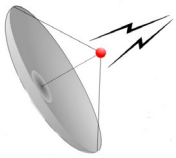

CAUTION: This stabilized antenna system is designed to be used with transmit/receive equipment manufactured by others. Refer to the documentation supplied by the manufacturer which will describe potential hazards, including exposure to RF radiation, associated with the improper use of the transmit/receive equipment. Note that the transmit/receive equipment will operate independently of the stabilized antenna system. **Prior to work on the stabilized antenna system, the power to the transmit/receive system must be locked out and tagged.**

When the transmit/receive system is in operation, no one should be allowed **anywhere within the radiated beam** being emitted from the reflector.

The ultimate responsibility for safety rests with the facility operator and the individuals who work on the system.

INSTALLATION AND OPERATION MANUAL FOR SEA TEL MODEL: 4003-6 BROADBAND-AT-SEA TRANSMIT / RECEIVE SYSTEM

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November 14, 2003

Look to the Leader. Look to Sea Tel.

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

Sea Tel is an ISO 9001 registered company. Registration Number M2314 issued November 09, 1998.

The Series 97 Family of Marine Stabilized Antenna Pedestals with DAC-03 Antenna Control Unit complied with the requirements of European Norms and European Standards EN 60945 (1997) and prETS 300 339 (1998-03) on July 20, 1999. Sea Tel document number 119360 European Union Declaration of Conformity for Marine Navigational Equipment is available on request.

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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 prETS 300 339 (1998-03).

The Product Covered by this Declaration:

Series 03 Family of Marine Stabilized Antenna Pedestals with DAC-97 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 on May 8,2003:

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

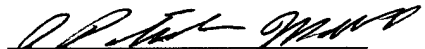
- Conducted Emissions (Clause 9.1 & 9.2)
- Radiated Emissions (Clause 9.1 & 9.3)
- Conducted Low Frequency (Audio) Interference (Clause 10.1 &10.2)
- Conducted Radio Frequency Interference (Clause 10.3) & IEC 1000-4-6 (1995)
- Radiated Radio Frequencies (Clause 10.4) & IEC 1000-4-3 (1995)
- Fast Transients 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)

*** prETS 300 339 (1998-03) Electromagnetic compatibility and Radio spectrum Matters (ERM); General ElectroMagnetic Compatibility (EMC) for Radio Communications Equipment.**

- RF Radiated Field Immunity (Clause 9.3)
- RF Common Mode Immunity (Clause 9.4, 9.5 & 9.6)

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 1999.

Authority: Mr. J. Patrick Matthews
President

Signature: 

Date: 10 Jan 2003

Attention

The attention of the specifier, purchaser, installer or user is drawn to special measures and limitations to use which must be observed when the product is taken into service to maintain compliance with the above directives. Details of these special measures and limitations are in the product manual.

RF Transmit and Receive equipment components (Radio Packages, Drivers, HPAs and LNCs) or TVRO LNBs which are mounted on the Marine Stabilized Antenna Pedestal must be CE marked separately by the manufacturer of those components.

Sea Tel, Inc.
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CE

Doc 121916-A

Revision History

REV	ECO#	Date	Description	By
X1	N/A	11-14-03	PRELIMINARY Release	MDN

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1. Operation

Operation of your system is accomplished from the Antenna Control Unit (ACU). There is no Operation of the Radome or Antenna Pedestal, other than from the ACU. The Antenna Control Unit Display will initially show "**SEA TEL INC - MASTER**" and the ACU software version (ie **DAC-03 VER 4.07**). The display will switch to "**SEA TEL INC - REMOTE**" and "**REMOTE INITIALIZING**", until the Pedestal Control Unit (PCU) completes initialization of the antenna pedestal. When initialization is completed the PCU will report its Model & Software version (ie **4003 VER 2.10**).

1.1. Quick Start Operation

If your system has been set up correctly, is using factory default parameters and the ship has not moved since the system was used last … Quick start operation of the system from a cold start involves the following steps.

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

2 Press **SHIP** 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. Press **SHIP 3 more times** to select ship's heading (HDG) entry mode. Use the NUMBER keys to enter the current ships heading and press **ENTER**. Entry of ships heading is not required when your system is connected to a 1:1 Synchro or NMEA 0183 Heading Gyro Compass output.

3 You may wish to press **SAT** to view (or change) the Satellite longitude and the tracking receiver tuning information *OR* press **ANTENNA** to monitor the antenna position information during normal operation.

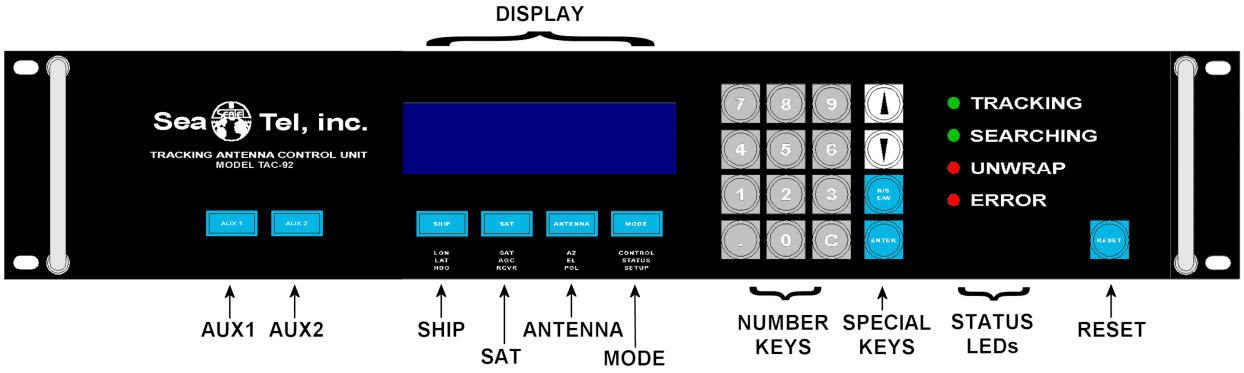
When Initialization is completed the ACU will automatically target the satellite (SAT), the Search LED will flash while the antenna is moving to the targeted AZ & EL position, then;

A. If no signal is found: The Tracking LED will flash for a short period of time (SEARCH DELAY) followed by the Search LED coming **ON**. The ACU will automatically set the tracking threshold and move the antenna in a spiral SEARCH pattern. The search movement will stop when 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 ACU will be receiving 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.

