER** key to send the command to the PCU. A response may be displayed in the lower line of the Remote Command window, or in the Remote Monitor window, depending on the command sent.

Refer to the Maintenance & Troubleshooting section of your antenna manual for some of the common diagnostic commands.

5.25. REMOTE MONITOR

Use to monitor the results of a diagnostic command which was sent to the PCU. Refer to your antenna manual.

5.26. To Disable/Enable DishScan

To be able to use Step Track, or to revert to Conscan, as your active tracking mode you will have to disable DishScan.

Select the DISHSCAN parameter window on the ACU:

1. Press the **RIGHT** arrow, then press the **UP** arrow and last press the **ENTER** key to turn DishScan mode ON.

2. Press the **RIGHT** arrow, then press the **DOWN** arrow and last press the **ENTER** key to turn DishScan Mode OFF.

If you change this remote parameter, you must save the change using **REMOTE PARAMETERS**.

If DishScan is OFF and the Step Integral parameter is set to 0000, you will get a constant ERROR 0016 (DishScan error) and you will see zeroes flashing in the lower left of the Azimuth and Elevation ENTRY menu displays. This is a visual indication that DishScan is turned OFF.

5.27. Satellite Reference Mode

The ships gyro compass input to the ACU may be accurate and stable in static conditions and yet may NOT be accurate or stable enough in some underway dynamic conditions. If there is no gyro compass or if the input is corrupt, not stable or not consistently accurate the tracking errors will become large enough to cause the antenna to be mis-pointed off satellite.

Satellite Reference Mode will uncouple the gyro reference from the azimuth rate sensor control loop. When operating in Satellite Reference Mode changes in ships gyro reading will not directly affect the azimuth control loop. The Pedestal Control Unit will stabilize the antenna based entirely on the azimuth rate sensor loop and the tracking information from DishScan. This will keep the azimuth rate sensor position from eventually drifting away at a rate faster than the tracking loop can correct by using the tracking errors to regulate the rate sensor bias.

Satellite Reference Mode can be used as a diagnostic mode to determine if tracking errors are caused by faulty gyro inputs.

Satellite Reference Mode **MUST be used when:**

- No Gyro Compass is available
- Frequent or constant ACU Error Code 0001 (Gyro Compass has failed)
- Gyro Compass output is NMEA heading
- Flux Gate Compass is being used
- GPS Satellite Compass is being used

To view, or change, the Satellite Reference Mode status, *select the SAT REF remote parameter:*

1. Press the RIGHT arrow, then press the UP arrow and last press the ENTER key to turn Satellite Reference Mode ON.

2. Press the RIGHT arrow, then press the DOWN arrow and last press the ENTER key to turn Satellite Reference Mode OFF.

If you change this remote parameter, you must save the change using REMOTE PARAMETERS.

5.28. REMOTE TILT

Allows easy access to the tilt adjustment commands. Refer to your antenna manual. Press LEFT or RIGHT arrow bring up the cursor and begin adjustment. Press UP/DOWN arrow to adjust tilt forward and back. Press LEFT/RIGHT to adjust the tilt left and right. Press ENTER to restore normal system operation. (You must save the new tilt settings using the REMOTE PARAMETERS function below.

5.29. REMOTE PARAMETERS

Allows any remote parameters that have been changed (via Remote Command or Remote Tilt) to be saved. Any REMOTE changes must be saved to NVRAM in the PCU, or they will be lost when power to the antenna is cycled or remote reset command is issued. Press RIGHT arrow and then press ENTER to save the parameters in the remote PCU's NVRAM. A "Parameters Saved" message will be displayed.

5.30. REMOTE UPLOAD

Your dealer may use this function to upload new software into the PCU.

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6.   Functional Testing

If not already ON, Turn ON the Power switch on the front panel of the ACU.

6.1.   ACU / Antenna System Check

1. Press RESET on the ACU front panel to initialize the system. Verify the display shows "SEA TEL INC - MASTER" and the ACU software version number. Wait 10 seconds for the display to change to "SEA TEL INC - REMOTE" and the PCU software version number.

If the display shows "REMOTE INITIALIZING" wait for approximately 2 minutes for the antenna to complete initialization and report the Antenna Model and PCU software version. If "REMOTE NOT RESPONDING" is displayed, refer to the Troubleshooting Section of this manual.

2. Press the **NEXT** key repeatedly to display the **Ship**, **Satellite**, **Antenna** and **Status** menu displays. This verifies that the displays change in the correct response to the keys.

6.2.   Latitude/Longitude Auto-Update check

This verifies that the GPS position information is automatically updating..

1. Press the **NEXT** key repeatedly to display the **Ship** menu. Press **ENTER** to access edit mode and view the current Latitude value.
2. Press the **LEFT** arrow key to bring the cursor up under the ones digit, press **UP** and then hit **ENTER**. The display should immediately show a latitude value one degree higher, but then will be overwritten within several seconds (back to the previous value) by the GPS engine.

This test does not need to be repeated in the Longitude menu.

6.3.   Ship Heading – Gyro Compass Following Check

This verifies that the Heading display is actually following the Ships Gyro Compass.

1. Press the **NEXT** key repeatedly to display the **Ship** menu. If the boat is underway, monitor the Heading value to verify that the display changes in the correct response to the Gyro Compass input (Heading value should always be exactly the same as the Gyro Compass repeater value).
2. If the ship is NOT underway, most ships will turn +/- 1-2 degrees at the pier, monitor the Heading value to verify that the display changes in the correct response to the Gyro Compass input (Heading value should always be exactly the same as the Gyro Compass repeater value).

6.4.   Azimuth & Elevation Drive

This verifies that the antenna moves in the correct response to the keys.

1. Press the **NEXT** key several times to display the Antenna menu.
2. Press the Tracking key to toggle Tracking OFF. Press the **UP** arrow key repeatedly and verify that the antenna moves up in elevation.
3. Press the **DOWN** arrow key repeatedly and verify that the antenna moves down in elevation.
4. Press the **RIGHT** arrow key repeatedly and verify that the antenna moves up (CW) in azimuth.
5. Press the **LEFT** arrow key repeatedly and verify that the antenna moves down (CCW) in azimuth.

6.5.   Four Quadrant Tracking Test

This verifies that the antenna moves in the correct response to the keys, that Tracking is signaling correctly and that the Tracking commands are being carried out (antenna drives to peak).

1. Verify antenna is locked onto and tracking a satellite
2. Press the **NEXT** key several times to display the **Antenna** menu.
3. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **UP** arrow key repeatedly to move the antenna up in elevation until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back down in elevation and that the AGC rises to its' previous high value.
4. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **DOWN** arrow key repeatedly to move the antenna down in elevation until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back up in elevation and that the AGC rises to its' previous high value.
5. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **RIGHT** arrow key repeatedly to move the antenna up in azimuth until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back down in azimuth and that the AGC rises to its' previous high value.
6. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **LEFT** arrow key repeatedly to move the antenna down in azimuth until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back up in azimuth and that the AGC rises to its' previous high value.

6.6.   Blockage Simulation Test

Blockage output function is used to modify the behavior of Tracking and Searching when there is a known blockage zone. The ACU provides a contact closure to ground on the SW2 terminal of the Terminal Mounting Strip when the antenna is pointed within any one of the blockage/hazard zones or the system is searching, targeting, unwrapping or is mis-pointed by 0.5 degrees or more (FCC TX Mute function for Transmit/Receive systems **only**). The contact closure is a transistor switch with a current sinking capability of 0.5 Amp. This logic output control signal is used for:

*   When used as simple "BLOCKED" logic output for a single Sea Tel antenna, this output could be used to light a remote LED and/or sound a buzzer to alert someone that the antenna is blocked, and signal is lost.
*   In a "Dual Antenna" installation, this logic output(s) is used to control Dual Antenna Arbitrator panel of coax switches to switch the source inputs to the matrix switch from Antenna "A" to Antenna "B", and vice versa.
*   When used as simple "**RF Radiation Hazard**" logic output for a single Sea Tel TX/RX antenna, this output could be used to suppress RF transmissions while the antenna is pointed where people would be harmed by the transmitted microwave RF power output. The SW2 output would be interfaced to the satellite modem to **disable** the TX output signal from the Satellite TXRX Modem whenever the antenna is within the RF Radiation Hazard zone(s).
*   When used for "**FCC TX Mute**" logic output for a single Sea Tel TX/RX antenna, this output could be used to suppress RF transmissions whenever the antenna is mis-pointed 0.5 degrees or more, is blocked, searching, targeting or unwrapping. The SW2 output would be interfaced to the satellite modem to **disable/mute** the TX output signal from the Satellite TX/RX Modem. When the mute condition is due to antenna mis-pointing, it will not **un-mute** until the pointing error of the antenna is within 0.2 degrees. The default output is contact closure to ground when the antenna is mis-pointed, therefore provides a **ground** to "Mute" the satellite modem on the SW2 terminal of the Terminal Mounting Strip. If your satellite modem requires an **open** to "Mute", refer to SYSTEM TYPE parameter 16 value to reverse the output logic from the ACU.

To Test the blockage function:

1. Press the **NEXT** key until you are at the Status menu. Press **ENTER** to access the Tracking menu.
2. Press the **RIGHT** arrow key to bring up and move the cursor to the far right. Press the **UP** arrow to simulate a manual BLOCKED condition. BLOCKED will appear in the Tracking display.
3. Verify that SW2 terminal shorts to ground (or open circuit if you have SYSTEM TYPE configured to reverse the output logic) and that the external alarms actuate OR the Dual Antenna Arbitrator coax switches toggle (if antenna B is not blocked) OR the Satellite Modem TX is disabled/muted.
4. Press the **LEFT** arrow key and then press the UP arrow key to turn the simulated blocked condition OFF. BLOCKED will disappear from the Tracking display.
5. Verify that SW2 terminal is open circuit (or ground if you have logic reversed) and that the external alarms deactivate OR the Satellite Modem TX is un-muted. The Dual Antenna Arbitrator coax switches should not toggle until you manually block Antenna B ACU.

6.7. Check ACU Parameters

Assure that the parameters are set correctly (you may wish to record them). Refer to the Antenna manual for factory default parameters.

PARAMETER	My Parameters
EL TRIM	
AZ TRIM	
AUTO THRES	
EL STEP SIZE	0
AZ STEP SIZE	0
STEP INTEGRAL	0
SEARCH INC	0
SEARCH LIMIT	
SEARCH DELAY	
SWEEP INC	
SYSTEM TYPE	
GYRO TYPE	
POL TYPE	
POL OFFSET	
POL SCALE	
AZ LIMIT 1	
AZ LIMIT 2	
AZ LIMIT 3	
AZ LIMIT 4	
AZ LIMIT 5	
AZ LIMIT 6	
TX POLARITY	

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7. Maintenance & Troubleshooting

Below are the common adjustments, maintenance and troubleshooting that may be required during the lifetime of your system.

If your system includes the OPTIONAL TSC-10 Touch Screen Controller, accomplish the Operator Testing and Troubleshooting in the ***Diagnostics*** screens.

7.1. General Cautions & Warnings

CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip or the boards inside the ACU.