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

1.2. Front Panel Layout



1.3. Basic Keyboard Entry

Keyboard operation is very simple and straightforward. Pressing any of the 4 main menu function keys located below the display, enables the display of all the information associated with that function. Pressing the same function key again, or pressing the ENTER key, enables the first display/entry sub-menu. Subsequent depressions the same function key, or the ENTER key, cycle through the other display/entry sub-menus. A selected display can be overwritten by pressing the desired NUMBER keys or it can be incremented and decremented with the UP/DOWN arrow keys. Pressing the DECIMAL POINT allows fractional entries to be made. Pressing C clears the display to correct errors. When satisfied with the entry, press ENTER again to set you input and proceed to the next function.

1.4. Basic description of front panel keys and their functions

The basic functions of the front panel keys, display and LEDs are:

DISPLAY - 20 character x 2-line display of all menu display, entry, control and status windows.

AUX1 - Toggles Tracking ON/OFF, regardless of which displayed menu location you are currently in.

AUX2 - No current operator function.

Main Menu Display & Entry Keys:

SHIP - Accesses the SHIP menus to display, enter or edit current Ships' Latitude, Longitude and gyro compass Heading information.

SAT - Accesses the SAT menus to display, enter or edit current Satellite Longitude, Threshold, Satellite ID Tracking Receiver settings, Network ID and current signal level being received (AGC).

ANTENNA - Accesses the ANTENNA menus to display, enter or edit current Azimuth, Elevation & Relative antenna position and Polarization setting. Current signal level being received (AGC) and Conscan tracking signals are also displayed in some of the sub-menu screens.

MODE - Accesses control of Tracking band & ON/OFF selection, Searching ON/OFF selection, Error status and Remote Auxiliary value.

NUMERIC KEY PAD - Used to key in numeric values in all entry menus.

NUMBERS - Key in numeric value of desired entry. May be used in conjunction with the Decimal Point.

DECIMAL POINT - Used with the Numbers to enter whole and tenths of degrees or MHz & KHz to enter tuning frequency.

C Key - Clear an incorrect numeric entry.

Special Keys -

UP Arrow - Steps the selected entry UP one increment per sequential key-press or rapidly increments the selected entry when pressed & held. Affects all Numeric entries and is used to toggle Tracking ON/OFF, turn Searching ON or to clear the Error display.

DOWN Arrow - Steps the selected entry DOWN one increment per sequential key-press or rapidly increments the selected entry when pressed & held. Affects all Numeric entries and is used to toggle Tracking Band selection, turn Searching OFF or to clear the Error display.

N/S/E/W - Toggles North/South Latitude entry, East/West Longitude entry, Tracking Receiver Input selection and Polarization mode (depends on POL TYPE parameter setting). When in MODE menus the N/S/E/W key steps the display back UP to the previous sub-menu.

ENTER - Enters the value that has been keyed in.

Status LEDs

TRACKING - (Green LED)

ON indicates that the ACU is Tracking a satellite signal whose AGC value is greater than the Threshold value AND contains the desired Network ID. The ACU is actively issuing small azimuth & elevation position adjustments to the antenna to optimize the signal level (AGC). If the system was Searching, SEARCH will go OFF when TRACKING turns ON.

Blinking indicates that the satellite signal AGC value is less than the Threshold value, OR is not the desired Network ID, and the ACU is counting down “SEARCH DELAY” (seconds). If the AGC does not rise above the Threshold before the count-down is completed, the ACU will automatically start, or continue, a SEARCH to acquire a signal that is greater than Threshold AND contains the desired NID. When SEARCH is ON, TRACKING will be OFF.

OFF indicates that Tracking is OFF. This may be due to the operator turning Tracking OFF intentionally or that Tracking was pre-empted by SEARCH.

SEARCHING - (Green LED)

ON indicates that the ACU is Searching for a satellite signal whose AGC value is greater than the Threshold value. When a satellite signal is found SEARCH will go OFF and TRACKING will come ON. If an adequate satellite signal is not found during the Search, SEARCH will blink as the antenna re-targets to the desired satellite. If an adequate satellite signal is still not found, then TRACKING will begin flashing (count-down) until the next SEARCH is automatically started.

Blinking indicates that the antenna is TARGETING to the calculated Azimuth & Elevation positions of the desired satellite (SAT). When the antenna arrives at the calculated position SEARCH will go OFF. If an adequate satellite signal is found at the targeted position Tracking will commence. If an adequate satellite signal is not found at the targeted position, TRACKING will begin blinking (see above) until the next SEARCH is automatically started.

OFF indicates that SEARCH is OFF. This may be due to the operator turning Search OFF intentionally or that Tracking has pre-empted SEARCH.

UNWRAP - (Red LED) Your system does not require UNWRAP, therefore, this LED should never be ON.

ERROR - (Red LED)

ON indicates that one, ***or more***, discrete system errors have occurred. Refer to MODE information menus below to determine which error(s) have occurred.

OFF indicates that no errors have occurred.

RESET - Resets the processors inside the ACU. This does NOT reset the antenna pedestal.

1.5. Display & Entry Operation Menus

1.5.1. SHIP information menus.

Main Menu	Sub Menu	Display	Meaning
SHIP		LAT 38 N LON 122 W HDG 000.0	Display of the current SHIP information.
	SHIP	LAT 38 N	***Latitude entry mode***. Used to calculate Azimuth, Elevation and Polarization for the desired satellite position. Latitude is updated automatically by the GPS mounted on the pedestal. The GPS Output from the J13 Aux Serial Port ***MUST*** be connected as shown in the System Block Diagram. To manually update, key in numeric latitude in decimal form. Tenths may be entered (and will be used internally) but the display will round off to nearest whole degree. Press **N/S/E/W** to toggle North/South hemisphere. Press **ENTER** to set the new latitude.
	SHIP	LON 122 W	***Longitude entry mode***. Used to calculate Azimuth, Elevation and Polarization for the desired satellite position. Longitude is updated automatically by the GPS mounted on the pedestal. The GPS Output from the J13 Aux Serial Port ***MUST*** be connected as shown in the System Block Diagram. To manually update, key in numeric longitude in decimal form. Tenths may be entered (and will be used internally) but the display will round off to nearest whole degree. Press **N/S/E/W** to toggle East/West hemisphere. Press **ENTER** to set the new longitude.
	SHIP	HDG 000.0 000.0	***Heading entry mode***. Used to provide "True" Azimuth antenna position. If the GYRO TYPE parameter is NMEA0183 data or 1:1 Synchro, you will not be able to set HDG to any other value than it receives from the Ships Gyro Compass. For all other acceptable Gyro Compass input types the HDG **MUST** be initially set whenever the ACU power is turned ON. Key in the heading value of the Ships Gyro Compass and press **ENTER**. HDG display may be a single value, or left and right values depending on the GYRO TYPE parameter. During subsequent normal operation, the HDG value should automatically follow the Ships Gyro Compass correctly (HDG value should agree with the value observed on the Gyro Compass).

1.5.2. SAT information menus.

Main Menu	Sub Menu	Display	Meaning
SAT		SAT 101 W THRS 1234 FREQ 1100 NID 1234	Display of the current SAT information. **NID** display is the Network ID which is ***currently being received*** from the satellite that the antenna is pointed to.
	SAT	SAT 101 W	***Satellite Longitude entry menu***. Used to calculate antenna Elevation, Azimuth and Polarity pointing angles. Key in the numeric longitude of the satellite you want to target (even if it is the same value as is presently displayed), press **N/S/E/W** to toggle the E/W hemisphere as necessary and press **ENTER**. The ACU will then calculate the Elevation, Azimuth and Polarization that the antenna will be driven to, based on the current SHIP information (LAT, LON & HDG) and issue those (AZ, EL & POL) targeting values to the antenna. Auto-Threshold will re-set as the antenna targets.
	SAT	THRS 1234	***Threshold entry mode***. Default setup is *Automatic Threshold,* which sets the Threshold value to 60 counts of AGC above the average off satellite AGC value whenever the ACU Searches, Targets or Unwraps. To manually set threshold, key in the desired numeric value and press **ENTER**.
	SAT	**In DVB Mode** FREQ 1100 AGC 1234 **In SCPC Mode** MHz 1111 AGC 1234	***Sat ID Receiver 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. In DVB Mode: **FREQ #### AGC 1234** In SCPC Mode: **MHz #### AGC 1234** Use the **NUMBER** keys to input the numeric value (in MHz) of the **I**ntermediate **F**requency (950-2150) you want to use for Tracking. The **UP**/**DOWN** arrow keys may be used to increment/decrement the frequency in 1 MHz steps. Press **ENTER** to set the desired frequency. Press **N/S/E/W** to select the *Baud* setting to be viewed/edited:

		**In DVB Mode** BAUD 00000 AGC 1234 **In SCPC Mode** KHz 0999 AGC 1234	In DVB Mode: **BAUD 00000 AGC 1234** In SCPC Mode: **KHz #### AGC 1234** Use the **NUMBER** keys to input the numeric value of Baud Rate OR of the KHz value of the desired the **I**ntermediate **F**requency (950-2150) you want to use for Tracking. DVB 100 & 200 receivers ***must*** be set to 00000. DVB 300 receivers can be set to any desired Baud Rate. Press **N/S/E/W** to select the *Tone* setting to be viewed/edited:
		Tone OFF AGC 1234	**Tone OFF AGC 1234** Use the **UP**/**DOWN** arrow key to toggle 22 kHz Tone output on the rear panel "F" connector ON/OFF. Tone selection also toggles the logic state of SW1 on the Terminal Mounting Strip (Tone ON = SW1 shorted to ground). ON is used to select High Band frequencies, OFF is used to select Low Band frequencies. Press **N/S/E/W** to select the *Volt* setting to be viewed/edited:
		Volt HORZ AGC 1234	**Volt HORZ AGC 1234** Use the **UP**/**DOWN** arrow key to toggle Voltage output on the rear panel "F" connector. Selections are; HORZ (18VDC), LHCP (18VDC), VERT (12VDC) or RHCP (12VDC). Press **N/S/E/W** to select *FEC* setting to be viewed/edited:
		FEC AUTO AGC 1234	**FEC AUTO AGC 1234** Default setting (AUTO) automatically scans through all the standard DVB & DSS FEC rates. Use the **UP/DOWN** arrow key to toggle through the available fixed FEC rates to select one of the fixed rates. DVB 200 receivers (shipped before July 2003) ***MUST*** be set to AUTO, *not AUT** (AUTO star'ed). 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. SCPC mode may be selected for narrow band use, which will change the FREQ and BAUD displays as noted above. Press **N/S/E/W** to select the *NID* setting to be viewed/edited:

		NID #### AGC 1234	**NID #### AGC 1234** Used to enter the NID (or forced NID) of the satellite you want to The Network ID is a four digit HEX value. Enter 0000 if no NID is available, or to test for proper FREQ, BAUD & FEC settings. Use the appropriate NUMBER key to enter a numeric value. Use a two key sequence (decimal point followed by a number key) to enter an alpha character. Key **"."** then **"1"** to enter an **A** up through **"."** then **"6"** to enter an **F**. (***Example:*** to enter an NID of **1B3D** you would key in " **1**, **.**, **2**, **3**, **.**, **4** ").