CAUTION *- Allow only an **authorized dealer** to install or service your Sea Tel System components. Unauthorized installation or service can be dangerous and can invalidate the warranty.*

7.2. Troubleshooting The ACU

The following paragraphs list the problems you might encounter when performing the functional checkout steps in the previous section of this manual. Following the problems are suggestions of where to start looking to solve the problem. Refer to the Drawings section of this manual and your Antenna manual for any/all pertinent block diagrams, schematics, wiring diagrams and assembly drawings to aid in diagnosing any type of failure.

Try pressing RESET first and then in some cases you may want to turn Power OFF for a short period of time then turn it back ON to see if that restores normal operation. Remember, with most Gyro Compass types (Synchro and SBS inputs) you MUST enter the beginning Heading value EVERY time you power-up the ACU, before you will be able to retarget your desired satellite.

Verify that the SETUP PARAMETERS are set correctly (refer to the Setup section of this manual).

7.2.1. ACU display is blank

This indicates no power to the internal electronics. Assure that the front panel Power switch is ON. Check the AC line voltage on the Power Cord. Check the cables on the rear panel of the ACU to assure they are properly connected. If AC Line voltage is Ok, one at a time disconnect (and check display status) the cables plugged into J1 Gyro Compass, then J2 NMEA, then J3 M&C to see if one of these cables is shorting the ACU Power. Call your dealer to report this failure and arrange for repair service.

7.2.2. ACU Status displays "REMOTE NOT RESPONDING"

This indicates a problem in the Antenna Control coax cable or communications modems in the ACU and/or Antenna PCU. Check the Antenna Control Cable connections at the J4 "Antenna" jack on the rear of the ACU and at the antenna pedestal inside the radome. If the connections are good, call your dealer to report this failure and arrange for repair service.

7.3. Troubleshooting Ships Gyro Compass problems

Ships Heading display does not follow ships movement and/or you are getting frequent or constant ERROR CODE 0001. Determine the type of gyro compass that is used on the ship, assure that the GYRO TYPE parameter is set correctly (refer to the setup section of this manual) and then proceed to the step that lists the troubleshooting for the correct type of Gyro Compass Signal.

7.3.1. <u>STEP-BY-STEP</u>

1. Verify that the GYRO TYPE parameter is set correctly.
2. Observe the ERROR LED on the FRONT panel. If it is illuminated, this indicates that an error was detected in the Step-By-Step input. Press RESET on the front panel. If the ERROR LED illuminates again, the problem is in the 4 connections to A, B, C and COMMON.
3. Check the connections to the Terminal Mounting Strip and to the ACU.
4. Measure the voltage between COMMON and A, B, and C. Each reading should either be near zero or 35 to 70 VDC. If all three are zero, check the repeater fuses. If some read negative and some read positive or if one reads an intermediate values the COMMON terminal is not properly connected.
5. If the ***Ship*** - Heading display is different from the actual Gyro heading, access the Heading entry menu and key in the correct heading value (refer to the operation Ship menu section). Note the reading. After the ship has turned more than one degree, compare the new gyro heading with the reading on the display, if it has moved in the opposite direction then reverse connections A and B. Reset the ACU, put in the correct ship's heading again and verify that the display reading now follows the Gyro heading.

7.3.2. <u>1:1 SYNCHRO</u>

Observe the ship's heading display on the ACU. Compare its movement with that of the ship. If it does not move at all go to step 1. If it moves but in the wrong direction (even if it does not display the correct heading) go to step 2. If it moves in the correct direction but does not display the correct heading go to step 3. The gyro compass connects to the Terminal Mounting Strip on TB3 R1, R2, S1, S2 and S3.

> ⚠️ ***CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip.***

1. The Ships Heading display does not change when the ship changes direction. Using a multimeter read between R1 and R2. It should read 115 VAC. If it does not then a fuse is blown at the gyro repeater or there is an open between the repeater and the ACU. Read between S1 and S2, S2 and S3 and finally S3 and S1. They should all read between 0 and 90 VAC. The voltage level will change as the ship turns. If one reading is very close to 0 volts wait until the ship has made a major change in heading and then check voltage again. If the reading is still very low there is a problem in the line between the gyro repeater and the ACU or a problem in the gyro repeater itself.
2. The display changes in the direction opposite of the movement of the ship. Switch the secondary leads S1 and S2. Caution: there is 90 VAC between them! Verify that when the ship changes direction the display shows change in the same direction. If the direction is correct but the heading is incorrect go to step C.

3. The ship's heading display does not indicate the correct heading. If the display is off by 60, 180 or 300 degrees, this indicates that R1 and R2 are reversed. Reverse R1 and R2 and recheck the heading display. If the display is off by 120 or 240 degrees, this indicates that S1, S2 and S3 are in the right order but off by one place. Note their positions and carefully move the connections one position over (S1 to S2, S2 to S3, and S3 to S1). This action will offset the display by 120 degrees. Check if the display now reads correctly. If not move all three leads one more time in the same direction as last time. Verify that the ship's heading is correct.

7.3.3. <u>360:1 Synchro</u>

Observe the ship's heading display on the ACU. Compare its movement with that of the ship. If it does not move at all go to step 1. If it moves but in the wrong direction (even if it does not display the correct heading) go to step 2. If it moves in the correct direction but does not display the correct heading go to step 3. The gyro compass connects to the Terminal Mounting Strip on TB3- R1, R2, S1, S2 and S3.

> ***CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned OFF when handling and connecting wiring to the Terminal Mounting Strip.***

1. The Ships Heading display does not change when the ship changes direction. Using a multimeter read between R1 and R2. It should read 115 VAC. If it does not then a fuse is blown at the gyro repeater or there is an open between the repeater and the ACU. Read between S1 and S2, S2 and S3 and finally S3 and S1. They should all read between 0 and 90 VAC. The voltage level will change as the ship turns. If one reading is very close to 0 volts wait until the ship has made a major change in heading and then check voltage again. If the reading is still very low there is a problem in the line between the gyro repeater and the ACU or a problem in the gyro repeater itself.

2. The display changes in the direction opposite of the movement of the ship. Switch the secondary leads S1 and S2. Caution: there is 90 VAC between them! Verify that when the ship changes direction the display shows change in the same direction. If the direction is correct but the heading is incorrect go to step C.

3. If the ship's heading is different than the bridge, select the HDG function in the SHIP display mode by pressing the SHIP key 4 times. Key in the correct heading using the numeric keys and press ENTER.

7.4. *Display Offsets / Optimizing Targeting*

If the antenna does not target to within +/- 1.0 degrees of the satellite actual Elevation and Azimuth location of the desired satellite, the EL & AZ TRIM parameters need to optimized. The is because the targeted positions may be different than the calculated look angles due to mechanical installation or antenna alignment offsets.

Targeting should have been optimized when the system was installed and should not need to be re-adjusted in normal operation. However, you will need to re-evaluate the elevation trim if the antenna has been re-balanced.

You may correct the displayed positions to optimize targeting by following the procedure described in the Maintenance section of your antenna pedestal manual.

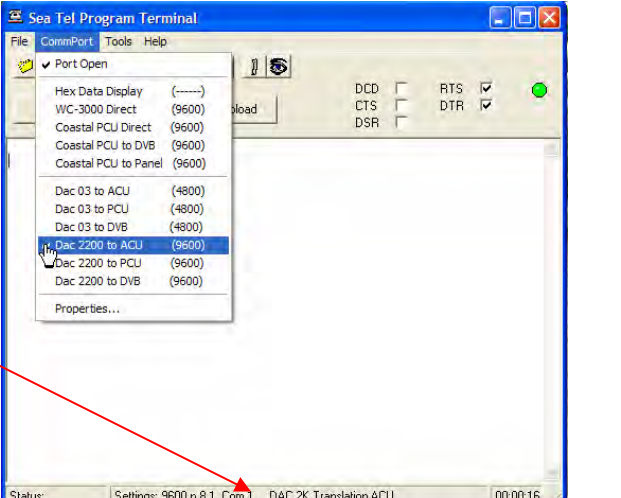## 7.5.   Configuring the COMM IF ports of the DAC-2202 ACU

The Monitor and Control (M&C J3) port allows external control from a PC using a communications program such as Sea Tel's ProgTerm or DacRemP via a straight 9 wire serial cable. This Port is used in conjunction with a diagnostic software connection to configure all communications settings, and/or for an **Authorized Sea Tel Dealer** to perform software uploads to the PCU, ACU Main PCB, and DVB Receiver.
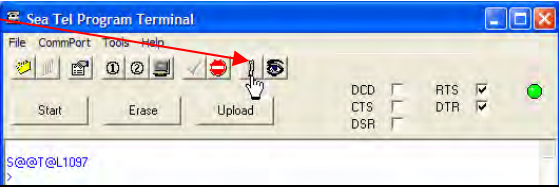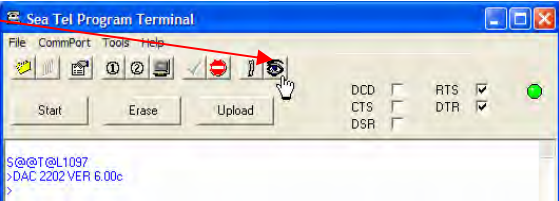
The Ethernet Port allows use of a LAN connection to login into the ACU's internal webpage's to view or change system parameters using a web browser such as Internet Explorer or Mozilla Firefox. This 10BaseT Ethernet Port has a configurable static IP address with 2 TCP/IP connections for diagnostic software connections and a UPD Port for an **Authorized Sea Tel Dealer** to perform a software upload to the Comm IF Module.

The NMEA J2 Port allows 2 simultaneous NMEA-0183 connections on the same DB9 connector, defined as NMEA A and NMEA B. Both NMEA A (J2-Pin1 Rx+ and J2-Pin3 Tx-) and NMEA B (J2-Pin7 Rxe+ and J2-8 Txe-) Ports have selectable baud rates independent of each other. The following procedure describes the process of connecting the ACU to your Laptop and configuring all Comm IF Properties.