1.5.3. ANTENNA information menus.

Main Menu	Sub Menu	Display	Meaning
		AZ 123.4 EL 056.7 REL 234.5 AGC 1234	Display of the current ANTENNA information. REL is a diagnostic display of the antenna position relative to the bow of the ship, ranging from 0-359.9, with 000.0 indicating when antenna is pointed in-line with the bow. The REL position of the antenna is used to set Radiation Hazard & Blockage Mapping points (AZ LIMIT 1 and AZ LIMIT 2).
		AZ 123.4 # AGC 1234	***Azimuth position/entry mode***. True Azimuth position of the antenna. Display is the sum of ships heading (HDG) and antenna relative (REL) position reduced to 0-359.9 degrees. To manually drive the antenna in azimuth (assure Tracking is OFF): Sequentially press the **UP** or **DOWN** arrow key to *step* the antenna up or down in small individual increments. ***OR***, Press & Hold the **UP** or **DOWN** arrow key to *slew* the antenna up or down in rapid increments. ***OR***, Key in the desired numeric value of azimuth you want to *target* the antenna to and press **ENTER**. Conscan tracking signals (**#**) will appear in the lower left of the display. Periodic 2, 4, 6 or 8 are normal Conscan tracking signals. Current IF signal level (AGC) is displayed to assist you in manually peaking AZ for best signal level.

	ANTENNA	EL 056.7 # AGC 1234	***Elevation position/entry mode***. Current Elevation angle of the antenna (0-90.0). To manually drive the antenna in elevation (assure Tracking is OFF): Sequentially press the **UP** or **DOWN** arrow key to *step* the antenna up or down in small individual increments. ***OR***, Press & Hold the **UP** or **DOWN** arrow key to *slew* the antenna up or down in rapid increments. ***OR***, Key in the desired numeric value of elevation you want to *target* the antenna to and press **ENTER**. Conscan tracking signals (**#**)will appear in the lower left of the display. Periodic 2, 4, 6 or 8 are normal Conscan tracking signals. Current IF signal level (AGC) is displayed to assist you in manually peaking EL for best signal level.
	ANTENNA	POL 0000 AGC 1234	***Polarization entry menu***. Allows polarization adjustment if Auto-Polarization (DEFAULT) is not being used. POL Display may be a numeric value representing the current polarization angle (polang) position or ALPHA display of HORZ, LHCP, VERT, RHCP polarization mode. In manual polarization mode the **N/S/E/W** key (selects HORZ, LHCP, VERT or RHCP) ***OR*** the **UP**/**DOWN** arrow keys (adjust polarization angle clockwise or counter- clockwise for fine-tuning) ***depending upon the POL TYPE parameter setting***. Current IF signal level (AGC) is displayed to assist you in manually peaking POL for best signal level.

1.5.4. MODE Control & Status menus.

Main Menu	Sub Menu	Display	Meaning
MODE		CONTROL TRACKING Ku OFF	***Control – Tracking*** menu. Use the **AUX1** or **UP** arrow key to turn Tracking ON/OFF. Use the **DOWN** arrow key (four times within 3 seconds) to toggle BAND (**Ku or C/X**). Then use the **DOWN** arrow key once to toggle between KuHi/KuLow OR C/X. If AZ Limits have been set to mask a blockage zone "**BLOCKED**" will appear at the end of the second line when the antenna is in the described blockage zone.

	MODE	CONTROL SEARCH 2 OFF	***Control – Searching*** menu. Use the **UP** arrow key to cause a manual SEARCH to begin (SEARCH 2 ON). Use the **DOWN** arrow key to stop a search (SEARCH 2 OFF).
	MODE	STATUS ERROR LLLL RRRR	***Status – Error*** menu. **LLLL** - **Comms Error Count** - indicates the number of times that a Pedestal M&C communication message (between the ACU and PCU) was not received correctly. Occasional counts are normal but more than 10 per minute indicates a problem that needs attention (refer to Troubleshooting section). **RRRR** - **Error Code** - indicates the SUM of the discrete error(s) that have occurred. It does not indicate *how many* of a particular error have occurred. Refer to the "To View Errors" paragraph below for a complete list of the discrete errors which could occur. Pressing **UP** arrow key clears error count, status code and extinguishes the Error LED.
	MODE	STATUS REMOTE AUX 0000	***Status – Remote Aux*** menu. Diagnostic *display* of Remote auxiliary read, typically used to indicate Temperature or EIRP readings from the antenna. Continuing to press **MODE** will not advance the display until the correct password is entered to allowing entry into the SETUP Parameter menus.

1.5.5. SETUP Parameter display and entry menus.

Access to the password protected system setup parameters 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 to perform properly.*

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

1.6. Operation Scenarios

Below are some of the common tasks an operator would perform. Each scenario includes in a sequence of keys you should press, some information about what should (or might) happen and what indication(s) you should see.

1.6.1. To Toggle Tracking ON/OFF

What button(s) do I push?

Press **AUX1**

System Action/What happens?

When Tracking is ON, the antenna will automatically step toward higher level of received satellite signal and the AGC will increase accordingly until it is at its peak value. If the antenna was not on a satellite when you turn Tracking on (AGC value was less than the Threshold value) the Tracking LED will flash for some (SEARCH DELAY) number of seconds and then initiate a SEARCH to find a satellite signal that is greater than Threshold. If the antenna was on a satellite signal when you turn Tracking OFF, the antenna should stay pointed near peak signal but may not stay at peak.

What do I see?

Tracking LED will be ON (or flashing) when Tracking is ON and the AGC should increase until it is at its peak value. Tracking LED will be extinguished when Tracking is OFF and AGC may not stay at its peak value.

1.6.2. To View SHIP Information

What button(s) do I push?

From any of the *other* main display/entry menus, Press **SHIP** and view the overall display.

If already in one of the SHIP sub-menus, continue pressing SHIP until the current SHIP information overall display is in view.

System Action/What happens?

The SHIP information will be accessed from memory in the ACU and displayed as the key is pressed.

What do I see?

The SHIP information display containing the current Latitude, Longitude and Heading.

1.6.3. Entering Ships' Latitude (LAT)

What button(s) do I push?

The Latitude is automatically updated by the GPS mounted on the antenna pedestal. It is also provided to the Satellite Modem via a ***required*** connection from J13 on the rear panel of the Antenna Control Unit through the Device Server. To manually update it:

From any of the *other* main display/entry menus, press **SHIP 2 times**, use the Number keys to enter the decimal value of the ships current Latitude (**##.#**), press **N/S/E/W** to toggle North or South hemisphere as needed and then press **ENTER**.

If already in one of the SHIP sub-menus, continue pressing SHIP until the Latitude entry menu is reached, use the Number keys to enter the decimal value of the ships current Latitude (**##.#**), press **N/S/E/W** to toggle North or South hemisphere as needed and then press **ENTER**.

System Action/What happens?

The LAT information will be accessed from memory in the ACU and displayed as the SHIP key is pressed. When you enter a new value and hit the ENTER key, the new information will overwrite the previous value in memory. If GPS input is connected, the next input update will overwrite LAT value in memory. New values will be displayed, and sent to the Device Server, as they occur.

What do I see?

The Latitude entry mode sub-menu display containing the current Latitude of the ship. New information will be displayed as you enter it.

If GPS input is connected, the next input update will overwrite the LAT value in memory and be displayed.

TIP: This is a good way to assure that the GPS is updating the ACU properly. Press the 0 Key, then press ENTER. The display will initially show LAT 00 and then automatically return to the previous value when the next GPS update is received (most GPS units update about once per 5 seconds).

1.6.4. Entering Ships' Longitude (LON)

What button(s) do I push?

The Longitude is automatically updated by the GPS mounted on the antenna pedestal. It is also provided to the Satellite Modem via a ***required*** connection from J13 on the rear panel of the Antenna Control Unit through the Device Server. To manually update it:

From any of the *other* main display/entry menus, press **SHIP 3 times**, use the Number keys to enter the decimal value of the ships current Longitude (**###.#**), press **N/S/E/W** to toggle East or West hemisphere as needed and then press **ENTER**.

If already in one of the SHIP sub-menus, continue pressing SHIP until the Longitude entry menu is reached, use the Number keys to enter the decimal value of the ships current Longitude (**###.#**), press **N/S/E/W** to toggle East or West hemisphere as needed and then press **ENTER**.

System Action/What happens?

The LON information will be accessed from memory in the ACU and displayed as the SHIP key is pressed. When you enter a new value and hit the ENTER key, the new information will overwrite the previous value in memory. If GPS input is connected, the next input update will overwrite LON value in memory. New values will be displayed, and sent to the Device Server, as they occur.

What do I see?

The Longitude entry mode sub-menu display containing the current Longitude of the ship. New information will be displayed as you enter it.

If GPS input is connected, the next input update will overwrite the LON value in memory and be displayed.

TIP: This is a good way to assure that the GPS is updating the ACU properly. Press the 0 Key, then press ENTER. The display will initially show LON 000 and then automatically return to the previous value when the next GPS update is received (most GPS units update about once per 5 seconds).

1.6.5. Entering Ships' Heading (HDG)

If the GYRO TYPE parameter is set to 1:1 SYNCHRO or NMEAH you will not be able to change the HDG entry because the absolute heading value is being read directly from the Gyro Compass input.

What button(s) do I push?

From any of the *other* main display/entry menus, press **SHIP 4 times**, use the Number keys to enter the decimal value of the ships current gyro compass heading (**###.#**) and then press **ENTER**.

If already in one of the SHIP sub-menus, continue pressing SHIP until the Heading entry menu is reached, use the Number keys to enter the decimal value of the ships current gyro compass heading (**###.#**) and then press **ENTER**.

System Action/What happens?

The HDG information will be accessed from memory in the ACU and displayed as the SHIP key is pressed. When you enter a new value and hit the ENTER key, the new information will overwrite the previous value in memory. If Ships Gyro input is connected, the next input update will overwrite HDG value in memory. New values will be displayed as they occur.

What do I see?

The Heading entry mode sub-menu display containing the current Heading of the ship. New information will be displayed as you enter it.

If Gyro Compass input is connected, the next input update will overwrite the HDG value in memory and be displayed.

1.6.6. To View SATELLITE Information

What button(s) do I push?

From any of the *other* main display/entry menus, Press **SAT** and view the overall display.

If already in one of the SAT sub-menus, continue pressing SAT until the current SAT information overall display is in view.

System Action/What happens?

The SAT information will be accessed from memory in the ACU and displayed as the key is pressed.

What do I see?

The SAT information display containing the current Satellite Longitude, Threshold value, Tracking Receiver Frequency and the Network ID (NID) which is currently being received from the satellite that the antenna is pointed to.

1.6.7. Targeting A Satellite (SAT)

What button(s) do I push?

From any of the *other* main display/entry menus, press **SAT 2 times,** use the Number keys to enter the decimal value of the desired Satellite Longitude [even if it is currently displayed], press **N/S/E/W** to toggle East or West hemisphere as needed and then press **ENTER**.

If already in one of the SAT sub-menus, continue pressing SAT until the SAT entry menu is reached, use the Number keys to enter the decimal value of the desired Satellite Longitude [even if it is currently displayed], press **N/S/E/W** to toggle East or West hemisphere as needed and then press **ENTER**.

System Action/What happens?

The SAT information will be accessed from memory in the ACU and displayed as the SAT key is pressed. As you enter a new value, the new information will overwrite the previous value in memory and be displayed.

When you press the ENTER key the ACU will evaluate whether the desired satellite will be below the horizon or not from the ships current position. If the desired satellite is below the horizon an ERROR code 128 will be generated (Satellite out of range). If the desired satellite is not below the horizon, the ACU will calculate the Elevation, Azimuth and Polarization angles for the desired satellite based on the SHIP Latitude LAT, Longitude (LON) and Heading (HDG) values in memory. The Elevation, Azimuth and Polarization targeting commands will then be sent to the Pedestal Control Unit (PCU) to drive the antenna to the calculated pointing angles.

What do I see?