Hardware/Software Requirements:

- Laptop/Desktop with an available Serial Com Port and ProgTerm Version 1.33 (Build 11.Mar.2007 or later). If no DB9 Serial port is available use a USB to Serial Adapter or use IP version of ProgTerm. Standard Straight 9 wire serial cable (Sea Tel Part Number 120643-25 or equiv.)
- DAC2202 Antenna Control Unit
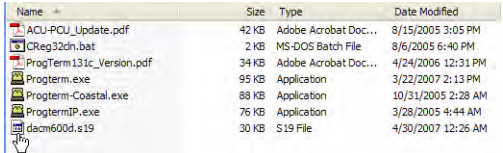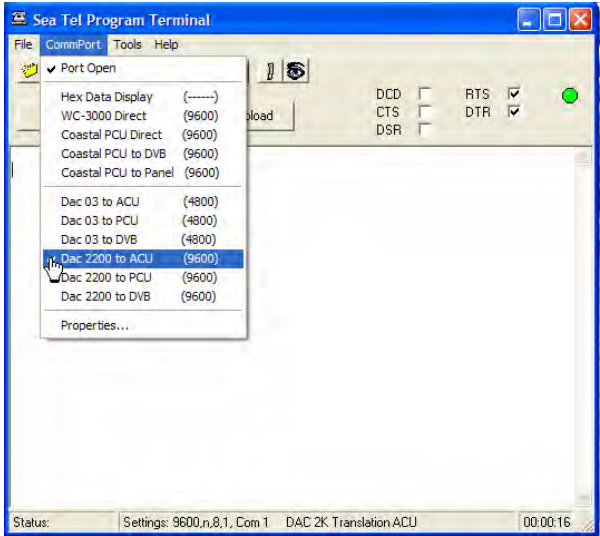
1. Turn Power off to ACU	
2. Connect J3 M&C Port to Computer Com Port using a Male to Female RS232 Straight 9 wire serial cable	
3. Turn Power on to ACU and then open Sea Tel's ProgTerm M&C software program.	Progterm.exe 95 KB Application 3/22/2007 2:13 PM
4. Configure ProgTerm's Translation Mode. Click on "CommPort" then select "Dac 2200 to ACU (9600)". Insure that the bottom of screen reads "DAC 2K Translation ACU"	
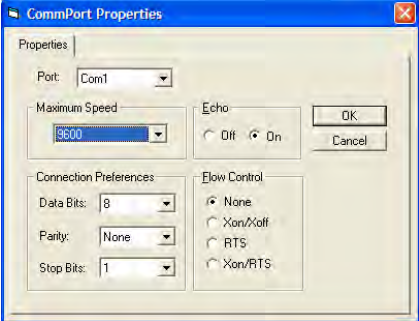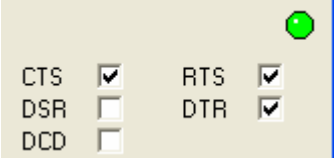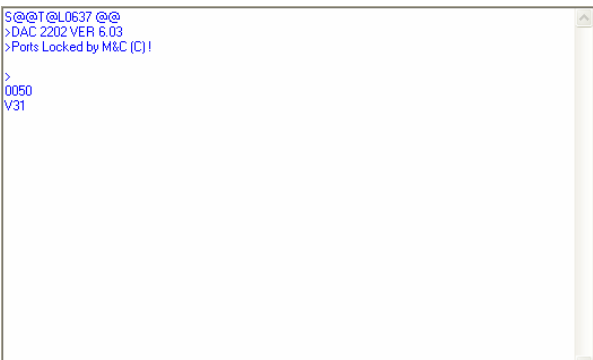
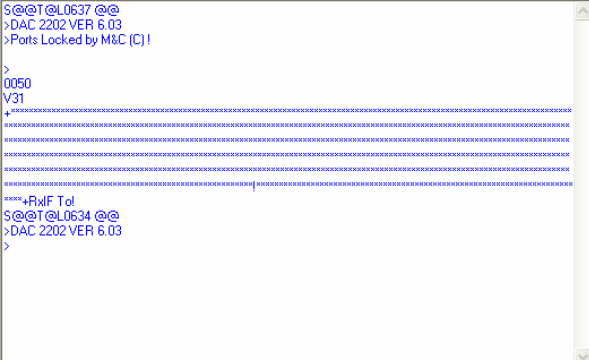|	
5. Mouse Click on the Paper Clip icon and verify response to ACU status query similar to what's shown.	*(Sea Tel Program Terminal window)* S@@T@L1097
6. Mouse click on the Eyeball icon and verify response to ACU software version query.	*(Sea Tel Program Terminal window)* S@@T@L1097 >DAC 2202 VER 6.00c
7. To View Communication settings type in "[?↵". That's left bracket, question mark, <carriage return>" (Typed characters will not display unless "Echo" is turned on in the Comm Port Properties.)	DAC2202 Comm IF Commands: [Innn.nnn.nnn.nnn↵ Set IP address [Nnnn.nnn.nnn.nnn↵ Set Net mask. [Gnnn.nnn.nnn.nnn↵ Set Gateway address [0nnnn↵ Set TCP/IP-0 (Port 0) port number [1nnnn↵ Set TCP/IP-1 (Port 1) port number [Unnnn↵ Set UDP (Software Upload) port number [Cnnnn↵ Set M&C (Port C) baud rate [Bnnnn↵ Set NMEA B (Port B) baud rate [Annnn↵ Set NMEA A (Port A) baud rate [?↵ View Settings IP, NM, GW, Port 0,1, baud C, B, A [V↵ View Comm IF PCB Software Version [L↵ Lock out ports for download
IP is the ACU IP address (Factory Default 192.168.30.195) *NM* is the ACU Subnet Mask (Factory Default 255.255.255.0) *GW* is the ACU Gateway (Factory Default 192.168.30.1) *TCP 0* is the first of two available TCP/IP Port's (Factory Default 2000) *TCP 1* is second of two available TCP/IP Port's (Factory Default is 2001) *UDP* is the Comm IF PCB Software Upload port (Factory Default 3000) *M&C (C)* is the M&C RS232 Port C (J3) Baud Rate (Factory Default 9600) *NMEA B* is the NMEA RS232 Port B (J2) Baud Rate (Factory Default 4800) *NMEA A* is the NMEA RS232 Port A (J2)Baud	S@@T@L1050 >DAC 2202 VER 6.00c >[? IP=192.168.0.195 >NM=255.255.255.0 >GW=192.168.0.1 >TCP-0=2000 >TCP-1=2001 >UDP =3000 >M&C (C)=9600 >NMEA(A)=4800 >NMEA(B)=4800

Rate (Factory Default 4800)	
8. To change Communication Settings Type "[Control Codennn<cr>". That's left bracket, control code alpha/numeric digit, parameter, <carriage return> (No Spaces). Example: Change ACU IP address to 192.168.30.195 type: "[I192.168.30.195↵" Example: Change J2 NMEA Port B Baud Rate to 9600 type: "[B9600↵"	S@@T@L1101 >DAC 2202 VER 6.00d >[I192.168.30.195 > S@@T@L1019 >DAC 2202 VER 6.00d >[B9600 >
9. To save parameters to Flash (Comm IF PCB) Type "[W↵". That's Left Bracket, Capital "W", <carriage return>(No Spaces). Verify "Done" is displayed after Saving Comm parameters. **Do not turn power off to ACU until finished**	S@@T@L1101 >DAC 2202 VER 6.00d >[I192.168.30.195 >[W Saving Comm parameters: Done! >
10. To reboot Comm IF software Type "[Z↵". That's Left Bracket, Capital "Z", <carriage return> (No Spaces). Verify "Comm IF Ver x.xx Port M&C (C)" is displayed.	>[W Saving Comm parameters: Done! > ? >[Z Comm Reset by M&C (C), please wait! >Comm IF Ver 0.69a Port M&C (C) >

7.6.   Programming Instructions Antenna Control Unit

These instructions apply to DAC-2200/2202/2302 and DAC-03 Antenna Control Units with GP32 Processors.
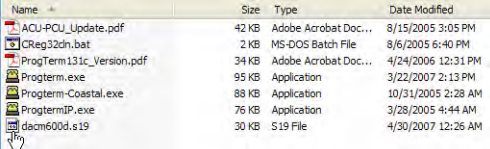
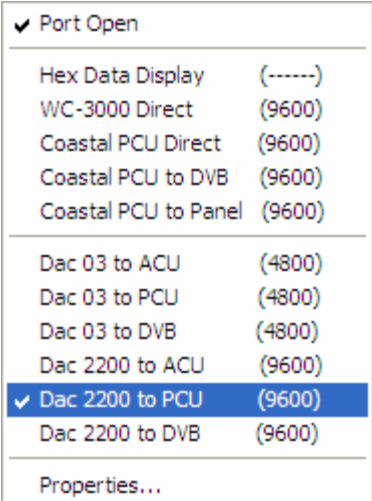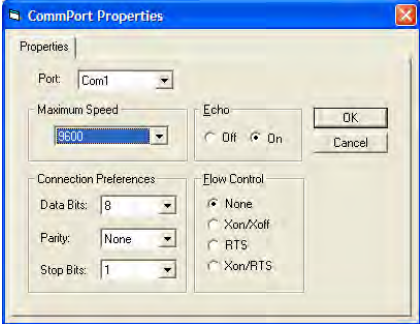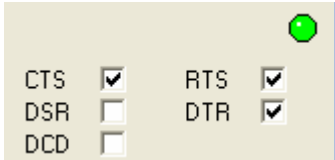|	
Electrical Hookup – DAC-2200/2202 1. Use a standard straight 9-pin serial cable (P/N 120643 or equiv.) connected between the ACU (M&C Port) and a PC with an available com port. **Electrical Hookup – DAC03 with Software 4.6x** 2. Ensure that a PC DAC cable (116670 or equiv.) is connected between ACU (J11 M&C/NMEA Port) and a PC with an available com port.	
3. Obtain a Copy of the ACU .s19 file and save in a copy in the same directory as the ProgTerm files.	
4. Click on the "ProgTerm" icon to open the ProgTerm program.	
Programming Operation: ACU Software Upload 5. Power on ACU 6. From the CommPort menu, Select the correct programming mode. (I.e. for a DAC2200/2202/2302, Click the 'DAC2200 to ACU') to set the ProgTerm program parameters for updating the below decks Antenna Control Unit (ACU). It is very important to be sure that you have selected the correct destination for the desired program update (ACU or PCU) and that you have selected the correct style of DAC interface to the PCU (03, 2200 or direct connection). If you select the incorrect destination and override the warnings, you will most certainly render your system inoperable.	
To make it easy to check the ProgTerm setup, the selected serial interface (port and baud rate) and the operating mode (ACU style and program destination) are always shown in the status bar at the bottom of the program window.	

7. From the "CommPort" menu, select "Properties". 8. Verify the correct COM port is selected. Select correct Maximum Speed (9600 for DAC2200/2202) and 4800 for DAC03). 9. Press OK to confirm any changes.	
10. Verify the LED on the right side of the program is GREEN indicating the port is open and functional. Click on the LED or select Port Open from the Comm Port menu to change the active state of the port and the LED.	
11. Click on the Paper Clip ⬛ button and then click on the EyeBall ⬛ button in the tool bar. This queries the Module Status and Module Version. The responses will be the Status and Version of the ACU (such as "DAC 2202 VER x.xx"). Both of these data requests must function properly before you can continue.	S@@T@L0637 @@ >DAC 2202 VER 6.03 >
If the ACU does not respond to a status request (Paper Clip button) the module may have been erased by a previous action. It can still be programmed but you need to contact the Sea Tel service department for instructions.	
12. Press 'START' to put the selected module into programming mode. After 2 to 3 seconds, you should see an echo of something like graphic to the right 0050 (Checksum of memory after serial load, 0050 for initial start) V11 or V31 (Version number of module bootloader)	S@@T@L0637 @@ >DAC 2202 VER 6.03 >Ports Locked by M&C (C) ! > 0050 V31