The Satellite Longitude entry mode sub-menu display containing the current Satellite Longitude. New information will be displayed as you enter it.

If the Error LED comes ON (ERROR code 128), it will be because the requested satellite is below the horizon from the ships current position. Check SHIP and SAT information, correct any incorrect information and re-target the satellite ***OR*** target another satellite which will not be below the horizon from your current location.

When the ENTER key is hit, the Searching LED will begin to flash (pre-empting Tracking) as the antenna targets/drives to the new position. When the antenna arrives at the targeted position the Searching LED will extinguish.

If the ACU was previously tracking a satellite, the Tracking LED will come ON (if the AGC value is greater than the Threshold value) or will begin to flash (if the AGC value is less than the Threshold value). If the Tracking LED begins flashing, it will flash for SEARCH DELAY number of seconds and an automatic Search will be initiated (Search LED ON) pre-empting Tracking until a signal is found (AGC value greater than Threshold value).

If the ACU was NOT previously tracking a satellite, the Tracking LED will remain OFF and the antenna will remain pointed at the (new) targeted location.

1.6.8. Setting Threshold (manually)

To properly set Threshold you will need to find out what AGC values you have “off satellite” and “peak satellite”. You will then set Threshold to a value that is about +3 dB above the “off satellite” noise level ***OR*** to a level that is 1/3 to ½ of the difference between “peak” & “off satellite” AGC, above the noise.

In the Satellite Identification receiver, 20 counts of AGC is approximately 1 dB of satellite signal. Therefore, 60 counts of AGC is approximately 3 dB of satellite signal (this is the value *Auto-Threshold* uses to set Threshold for you).

The difference between “off satellite” and “peak satellite” AGC values is called *AGC Delta*. When you are in a weak area of the satellite footprint, this value may be small. In this case you may want to set threshold to a 1/3rd to ½ of the AGC delta above the off satellite noise value of AGC.

What button(s) do I push?

Press **ANTENNA 3 times** to select Elevation entry mode. Record your “peak satellite” AGC value while Tracking the satellite. Press **AUX1** to turn Tracking OFF. Step Elevation **UP** until you are well off satellite and record the “off satellite” AGC value. Step Elevation back **DOWN** to return to “peak satellite” Elevation position and press **AUX1** to turn Tracking back ON. Subtract the “off satellite” AGC value from the “peak satellite” AGC value to determine your AGC Delta.

If your AGC Delta is greater than 150 counts, simply add 60 to the “off satellite” value of AGC and enter the sum as the Threshold value. Example: Peak (1600) - Noise (1000) = AGC Delta (600). Set Threshold to 1000 + 60 = 1060.

If your AGC Delta is less than 150 counts, set Threshold to “off satellite” plus 1/3 to ½ of

your AGC Delta. Example: Peak (1100) - Noise (1000) = AGC Delta (120). Set Threshold to 1000 + 40 = 1040 ***OR*** Set Threshold to 1000 + 60 = 1060.

Press **SAT 3 times** to select Threshold entry mode, use the Number keys to enter the calculated Threshold value and press **ENTER**.

Note: If Auto-Threshold is not turned OFF the Threshold will be automatically re-set the next time the system Targets or Searches.

System Action/What happens?

The THRES information will be accessed from memory in the ACU and displayed as the SAT key is pressed. When the ENTER key is hit the new value will overwrite the previous value in memory and be displayed.

What do I see?

In the first step you will see the Elevation entry mode display containing the current Elevation position of the antenna, Conscan tracking signals and the current level of AGC. When you press AUX1 the Tracking LED will go OFF. As you step UP the Elevation position will increase, Conscan will initially flash 2's as you go off peak but will become random when you are off satellite and AGC will decrease from peak value to "off satellite" value. As you step back DOWN the Elevation position will decrease, Conscan will initially be random but will flash 8's when you get back on satellite until you get back to peak and AGC will increase from "off satellite" value to peak value. When you press AUX1 the Tracking LED will go ON.

In the second step you will see the Threshold entry mode display containing the current Threshold and the current level of AGC. The Threshold value will change as you key in the new value.

Note: If Auto-Threshold is not turned OFF the Threshold will be automatically re-set the next time the system Targets or Searches.

1.6.9. SatID Tracking Receiver Settings

The internal Satellite Identification tracking receiver is DVB compliant, Digital Satellite Equipment Control (DiSEqC) compatible and is also able to discriminate DSS Signals.

What button(s) do I push?

Press **SAT 4 times** to view the RCVR selection & frequency entry mode display, then press **N/S/E/W** repeatedly to select **FREQ**, **Baud**, **Tone**, **Volt, FEC** or **NID**.

If already in one of the SAT sub-menus, continue pressing SAT until the RCVR entry menu is reached, press **N/S/E/W** repeatedly to select FREQ, Tone, Volt or NID.

FREQ Used to enter the desired IF frequency (in MHz) that the internal Tracking Receiver will be tuned to. Valid frequency entry is from 950 MHz to 2150 MHz. Signal input electrically comes from the F connector input (RF Input A) on the rear panel of the ACU.

BAUD Used to set the internal Satellite ID Receiver to a desired Baud Rate (DVB 100 & 200 receivers ***must*** be set to 00000, DVB 300 receivers can be set to any desired Baud Rate) or KHz tuning when in SCPC mode.

Tone Used to set 22 kHz **Tone** output from the Tracking Receiver ON/OFF. Tone is used to select High (ON) or Low (OFF) band signal frequencies from your feed or matrix switch. This signal will output on the F connector (RF Input A) on the rear panel of the ACU and will toggle the logic state of SW2 on the Terminal Mounting Strip (Tone ON – SW2 shorted to ground) to control external Tone Generator(s).

Volt Used to set the **Voltage** output from the Tracking Receiver ON/OFF. When set to VERT or RHCP the voltage output will be low (13VDC) and when set to HORZ or LHCP the voltage output will be high (18 VDC).

Voltage output is electrically combined on the F connector (RF Input A) on the rear panel of the ACU.