7-8

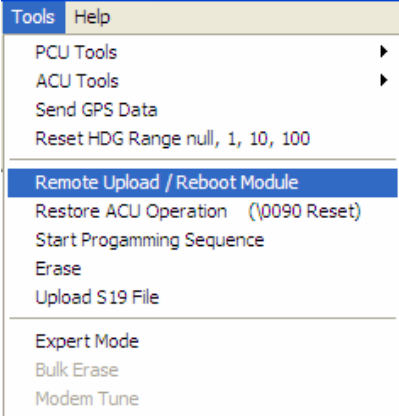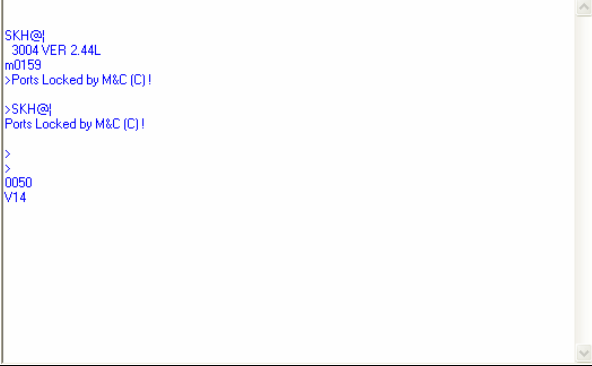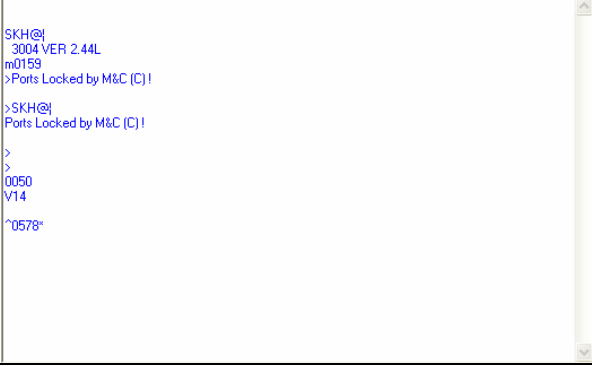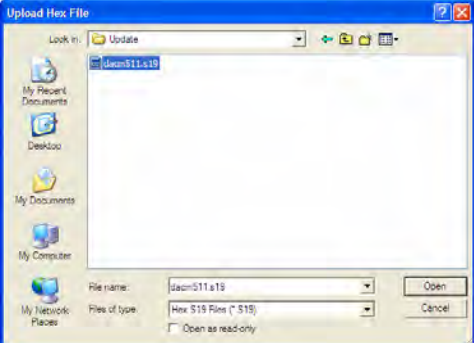|	
13. Press 'ERASE' to clear the current Flash program memory. The screen should now respond '**+**' for ACU programming. If it responds with some other characters or the '+' is not present, check to be sure that Tracking has been turned off and press 'ERASE' again. Do Not continue until a proper response is achieved.	S@@T@L0637 @@ >DAC 2202 VER 6.03 >Ports Locked by M&C (C) ! > 0050 V31 +
14. Press 'UPLOAD' to begin sending the new hex file program update to the ACU module. A dialog box will appear to allow you to select the file to be programmed.	*Upload Hex File dialog box:* Look in: ProgTerm, dac2202-603.s19, dacm602b.s19. File name: dac2202-603.s19. Files of type: Hex S19 Files (*.S19). Open as read-only. Open / Cancel.
15. Program Terminal will send the new file to the desired module and you will see an "Upload" dialog box with a "Cancel" button.	*Upload dialog box:* Uploading Hex File - C:\Update\dacm511.s19 Cancel
For each line of hex data that is programmed during the ACU software upload procedure ProgTerm will display one of the following characters: "*****" (successful programming), "**_**" (failed programming), "**!**" (protected memory access) ⚠️ *If you see any "**_**" characters while programming it means that the ports did not get locked properly and you must stop the upload (by pressing **Cancel** to abort) immediately and restart the upload sequence.*	S@@T@L0637 @@ >DAC 2202 VER 6.03 >Ports Locked by M&C (C) ! > 0050 V31 +************************* ************************** ************************** ************************** ************************** ****+RxIF To!

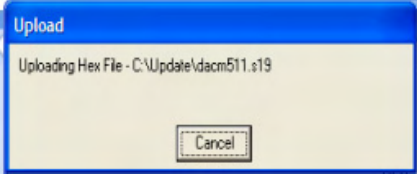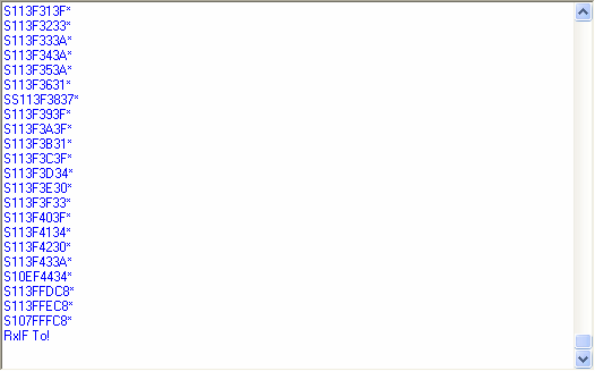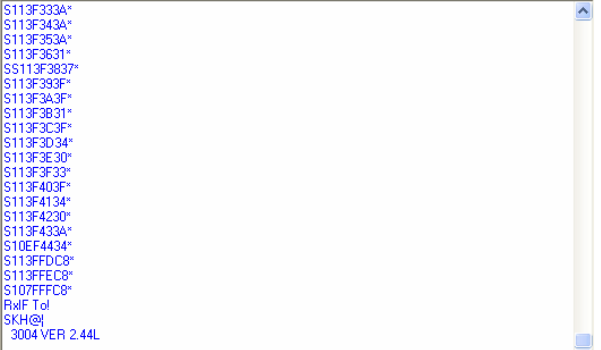|	
16. If the bootload is successful, the module will reboot, you may not see any text after the last S9 record, but it will respond correctly to the Paper Clip and EyeBall tool bar button requests to display the new versions you just loaded in. In this case, you are done. **17.** If the bootload was unsuccessful, you will see checksum and bootloader version displayed. In this case, repeat the upload procedure.	S@@T@L0637 @@ >DAC 2202 VER 6.03 >Ports Locked by M&C (C) ! > > 0050 V31 +*** *** *** *** *** ****+RxIF To! S@@T@L0634 @@ >DAC 2202 VER 6.03 >

7.7. Programming Instructions Pedestal Control Unit

These instructions apply to Pedestal Control Units with GP32 Processors.

Electrical Hookup – DAC-2200/2202/2302
 	
  1. Use a standard straight 9-pin serial cable (P/N 120643 or equiv.) connected between the ACU (M&C Port) and a PC with an available com port.
 	
Electrical Hookup – DAC03 with Software 4.6x
 	
  1. Ensure that a PC DAC cable (116670 or equiv.) is connected between ACU (J11 M&C/NMEA Port) and a PC with an available com port.	

2. Obtain a Copy of the ACU .s19 file and save in a convenient area such as the desktop or in the same directory as the ProgTerm files.	
3. Click on the "ProgTerm" icon to open the ProgTerm program and verify the build date is Mar 2007 or later	

Programming Operation: PCU Software Upload
 	
  4. Power on ACU and Antenna.
 	
  5. From the CommPort menu, select the correct ProgTerm programming mode and destination. I.E. for a DAC2200 / 2202 PCU, click the 'DAC2200 to PCU' menu item. It is very important to be sure that you have selected the correct programming mode (DAC-03, DAC-2200, Coastal or Direct) and the correct destination (ACU, PCU or DVB). If you select the incorrect destination and actively override the self-check warnings, you will most certainly render your system inoperable	

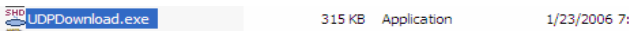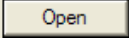|	
	✔ Port Open Hex Data Display (------) WC-3000 Direct (9600) Coastal PCU Direct (9600) Coastal PCU to DVB (9600) Coastal PCU to Panel (9600) Dac 03 to ACU (4800) Dac 03 to PCU (4800) Dac 03 to DVB (4800) Dac 2200 to ACU (9600) ✔ Dac 2200 to PCU (9600) Dac 2200 to DVB (9600) Properties...
Check the status bar at the bottom edge of the ProgTerm window. It displays the selected serial interface (baud rate and port), the operating mode (DAC Style), and program destination (ACU, PCU, or DVB).	Status: Settings: 9600,n,8,1, Com 1 DAC 2K Translation PCU 00:00:53
6. From the "**CommPort**" menu, select "**Properties**". 7. Verify the correct COM port is selected. Select correct Maximum Speed (9600 for DAC2200/2202) and 4800 for DAC03). 8. Press "**OK**" to confirm any changes.	*CommPort Properties dialog showing Port: Com1, Maximum Speed: 9600, Echo: On, Data Bits: 8, Parity: None, Stop Bits: 1, Flow Control: None*
9. Verify the LED on the right side of the program is GREEN indicating the port is open and functional. Click on the LED or select Port Open from the Comm Port menu to change the active state of the port and the LED.	CTS ☑ RTS ☑ DSR ☐ DTR ☑ DCD ☐
10. Click on the Paper Clip [button] button and then click on the EyeBall [button] button in the tool bar. These query the PCU for Module Status and Module Version. The responses will be the Status and Version of the PCU which the ACU is connected to (such as "3004 VER 2.xxL"). Both of these data requests must function properly before you can continue.	SKH@| 3004 VER 2.44L
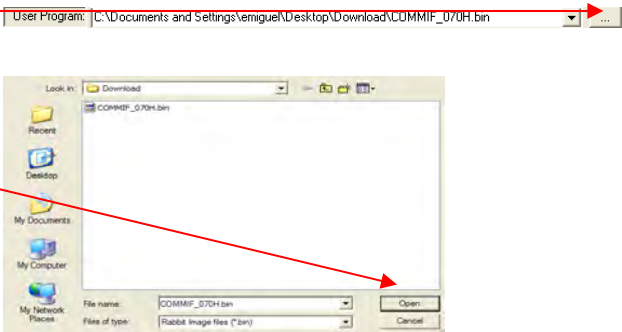
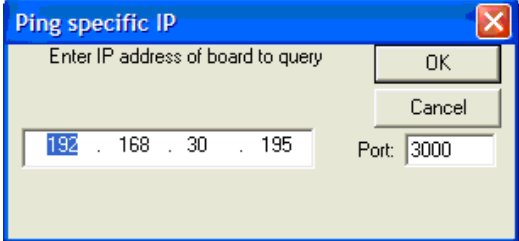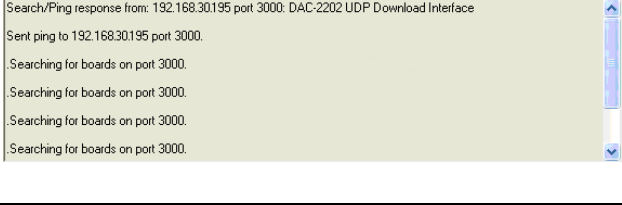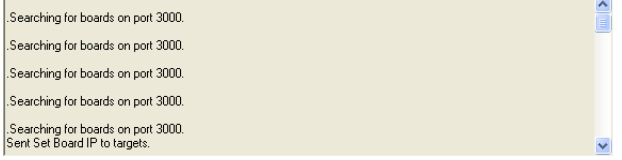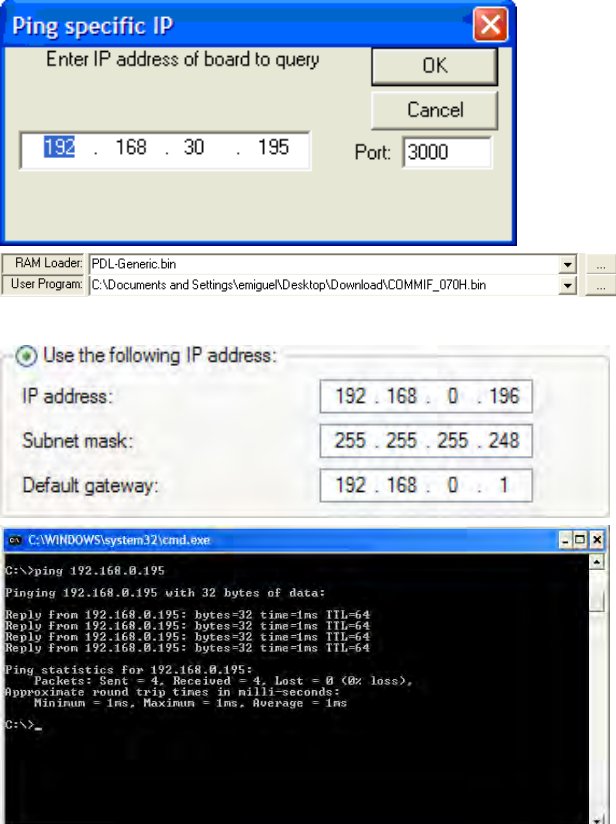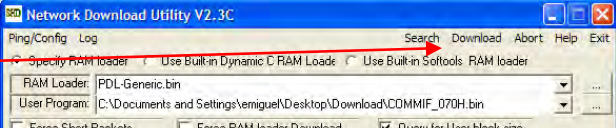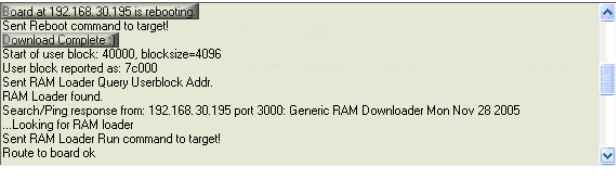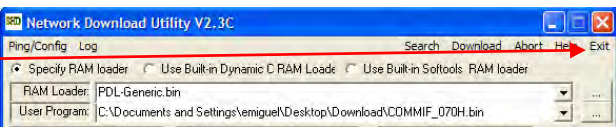|	
If the PCU does not respond to a status request (Paper Clip button), the module may have been erased by a previous action. It can still be programmed but you need to reboot the loader by typing "S9<enter>"	
11. Press "Tools>Remote Upload / Reboot Module" to enable PCU software upload mode. The ACU front panel should now read "Remote Upload"	Tools Help PCU Tools ▶ ACU Tools ▶ Send GPS Data Reset HDG Range null, 1, 10, 100 Remote Upload / Reboot Module Restore ACU Operation (\0090 Reset) Start Progamming Sequence Erase Upload S19 File Expert Mode Bulk Erase Modem Tune
12. Press '**START**' to put the selected module into programming mode. After 2 to 3 seconds, you should see an echo of something like graphic to the right 0050 (Checksum of memory after serial load, 0050 for initial start) V14 or V01 (Version number of module bootloader)	SKH@¦ 3004 VER 2.44L m0159 >Ports Locked by M&C (C) ! >SKH@¦ Ports Locked by M&C (C) ! > > 0050 V14
13. Press '**ERASE**' to clear the current Flash program memory. The screen should now respond '**0578***' for PCU programming. If it responds with some other characters or the '*****' is not present, check to be sure that Tracking has been turned off and press '**ERASE**' again. ***Do not continue until a proper response is achieved.***	SKH@¦ 3004 VER 2.44L m0159 >Ports Locked by M&C (C) ! >SKH@¦ Ports Locked by M&C (C) ! > > 0050 V14 ^0578*
14. Press '**UPLOAD**' to begin sending the new hex file program update to the ACU module. A dialog box will appear to allow you to select the file to be programmed.	Upload Hex File Look in: Update dacm511.s19 My Recent Documents Desktop My Documents My Computer My Network Places File name: dacm511.s19 Open Files of type: Hex S19 Files (*.S19) Cancel Open as read-only

15. Program Terminal will send the new file to the desired module and you will see an "Upload" dialog box with a "Cancel" button.	
For each line of hex data that is programmed during the PCU software upload procedure ProgTerm will display one of the following characters: "*****" (successful programming), "**_**" (failed programming), "**!**" (protected memory access) ⚠️*If you see any "_" characters while programming you should press **Cancel** to abort the upload and determine the source of the problem.*	
16. If the bootload is successful, the module will reboot, you will not see any text after the last S9 record. Press "Tools>Restore ACU Operation and it will respond correctly to the Paper Clip and EyeBall tool bar button requests to display the new versions you've just Uploaded. In this case, you are done.	

7.8.   Communications Interface (CommIF PCB) Software Upload Instructions

The newly released antenna control has implemented an embedded Rabbit© 3720 controller (known as the "Comm IF PCB") into the 68HC908 based DAC-2202. The addition of the Comm If PCB adds 3 serial ports (M&C, NMEA A, and NMEA B) 2 TCP/IP connections, 1 UPD connection (Rabbit Module update port), a Web server and processing power for future ACU releases. This document describes the process of uploading software to the Rabbit Module using 3rd party Network Download Utility Software (UDPDownload.exe, Contact the Sea Tel Service Dept for a copy).
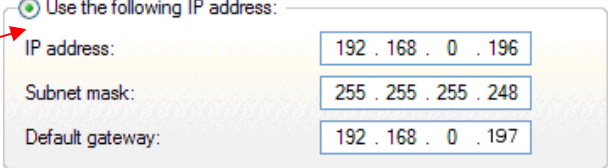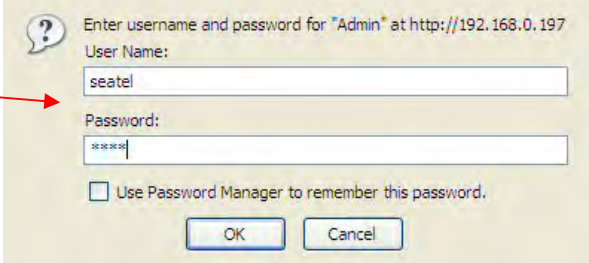
1. Connect the "ETHERNET" port on DAC-2202 to a Local Area Network (LAN) Connection using a standard CAT5 cable that has its IP address, subnet mask, and Gateway parameters match that of the DAC2202's Ethernet port.	Factory default IP address for all ACU Ethernet Ports is 192.168.30.195. If this has been changed to match an existing network, refer to the instructions in the Maintenance & Troubleshooting section (Configuring the COMM IF ports of the DAC-2202 ACU) in the DAC2202 Manual
2. Power on DAC2202	
3. Start the Network Download Utility called "UDPDownload.exe"	

4. Ensure that the "RAM Loader" displays as PDL-Generic.bin	RAM Loader: PDL-Generic.bin
5. Ensure that the "User Program" field displays the file location & is current software version. If correct, skip ahead to step 9. If incorrect, continue on to step 6	User Program: C:\Documents and Settings\emiguel\Desktop\Download\COMMIF_070H.bin
6. Select the [...] icon 7. Browse to the location where the bin file is stored. 8. Select the [Open] icon.	User Program: C:\Documents and Settings\emiguel\Desktop\Download\COMMIF_070H.bin
9. Click on "Ping/Config" then "UDP Port" and enter 3000	**UDP Port Number** Enter UDP port # to communicate with boards. [3000] OK Cancel
10. Press "Reset" key on front panel of ACU. 11. Click on "Ping/Config" then "Ping Specific IP" and enter the address of the DAC2202 then click OK. (One time only)	**Ping specific IP** Enter IP address of board to query OK Cancel 192 . 168 . 30 . 195 Port: 3000
12. Verify "Search/Ping Response from: 192.168.30.195 port 3000: DAC-2202 UDP Download Interface" is displayed in bottom Dialog Box and skip ahead to step 13 if this step fails continue on to 12a.	Search/Ping response from: 192.168.30.195 port 3000: DAC-2202 UDP Download Interface Sent ping to 192.168.30.195 port 3000. .Searching for boards on port 3000. .Searching for boards on port 3000. .Searching for boards on port 3000. .Searching for boards on port 3000.
12a. If "Searching for boards on port 3000." continuously displays on bottom dialog box after sending Ping Request, then the Comm IF PCB is NOT communicating with computers Ethernet port. Possible Failure: Network Download Utility not configured correctly Check: Verify IP address and Port Number entered in step 11 matches that of the ACU. (Factory Default IP address is 192.168.30.195 with a Subnet mask of 255.255.255.248)	.Searching for boards on port 3000. .Searching for boards on port 3000. .Searching for boards on port 3000. .Searching for boards on port 3000. .Searching for boards on port 3000. Sent Set Board IP to targets.

Check: Verify "RAM Loader" and "User Program" parameters entered in Steps 4 and 5. Possible Failure: Laptop Ethernet Port settings not configured correctly. Check: Verify computer LAN port has been configured with a static IP address on the same Subnet as DAC2202. Possible Failure: UDP Port Lockout Check: The UDP port is only open for a limited time frame after ACU is powered up or Reset button is pressed. First verify ability to Ping ACU Ethernet Port using windows Command Prompt. If successful, go back to step 7.	
13. Click on "Download" in the upper right hand corner to start the download process.	
14. Verify dialog box displays "Download Complete:)" 15. Verify the Network Download Utility sends a Reboot command to the ACU and that the ACU echo's back "Board at 192.168.30.195 is rebooting"	
16. Close Network Download Utility by clicking on "Exit"	

7.9.   Internal HTML Page

The following procedure(s) define the process of connecting and logging into the DAC2202's internal HTML page. **If the IP address for your DAC2202 has been changed from a factory default of 192.168.30.195 or if is unknown use the procedure in section 5.21 to view or change the existing parameters.

1. Connect the "ETHERNET" port on DAC-2202 to a Local Area Network (LAN) Connection or directly to an available Ethernet port on a Laptop/Desktop using a standard CAT5 cable.	
2. Power on DAC2202	
3. Configure the connected LAN connection with a static IP address which is on the same sub net as the DAC2202.	
4. Start up your Internet Browser (i.e. Internet Explorer, Mozilla Firefox, etc.) and type in the IP address of the DAC2202 into the address bar.	
5. Log into the DAC2202 by typing in Username and Password information . USERNAME: seatel PASSWORD: 1234	

7.9.1. <u>System Information</u>

Number	Description
1	Click to redirect to the **Port Settings** Page. This page presents the TCP connection and baud rate settings for the Comm If Module.
2	Click to redirect to the **DAC Parameters 1** Page. This page presents the current ACU configuration parameter values stored in the 68HC08 processor.
3	Click to redirect to the **DAC Parameters 2** Page. This page presents the current Satellite Tracking parameter values stored in the 68HC08 processor. This page also contains the currently defined blockage zones (Az Limits 1-6).
4	The **ACU Model** field displays the software version currently installed in the DAC2202 M/B.
5	Click to redirect to the **Status** page. This page presents current system status, including Tracking condition, Antenna Position, Vessel Location / Orientation, and decoded error conditions.
6	The **PCU Model** field displays the Antenna model configuration and the software version currently installed in the PCU.
7	The **Comm Interface** field displays the currently software version installed onto the Comm If Module.
8	The **Serial Number** display fields are NOT currently being used.