FEC Used to set the internal Satellite ID Receiver to a desired FEC Rate to automatically scan through all the standard FEC rates or select a fixed rate. If the satellite does not generate an NID an *FEC** choice from this list will generate a pseudo NID (FFFE for DSS signals or FFFD for DVB signals) to represent the desired satellite.

NID Used to enter the Network ID of the **desired** satellite. The NID which is currently being received from a satellite will be compared to this entry, to verify that the *current* satellite ID matches the *desired* satellite ID. The system will continue *searching* until a valid AGC (a value greater than Threshold) ***AND*** the desired satellite NID (four digit hex value) are found.

Refer to the next scenario to change these settings.

System Action/What happens?

The RCVR information will be accessed from memory in the ACU and displayed as the SAT key is pressed. As you press the **N/S/E/W** key the ACU is internally selecting each of the receiver settings and the selection is being displayed followed by the actual value of AGC coming from the receiver.

What do I see?

The selected receiver setting display information will be accessed from memory in the ACU and displayed. As you sequentially press the **N/S/E/W** key the display will show FREQ, Tone, Volt or NID. Each of these selections will be followed by a 4 digit value of AGC which currently coming from the receiver, with the current settings.

Also refer to the next scenario to change these settings.

1.6.10. Setting SatID Tracking Receiver Frequency, Tone, Voltage Baud FEC and NID

Press SAT 4 times to view the RCVR selection & frequency entry mode display, then press N/S/E/W repeatedly to select FREQ, Tone, Volt or NID.

If already in one of the SAT sub-menus, continue pressing SAT until the RCVR entry menu is reached, press N/S/E/W repeatedly to select FREQ, Tone, Volt or NID.

1.6.10.1. Setting SatID Tracking Receiver Frequency

What you see displayed in DVB mode will be different from what you see in SCPC Mode. The last selection in the FEC settings is SCPC mode, all other FEC & FEC* settings are DVB mode (see FEC settings below).

In DVB Mode you see: ***FREQ #### AGC 1234***

Calculate the desired **I**ntermediate **F**requency (in MHz) that the internal Tracking Receiver will be tuned to. Valid frequency entry is from 950 MHz to 2150 MHz. Signal input electrically comes from the F connector input (RF Input A) on the rear panel of the ACU.

C-Band Tuning - C-Band RF range is 3700-4200 MHz and the Local Oscillator frequency is 5150 MHz. IF is calculated by subtracting the RF from the LO (LO – RF = IF).

Ku-Band Tuning - Ku-Band RF range is 10750-12750 MHz but there are a wide variety of Local Oscillator frequencies used by different LNB manufacturers. You will need to know the Local Oscillator frequency(ies) of the LNB(s) installed on your feed. IF is calculated by subtracting the LO from the RF (RF – LO = IF).

Keep in mind that you will need to enter a High Band frequency when you have the **Tone** setting ON or enter a Low Band frequency when you have the Tone OFF and that these may be two different Local Oscillator frequencies in your LNB.

In SCPC Mode you see: ***MHz #### AGC 1234***

Enter the frequency (in MHz) of the SCPC IF carrier or beacon (ie 70 or 140) you wish to track on.

What button(s) do I push?

Press **SAT 4 times** to view the frequency entry menu display (***FREQ* #### AGC 1234 or MHz AGC ####**).

If already in one of the **SAT** sub-menus, continue pressing **SAT** until the frequency entry menu is reached.

Use the **NUMBER** keys to enter the numeric value of the **I**ntermediate **F**requency (in MHz) you want to use for Tracking. The **UP**/**DOWN** arrow keys may be used to increment/decrement the frequency in 1 MHz steps.

Press **N/S/E/W** to select Baud, Tone, Voltage, FEC or NID for editing OR press **ENTER** to set the desired frequency and return to overall **SAT** display.

System Action/What happens?

The receiver source will be tuned to the Intermediate Frequency (IF) value you entered and the AGC value actually coming from the receiver (at that frequency) will be displayed. When you hit ENTER the input selection and frequency values in memory will be overwritten with the new values and the display will return to the overall **SAT** display.

What do I see?

The frequency (in MHz) that the receiver is tuned to and the AGC value actually coming from the receiver (at that frequency) will be displayed. New frequency input and the corresponding AGC will be displayed as changes are made.

1.6.10.2. Setting SatID Tracking Receiver BAUD Rate

What you see displayed in DVB mode will be different from what you see in SCPC Mode. The last selection in the FEC settings is SCPC mode, all other FEC & FEC* settings are DVB mode (see FEC settings below).

In DVB Mode you see: ***BAUD* ##### AGC 1234**

BAUD Used to enter the Baud Rate timing of the **desired** satellite signal. The Baud Rate is used in conjunction with Frequency and FEC Rate to achieve lock on the **desired** satellite signal. Achieving lock will obtain an NID if the satellite is transmitting one or will be used to generate a pseudo NID if the satellite is not broadcasting a discrete NID. The system will continue *searching* until a valid AGC (a value greater than Threshold) ***AND*** the desired satellite NID (four digit hex value) are found.

In SCPC Mode you see: ***KHz* #### AGC 1234**

Enter the frequency (in KHz) of the SCPC IF carrier or beacon (ie 70.**250** or 140.**500**) you wish to track on.

What button(s) do I push?

Press **SAT 4 times** to view the **FREQ** selection display, then press **N/S/E/W** three times to select **BAUD**.

If already in one of the SatID Receiver setting displays, continue pressing **N/S/E/W** repeatedly to select **NID**.

Use the **NUMBER** keys to input the numeric value of Baud Rate. DVB 100 & 200 receivers ***must*** be set to 00000. DVB 300 receivers can be set to any desired Baud Rate.

Press **N/S/E/W** to select the *FEC* setting to be viewed/edited OR press **ENTER** to set the desired *BAUD* and return to overall **SAT** display.

System Action/What happens?

The BAUD setting will be accessed from memory in the ACU and displayed when selected. When you press the **ENTER** key the NID selection value in memory will be overwritten with the new value.

What do I see?