7.9.2. Communication Port Settings

Number	Description
1	The **IP Address** field presents the Static Internet Protocol address value currently stored in the Comm IF module (Flash). To change the IP address to match an existing LAN info structure, type in the desired value and click on the **SUBMIT** button. If the parameter change causes desirable operation click on the **SAVE** button to store value to Flash. This address must conform to the *nnn.nnn.nnn.nnn* format where *nnn* is a number between 0 and 255.
2	The **Net Mask** field presents the Subnet Mask address value currently stored in the Comm IF module. To change the Subnet to match an existing LAN info structure, type in the desired value and click on the **SUBMIT** button. If the parameter change causes desirable operation click on the **SAVE** button to store value to Flash. This address must conform to the *nnn.nnn.nnn.nnn* format where *nnn* is a number between 0 and 255.
3	The **Gateway** field presents the Static Gateway Internet Protocol address value currently stored in the Comm IF module. To change the Gateway IP address to match an existing LAN info structure, type in the desired value and click on the **SUBMIT** button. If the parameter change causes desirable operation click on the **SAVE** button to store value to Flash. This address must conform to the *nnn.nnn.nnn.nnn* format where *nnn* is a number between 0 and 255.
4	The **TCP Port 0** field presents the Transmission Control Protocol Port 0 value currently stored in the Comm IF Module. To change the Port value to match an existing LAN info structure, type in the desired value and click on the **SUBMIT** button. If the parameter change causes desirable operation click on the **SAVE** button to store value to Flash. This address must conform to the *nnnn* format where *nnnn* is a number between 0 and 65535.
5	The **TCP Port 1** field presents the Transmission Control Protocol Port 1 value currently stored in the Comm IF Module. To change the Port value to match an existing LAN info structure, type in the desired value and click on the **SUBMIT** button. If the parameter change causes desirable operation click on the **SAVE** button to store value to Flash. This address must conform to the *nnnn* format where *nnnn* is a number between 0 and 65535.
6	The **UDP Port** presents the User Datagram Protocol Port value stored in the Comm IF Module. This port is specifically used to perform software upgrades to the Comm IF Module and should NOT be changed.
7	Click to redirect to the **DAC Parameters 1** Page. This page presents the current ACU configuration parameter values stored in the 68HC08 processor.

8	Click to redirect to the **DAC Parameters 2** Page. This page presents the current Satellite Tracking parameter values stored in the 68HC08 processor. This page also contains the currently defined blockage zones (Az Limits 1-6).
9	Click to redirect to the **Status** page. This page presents current system status, including Tracking condition, Antenna Position, Vessel Location / Orientation, and decoded error conditions.
10	Click to redirect to the **Home** page. This page presents current system software versions and antenna model configuration.
11	Click the **SAVE** button to store all current parameters in the operating software variables table to Flash (Comm IF). **THIS DOES NOT SAVE DISPLAYED PARAMETERS UNLESS THE SUBMIT BUTTON IS PRESSED FIRST**
12	The **M&C Baudrate** field presents the J3 M&C Port Baud rate value currently stored in the Comm IF Module. To change the Baud rate, type in the desired value and click on the **SUBMIT** button or click on the **SAVE** button to store value to Flash. Acceptable baud rate values are 4800 or 9600.
13	The **NMEA A Baudrate** field presents the J2 NMEA Port A Baud rate value currently stored in the Comm IF Module. To change the Baud rate, type in the desired value and click on the **SUBMIT** button or click on the **SAVE** button to store value to Flash. Acceptable baud rate values are 4800 or 9600.
14	The **NMEA B Baudrate** field presents the J2 NMEA Port B Baud rate value currently stored in the Comm IF Module. To change the Baud rate, type in the desired value and click on the **SUBMIT** button or click on the **SAVE** button to store value to Flash. Acceptable baud rate values are 4800 or 9600.
15	Click the **SUBMIT** button to transfer all currently displayed parameters to the Comm IF module operating software variables table. NOTE: The submit button will not store the values to flash; an ACU reset (hard or soft) will revert to the old settings.

7.9.3. DAC Parameters Page 1

Number	Description
1	Click to redirect to the **Port Settings** Page. This page presents the TCP connection and baud rate settings for the Comm If Module.
2	Click to redirect to the **DAC Parameters 1** Page. This page presents the current ACU configuration parameter values stored in the 68HC08 processor.
3	Click to redirect to the **DAC Parameters 2** Page. This page presents the current Satellite Tracking parameter values stored in the 68HC08 processor. This page also contains the currently defined blockage zones (Az Limits 1-6).
4	Click to redirect to the **Status** page. This page presents current system status, including Tracking condition, Antenna Position, Vessel Location / Orientation, and decoded error conditions.
5	Click to redirect to the **Home** page. This page presents current system software versions and antenna model configuration.
6	Click the "**RELOAD**" button to refresh the screen to the current ACU parameter values
7	Click the **SAVE** button to store all currently displayed parameters to Flash (68HC08).
8	These fields present the ACU parameter values currently stored in Flash. To change a parameter value mouse click inside the entry field and type in the desired value and click on the **SUBMIT** button. If the parameter value change(s) causes desirable operation click on the **SAVE** button to store value to Flash. Refer to Setup (Section 5) of this manual for acceptable range values and definitions of these parameters.
9	This List box presents the decoded System Type parameter currently stored in Flash. When the entered System Type value enables an available ACU system options it is highlighted in blue. No changes to this list box is possible, any desired changes to the System Type parameter are done via the **System Type** entry field.

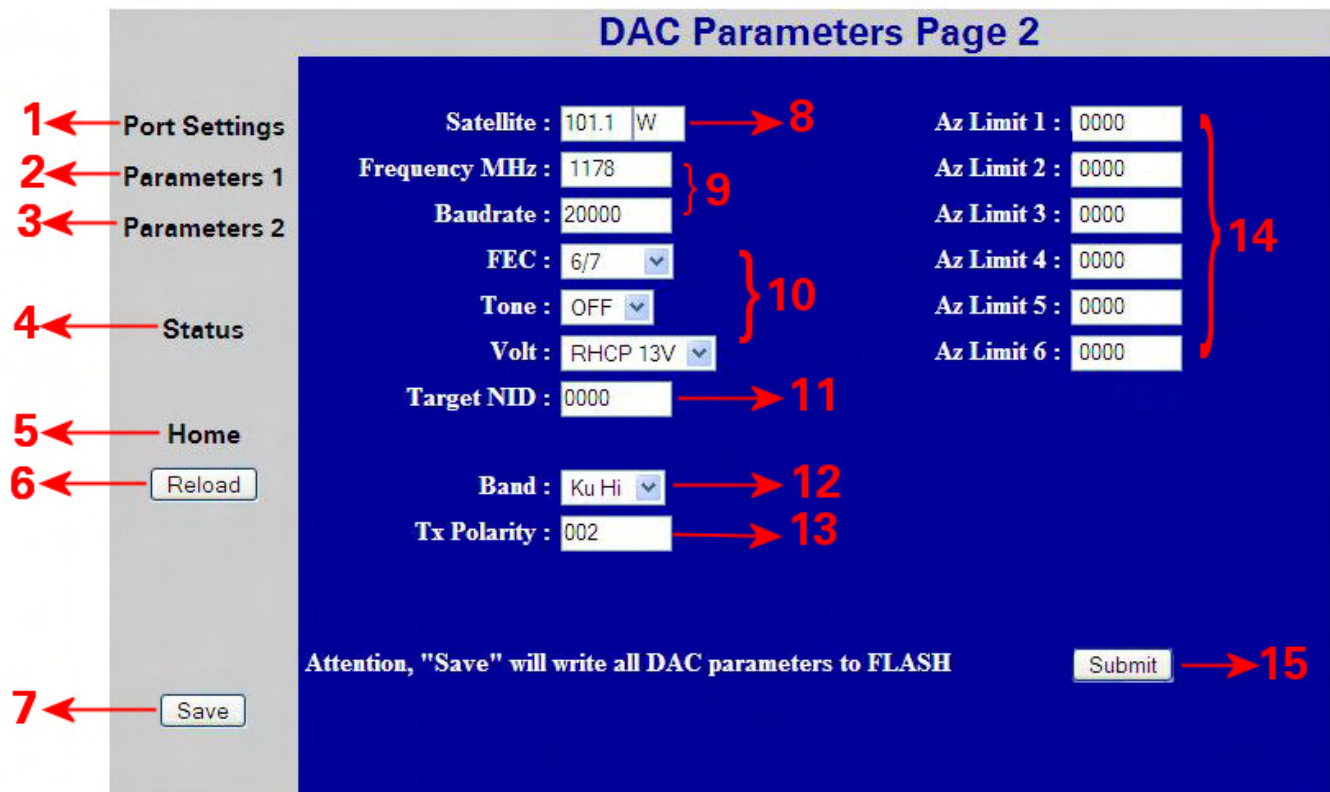|	
10	This drop-down list box presents the Gyro Type parameter value currently stored in Flash. To change to Gyro type, mouse click on the selection arrow and choose the desired gyro source which is interfaced with the DAC2202.
11	Click the **SUBMIT** button to transfer all currently displayed parameters to the 68HC08 module operating software variables table. NOTE: The submit button will not store the values to flash, an ACU reset (hard or soft) will revert to the old settings.

7.9.4. DAC Parameters Page 2

Number	Description
1	Click to redirect to the **Port Settings** Page. This page presents the TCP connection and baud rate settings for the Comm If Module.
2	Click to redirect to the **DAC Parameters 1** Page. This page presents the current ACU configuration parameter values stored in the 68HC08 processor.
3	Click to redirect to the **DAC Parameters 2** Page. This page presents the current Satellite Tracking parameter values stored in the 68HC08 processor. This page also contains the currently defined blockage zones (Az Limits 1-6).
4	Click to redirect to the **Status** page. This page presents current system status, including Tracking condition, Antenna Position, Vessel Location / Orientation, and decoded error conditions.
5	Click to redirect to the **Home** page. This page presents current system software versions and antenna model configuration.
6	Click the **RELOAD** button to refresh the screen to display the current ACU parameter values
7	Click the **SAVE** button to store all currently displayed parameters to Flash (68HC08).

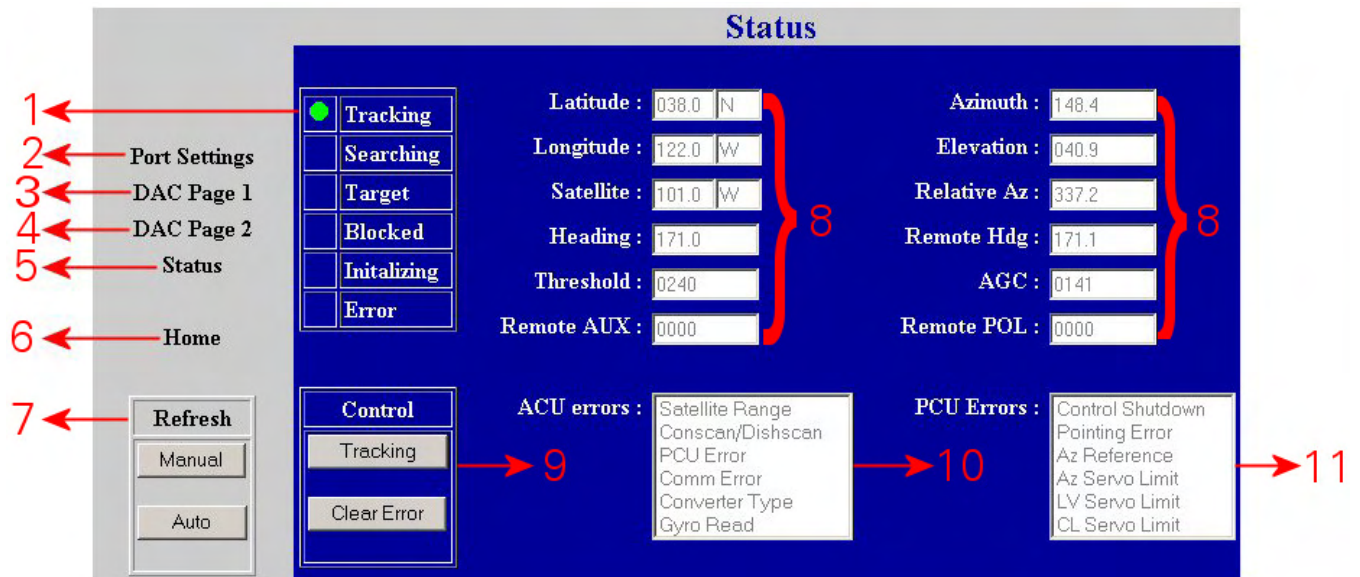|	
8	The **SATELLITE** field(s) present longitudinal position of the currently stored (or last targeted) satellite. To change a parameter value mouse click inside the entry field and type in the desired value. Refer to Setup (Section 5) of this manual for acceptable range values.
9	These fields present 2 of the required 6 tracking parameters of the currently stored (or last targeted) satellite. To change a parameter value mouse click inside the entry field and type in the desired value. Refer to Setup (Section 5) of this manual for acceptable range values.
10	These fields present 3 of the required 6 tracking parameters of the currently stored (or last targeted) satellite. To change this parameter value mouse click on the drop down menu arrow and select desired parameter from list. Refer to Setup (Section 5) of this manual for acceptable range values.
11	This field presents the Network Identification parameter currently stored for the desired satellite. To change a parameter, value mouse click inside the entry field and type in the desired HEX format value. Refer to Setup (Section 5) of this manual for acceptable range values.
12	The **BAND** field presents the currently stored Tracking Band Selection in memory. To change this parameter value mouse click on the drop down menu arrow and select desired parameter from list. Refer to Setup (Section 5) of this manual for acceptable range values.
13	The **Tx Polarity** field presents the default Transmit Polarity parameter currently stored. To change a parameter value mouse click inside the entry field and type in the desired value Refer to Setup (Section 5) of this manual for acceptable range values.
14	The **Az Limits 1-6** fields presents the defined blockage zones currently stored. To change a parameter value mouse click inside the entry field and type in the desired value Refer to Setup (Section 5) of this manual for acceptable range values.
15	Click the **SUBMIT** button to transfer all currently displayed parameters to the 68HC08 module operating software variables table. NOTE: The submit button will not store the values to flash, an ACU reset (hard or soft) will revert to the old settings.

7.9.5. Status Page

Number	Description
1	These fields presents the current antenna status.
2	Click to redirect to the **Port Settings** Page. This page presents the TCP connection and baud rate settings for the Comm If Module.
3	Click to redirect to the **DAC Parameters 1** Page. This page presents the current ACU configuration parameter values stored in the 68HC08 processor.
4	Click to redirect to the **DAC Parameters 2** Page. This page presents the current Satellite Tracking parameter values stored in the 68HC08 processor. This page also contains the currently defined blockage zones (Az Limits 1-6).
5	Click to redirect to the **Status** page. This page presents current system status, including Tracking condition, Antenna Position, Vessel Location / Orientation, and decoded error conditions.
6	Click to redirect to the **Home** page. This page presents current system software versions and antenna model configuration.
7	The **Refresh** field allows the user to adjust the page refresh settings, AUTO is selected by default, which refreshes the displayed page every 5 seconds
8	These fields presents the antenna's positional and signal strength information currently stored. To change a parameter value mouse click inside the entry field and type in the desired value Refer to Setup (Section 5) of this manual for acceptable range values.
9	The **Control** field buttons allow the user to Toggle the antennas' current tracking condition or to clear any reported errors as reported in fields 10 and 11.
10	The **ACU Errors** box is a read only field that presents the decoded ACU reported errors that are currently triggered. Refer to the Maintenance section of this manual for troubleshooting frequent or constant errors.
11	The **PCU Errors** box is a read only field that presents Pedestal reported errors currently triggered. Refer to the Maintenance section of this manual for troubleshooting frequent or constant errors.

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8.   Technical Specifications

The technical specifications for the DAC-2202 ACU and some of the specifications for general Below Decks are:

8.1.   DAC-2202 Antenna Control Unit

The technical specifications for the DAC-2202 ACU are:

8.1.1. General

Physical Dimensions:	Rackmount: 1.75" x 17" x 14"
Input Voltage:	110/220 VAC, 50/60 Hz
Power Requirements:	160 Watts maximum (including the stabilized antenna pedestal and TSC-10 Touch Screen Controller)

8.1.2. Front Panel

Status Indicator Display:	6 LED enunciators for Tracking, Searching, Target, Power, Initializing, and Error
Alpha Numeric Display:	2 Line 20 Character Alpha Numeric
Next Button	Cycles display between Ship, Satellite, Antenna, and Status
4-Position Keypad	Cycles cursor Up / Down / Left / Right
Enter Button	
Reset Button	Soft reset to ACU ONLY
Controls:	AC Power On/Off

8.1.3. Rear Panel

Connectors:

J1 "Ship Gyro"	25 pin female D-Subminiature
J2 "NMEA" RS-422 Serial I/O	9 pin male D-Subminiature
J3 "M&C" RS-422 Serial I/O	9 pin female D-Subminiature
J4A "Antenna" RS-422 Pedestal M&C	9 pin female D-Subminiature
J4B "Antenna" Control IF and Pedestal DC Power	Type F female
J6 "RF IN" Tracking Receiver IF Input	Type F female
J7 "RF OUT" Tracking Receiver IF Output	Type F female
"Ethernet"	RJ-45
"AC Input Power 95-250VAC"	IEC receptacle

8.1.4. J4A "Antenna" Pedestal M&C Interface

Communications Parameters:	9600 Baud, 8 bits, No parity, 1Stop Bit
Interface Protocol:	Full Duplex RS-422
Base Modem Power:	30 Volts DC
Interface Connector:	9 pin male D-Subminiature

8.1.5. J4B "Antenna" Pedestal M&C Interface

Communications Parameters:	9600 Baud, 8 bits, No parity, 1Stop Bit
Interface Protocol:	Full Duplex FSK Modulated at 70 KHz (TX) & 120 KHz (RX)
Antenna Power:	30 Volts DC
Interface Connector:	Type F female

8.1.6. J3 "M&C" Aux Serial Interface

Communications Parameters:	9600 Baud, 8 bits, No parity, 1Stop Bit
Interface Protocol:	Optically Isolated RS-422/RS232
Interface Connector:	DE9S

8.1.7. J2 "NMEA A" Interface

Communications Parameters:	(Selectable) 4800 Baud, 8, N, 1
Interface Protocol	Optically isolated RS-422 Receive
	RS-232 Transmit (Pseudo GGA echo sentence)
Interface Connector	DE9P
NMEA GPS Sentence:	xxGLL typically GPGLL or LCGLL
NMEA Heading Sentence:	xxHDT or xxHDM typically HCHDM or HCHDT

8.1.8. J2 "NMEA B" Interface

Communications Parameters:	(Selectable) 4800 Baud, 8, N, 1
Interface Protocol	Optically isolated RS-422 Receive
Interface Connector	DE9P
NMEA GPS Sentence:	xxGLL typically GPGLL or LCGLL
NMEA Heading Sentence:	xxHDT or xxHDM typically HCHDM or HCHDT

8.1.9. Ethernet

Interface Protocol	10BaseT
Interface Connector	RJ-45
Interface Ports	2 TCP M&C (Ports 2000, 2001)
	1 UPD Upload (Port 3000)
	1 Multi-User HTML (Port 80)

8.1.10. <u>DVB Compliant Tracking Receiver</u>

Internal Satellite Identification Receiver

Tuning range	950 to 2150 MHz in 1 MHz increments in DVB Mode.
Input RF Level	-85 to -25 dBm typical
Output RF Level	Input level +/- 1 dB typical
Sensitivity	30 mV / dB typical
Bandwidth	Selectable 7.5-30 MHz in DVB Mode,
Polarity switching	13 VDC output to select **Vertical** or **RHCP** polarity.
	18 VDC to output select **Horizontal** or **LHCP** polarity
Band Switching:	22kHz continuous tone output to select **High** band, No tone to select **Low** band.
Satellite ID	Network ID for DVB signals. QPSK demodulator and FEC decoder lock for DSS, or DVB without NID (forced NID).
QPSK Demodulator	3000 to 30000 baud (ksps)
FEC Decoder	1/2, 2/3, 3/4, 5/6, 6/7, 7/8, or Automatic.
Pipeline Decoder	DVB or DSS compatible.

8.1.11. <u>L-Band SCPC Narrow Band Tracking Receiver</u>

Internal Satellite Identification Receiver

Tuning range	950 to 2150 MHz in 1 KHz increments.
Input RF Level	-85 to -25 dBm typical
Output RF Level	Input level +/- 1 dB typical
Sensitivity	30 mV / dB typical
Bandwidth	300 KHz
Polarity switching	13 VDC output to select **Vertical** or **RHCP** polarity.
	18 VDC to output select **Horizontal** or **LHCP** polarity
Band Switching:	22kHz continuous tone output to select **High** band, No tone to select **Low** band.

8.1.12. <u>Narrow Band SCPC receiver:</u>

Frequency Range:	60 - 80 MHz (70 MHz SCPC) Narrow Tuning Range
	52 - 88 MHz (70 MHz SCPC) Wide Tuning Range
	110 - 170 (140 MHz SCPC)
Input Level:	-90 to -30 dBm
Detection Bandwidth:	30 kHz

8.2.   Terminal Mounting Strip

8.2.1. Synchro Interface:

Connectors	5 screw terminal connections
Input Voltage Level	36-110 VDC, 400 or 60 hertz
Synchro Ratios	1:1, 36:1, 90 or 180:1 and 360:1 with Synchro-Digital converter
	360:1 with Synchro-SBS converter
Impedance:	1M ohm

8.2.2. SBS Interface

Connectors	4 screw terminal connections
Input Voltage Level	20-90 VDC
Interface	Opto-Isolated,
Polarity	Auto switching
Ratio	6 steps per degree
Impedance:	10K ohm

8.2.3. Control Interface

8.2.3.1.   External AGC

External AGC or Satellite Modem Lock Input.

Connections	2 screw terminal connections (AGC and GND)
Voltage Level:	0-5 VDC
Impedance:	30K ohm
Control:	Low Level (<1.25Vdc) = Modem Lock*
	High Level (>1.25Vdc) = Modem Unlock*

   *The logic sense of the external Satellite Modem Lock input can be reversed by adding 128 to the SYSTEM TYPE Parameter.

8.2.3.2.   SW1 Local Band Select Output

Control local (BDE) band select switch(s) or tone generator(s).

Connections	1 screw terminal connection (SW1)
Control Level:	Low Band = OPEN circuit
	High Band = SHORT to ground
	Controlled by MODE – TRACKING – Band Selection.
	Current sink of 0.5 amps **max**

8.2.3.3.   SW2 Blockage / TX Mute Output

Blockage output to Dual Antenna Arbitrator coax switch panel OR TX Mute output to Satellite Modem for RF radiation hazard and/or FCC compliance.

Connections	1 screw terminal connection (SW2)
Control Level:	Not Blocked or Not mispointed = OPEN circuit*
	Blocked or mispointed = SHORT to ground *
	Current sink of 0.5 amps **max**

*You may reverse the factory default logic level output by adding 16 to the current SYSTEM TYPE parameter.

8.2.4. NMEA Interface

This interface allows up to two simultaneous external GPS or NMEA 0183 compliant Heading inputs and an echoed GPS (GPGGA) output.

Connections	5 Screw terminal connections (RXA+ / RXA- input, RXB+ / RXB-input, and TXA+ output)

8.3.   Environmental Conditions

The following requirements apply to equipment installed in weather-protected locations.

Temperature	0 to 40 degrees C
Humidity	Up to 100% @ 40 degrees C, Non-condensing

8.4.   Cables

8.4.1. DAC-2200 AC Power Cable

Voltage:	110 or 220 volts AC
Cycle:	50 or 60Hz
Power:	160 Watts maximum

8.4.2. Antenna Control Cable

Refer to your antenna manual for connection to J4A using a multi-conductor cable assembly or to J4B using a coax cable.

8.4.3. IF Signal Cables

Please refer to the "Antenna L-Band IF Coax Cables" section of the specification chapter of your antenna manual for coaxial cable recommendations.

8.4.4. SBS/Synchro Gyro Compass Interface Cable (Customer Furnished)

Type:	Multi-conductor, Shielded
Number of wires	4 Conductors for Step-By-Step Gyro, 5 Conductors for Synchro
Wire Gauge:	18 AWG
Insulation:	600 VAC

8.4.5. Audio / Video cables

Customer supplied. Connects the DSS receiver outputs to you video monitor, TV, or stereo system.

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9. Drawings

The drawings listed below are provided as a part of this manual for use as a diagnostic reference.

9.1. DAC-2202 Antenna Control Unit Drawings

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SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY		PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1	EA	124265	A	ENCLOSURE, 1U RACKMOUNT, DAC-2200	
2	1	EA	122300	E	LID, DAC-2200 SERIES ENCLOSURE	
5	1	EA	120385-2	A	BRACKET, LID, ACU ASS'Y	
7	1	EA	122445	A	FRONT PANEL ASS'Y, DAC-2200	
8	1	EA	119667-5	A	POWER ENTRY MODULE, 120V, 3A	
9	1	EA	122307-1	G	DVB RECEIVER ASS'Y, STD ACU	
11	1	EA	124813-1	E	PCB ASS'Y, DAC ACU	
16	1	EA	114836	A	PCB ASS'Y, S/D CONVERTER, 12 BIT	
17	1	EA	123046-3	A2	HARNESS, DC POWER	
18	1	EA	125343-6		POWER SUPPLY, COSEL PBA150F-24	
19	1	EA	112646-13	A2	PCB ASS'Y, DC-DC CONVERTER	
21	1	EA	122660-4	A	HARNESS, AC ENTRY, SINGLE	
24	1	EA	112918-9	B1	CABLE ASS'Y, RIBBON, 20 PIN	
25	1	EA	120740	A	CABLE ASS'Y, DVB RECEIVER	
30	1	EA	123070		DECAL, HIGH VOLTAGE WARNING	
41	8	EA	110941-3	B	SCREW, JACK, 4-40 X 5/16	
42	1	EA	114587-106		SCREW, RND HD, PHIL, 4-40X1/4, S.S	
44	7	EA	114588-144		SCREW, PAN HD, PHIL, 6-32 x 1/4, S.S.	
45	6	EA	114576-106		SCREW, FLAT HD, PHIL, 4-40 x 1/4, S.S.	
46	1	EA	114588-146		SCREW, PAN HD, PHIL, 6-32 x 3/8, S.S.	
47	6	EA	114580-007		WASHER, FLAT, #6, S.S.	
48	2	EA	114583-007		NUT, HEX, 6-32, S.S.	
49	4	EA	119967	A	NUT, HEX, PANEL, 3/8-32	
50	3	EA	119952-031	A1	WASHER, STAR, INTERNAL TOOTH, 3/8, S.	
58	1	EA	120090-17		MICRO ASS'Y, 12-BIT SDC	
65	2	EA	120452-32		SCREW, RND HD, PHIL, 6-32 X 3/8, BLACK	
68	5	EA	119961-007		NUT, HEX, SMALL PATTERN, 6-32, S.S.	
72	4	EA	120077-118		SCREW, FLAT HD, PHIL, M3 X 8, S.S.	
73	1	EA	125193	0.71	SOFTWARE, DAC-2202 I/O, RABBITCORE	

Sea Tel				
DAC-2202, DVB RCVR, COAX IF				
PROD FAMILY COMMON	EFF. DATE 21-Dec-07	SHT 1 OF 2	DRAWING NUMBER **125411-1**	REV **D**

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
74	1 EA	124871	6.02E	SOFTWARE, DAC-2202 ACU, GP32, STD	
76	1 EA	108929-2	C1	POWER CORD, 110V AC	(NOT SHOWN)
77	1 EA	109752-3		POWER CORD, 220V AC	(NOT SHOWN)
78	1 EA	110959-1	A1	DECAL, MODEL & P/N, SMALL	

Sea Tel

DAC-2202, DVB RCVR, COAX IF

PROD FAMILY COMMON	EFF. DATE 21-Dec-07	SHT 2 OF 2	DRAWING NUMBER 125411-1	REV D

VIEW A-A
SCALE: 2:1

POWER SUPPLY CONNECTIONS

(terminals) +V +V -V -V FG AC(L) AC(N)

DASH No.	RECEIVER	ANTENNA	JP3
-1	DVB	COAX	2-3
-2	DVB	9 WIRE	1-2
-3	SCPC	9 WIRE	1-2

NOTES, UNLESS OTHERWISE SPECIFIED:

1. APPLY ADHESIVE PER SEA TEL SPEC. 121730.

2. LOCATE LABEL, ITEM 69 AS SHOWN APPROXIMATLY

3. INSTALLED JUMERS:
   JP2 1-2
   JP3 SEE DASH TABLE
   JP4 1-2

4. ROUTE THE RIBBON CABLE PER DRAWING ORIENTATION.

REFERENCE DRAWINGS:

126881   WIRING DIAGRAM, DAC 2202

TOLERANCES
UNLESS OTHERWISE SPECIFIED
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

DRAWN BY: LAE
DRAWN DATE: 5/17/06
APPROVED BY:
APPROVED DATE:
MATERIAL:
FINISH:

Sea Tel®
4030 NELSON AVENUE
CONCORD, CA 94520
Tel. 925-798-7979 Fax. 925-798-7986

TITLE:
DAC 2202
RACKMOUNT ASS'Y

SIZE: B
SCALE: FULL
DRAWING NUMBER: 125411
REV: D

3rd ANGLE PROJECTION
FIRST USED:
SHEET NUMBER: 1 OF 1

DAC 2202 ANTENNA CONTROL UNIT

Panel labels:
AC POWER 95-260 VAC
RF IN J6
RF OUT J7
ETHERNET
ANTENNA J4 B
ANTENNA J4 A
M&C J3
NMEA J2
SHIP GYRO J1

ENTER RESET Power
NEXT TRACK
Ship Satellite Antenna Status
Power Initializing Error
Tracking Searching Target

DOCUMENT NO. 124225-4_A

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY		PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1	EA	124265	A	ENCLOSURE, 1U RACKMOUNT, DAC-2200	
2	1	EA	122300	E	LID, DAC-2200 SERIES ENCLOSURE	
5	1	EA	120385-2	A	BRACKET, LID, ACU ASS'Y	
7	1	EA	122445	A	FRONT PANEL ASS'Y, DAC-2200	
8	1	EA	119667-5	A	POWER ENTRY MODULE, 120V, 3A	
9	1	EA	127166-1	B	SCPC RECEIVER ASS'Y, ACU	
11	1	EA	124813-1	E	PCB ASS'Y, DAC ACU	
16	1	EA	114836	A	PCB ASS'Y, S/D CONVERTER, 12 BIT	
17	1	EA	123046-3	A2	HARNESS, DC POWER	
18	1	EA	125343-6		POWER SUPPLY, COSEL PBA150F-24	
19	1	EA	112646-13	A2	PCB ASS'Y, DC-DC CONVERTER	
21	1	EA	122660-4	A	HARNESS, AC ENTRY, SINGLE	
24	1	EA	112918-9	B1	CABLE ASS'Y, RIBBON, 20 PIN	
25	1	EA	120740	A	CABLE ASS'Y, DVB RECEIVER	
30	1	EA	123070		DECAL, HIGH VOLTAGE WARNING	
41	8	EA	110941-3	B	SCREW, JACK, 4-40 X 5/16	
42	1	EA	114587-106		SCREW, RND HD, PHIL, 4-40X1/4, S.S	
44	7	EA	114588-144		SCREW, PAN HD, PHIL, 6-32 x 1/4, S.S.	
45	6	EA	114576-106		SCREW, FLAT HD, PHIL, 4-40 x 1/4, S.S.	
46	1	EA	114588-146		SCREW, PAN HD, PHIL, 6-32 x 3/8, S.S.	
47	6	EA	114580-007		WASHER, FLAT, #6, S.S.	
48	2	EA	114583-007		NUT, HEX, 6-32, S.S.	
49	4	EA	119967	A	NUT, HEX, PANEL, 3/8-32	
50	3	EA	119952-031	A1	WASHER, STAR, INTERNAL TOOTH, 3/8, S.	
58	1	EA	120090-17		MICRO ASS'Y, 12-BIT SDC	
65	2	EA	120452-32		SCREW, RND HD, PHIL, 6-32 X 3/8, BLACK	
68	5	EA	119961-007		NUT, HEX, SMALL PATTERN, 6-32, S.S.	
69	4	EA	124791	A	LABEL CAUTION, MICROWAVE HAZARD	
72	2	EA	120077-118		SCREW, FLAT HD, PHIL, M3 X 8, S.S.	

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DAC-2202, SCPC RCVR, 9 WIRE IF

PROD FAMILY COMMON	EFF. DATE 21-Dec-07	SHT 1 OF 2	DRAWING NUMBER 125411-3	REV D

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
73	1 EA	125193	0.71	SOFTWARE, DAC-2202 I/O, RABBITCORE	
74	1 EA	124871	6.02E	SOFTWARE, DAC-2202 ACU, GP32, STD	
76	1 EA	108929-2	C1	POWER CORD, 110V AC	(NOT SHOWN)
77	1 EA	109752-3		POWER CORD, 220V AC	(NOT SHOWN)
78	1 EA	110959-1	A1	DECAL, MODEL & P/N, SMALL	

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DAC-2202, SCPC RCVR, 9 WIRE IF

PROD FAMILY COMMON	EFF. DATE 21-Dec-07	SHT 2 OF 2	DRAWING NUMBER 125411-3	REV D