The BAUD setting and the AGC value will be displayed. New setting and the corresponding AGC will be displayed as changes are made.

1.6.10.3. Setting SatID Tracking Receiver Voltage Output

Volt HORZ AGC 1234

Volt Used to set the **Voltage** output from the Tracking Receiver to 12 or 18 VDC. Selections are; HORZ (18VDC), LHCP (18VDC), VERT (12VDC) or RHCP (12VDC).

Voltage output is electrically combined on the F connector (RF Input A) on the rear panel of the ACU.

What button(s) do I push?

Press **SAT 4 times** to view the **FREQ** selection display, then press **N/S/E/W** twice to select **Volt**.

If already in one of the SatID Receiver setting displays, continue pressing N/S/E/W repeatedly to select **Volt**.

Use the **UP**/**DOWN** arrow key to toggle Voltage output for HORZ (18VDC), LHCP (18VDC), VERT (12VDC) or RHCP (12VDC).

Press **N/S/E/W** to select *BAUD* setting to be viewed/edited OR press **ENTER** to set the Voltage selection and return to overall **SAT** display.

System Action/What happens?

The Voltage setting will be accessed from memory in the ACU and displayed when selected. When you press the **UP** or **DOWN** arrow key Voltage selection display & value in memory will be overwritten with the new values.

What do I see?

The Voltage setting and the AGC value will be displayed. New setting and the corresponding AGC will be displayed as changes are made.

1.6.10.4. Setting SatID Tracking Receiver BAUD Rate

What you see displayed in DVB mode will be different from what you see in SCPC Mode. The last selection in the FEC settings is SCPC mode, all other FEC & FEC* settings are DVB mode (see FEC settings below).

In DVB Mode you see: ***BAUD* ##### AGC 1234**

BAUD Used to enter the Baud Rate timing of the **desired** satellite signal. The Baud Rate is used in conjunction with Frequency and FEC Rate to achieve lock on the **desired** satellite signal. Achieving lock will obtain an NID if the satellite is transmitting one or will be used to generate a pseudo NID if the satellite is not broadcasting a discrete NID. The system will continue *searching* until a valid AGC (a value greater than Threshold) ***AND*** the desired satellite NID (four digit hex value) are found.

In SCPC Mode you see: ***KHz* #### AGC 1234**

Enter the frequency (in KHz) of the SCPC IF carrier or beacon (ie 70.**250** or 140.**500**) you wish to track on.

What button(s) do I push?

Press **SAT 4 times** to view the **FREQ** selection display, then press **N/S/E/W** three times to select **BAUD**.

If already in one of the SatID Receiver setting displays, continue pressing **N/S/E/W** repeatedly to select **NID**.

Use the **NUMBER** keys to input the numeric value of Baud Rate. DVB 100 & 200 receivers ***must*** be set to 00000. DVB 300 receivers can be set to any desired Baud Rate.

Press **N/S/E/W** to select the *FEC* setting to be viewed/edited OR press **ENTER** to set the desired *BAUD* and return to overall **SAT** display.

System Action/What happens?

The BAUD setting will be accessed from memory in the ACU and displayed when selected. When you press the **ENTER** key the NID selection value in memory will be overwritten with the new value.

What do I see?

The BAUD setting and the AGC value will be displayed. New setting and the corresponding AGC will be displayed as changes are made.

1.6.10.5. Setting SatID Tracking Receiver FEC Rate

FEC AUTO AGC 1234

FEC Used to enter the FEC Rate of the **desired** satellite signal. The FEC Rate is used in conjunction with Frequency and BAUD Rate to achieve lock on the **desired** satellite signal. Achieving lock will obtain an NID if the satellite is transmitting one or will be used to generate a forced NID if the satellite is not broadcasting a discrete NID. The system will continue *searching* until a valid AGC (a value greater than Threshold) ***AND*** the desired satellite NID (four digit hex value) are found.

Default setting (AUTO) automatically scans through all the standard DVB & DSS FEC rates. The AUTO selection is followed by available ***fixed*** FEC rates which are then followed by the available fixed ***** (star'ed) FEC rates. DVB 200 receivers (shipped before July 2003) ***MUST*** be set to AUTO, *not AUT** (AUTO star'ed).

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 DAC-03 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 forced NID in the *NID* setting below.

What button(s) do I push?

Press **SAT 4 times** to view the **FREQ** selection display, then press **N/S/E/W** four times to select **FEC**.

If already in one of the SatID Receiver setting displays, continue pressing **N/S/E/W** repeatedly to select **FEC**.

Default setting (AUTO) automatically scans through all the standard DVB & DSS FEC rates. If a fixed FEC rate is desired, use the **UP/DOWN** arrow key to toggle through the available fixed FEC rates to select one of the fixed rates OR one of the fixed ***** (star'ed) FEC rates.

Press **N/S/E/W** to select NID for editing OR press **ENTER** to set the desired FEC selection and return to overall **SAT** display.

System Action/What happens?

The FEC setting will be accessed from memory in the ACU and displayed when selected. When you press the **ENTER** key the FEC selection value in memory will be overwritten with the new value.

If you selected a *FEC** choice from this list, the DAC-03 will generate a unique forced NID (FFFE for DSS signals or FFFD for DVB signals) to represent the desired satellite. You must enter this forced NID in the *NID* setting below.

What do I see?

The FEC setting and the AGC value will be displayed. New setting and the corresponding AGC will be displayed as changes are made.

1.6.10.6. Setting SatID Tracking Receiver NetworkID

NID #### AGC 1234

Used to enter the NID of the satellite you want to The Network ID is a four digit HEX value.

NID Used to enter the Network ID of the **desired** satellite. The NID which is currently being received from a satellite will be compared to this entry, to verify that the *current* satellite ID matches the *desired* satellite ID. The system will continue *searching* until a valid AGC (a value greater than Threshold) ***AND*** the desired satellite NID (four digit hex value) are found. Enter 0000 if no NID is available, or to test for proper FREQ, BAUD & FEC settings.

What button(s) do I push?

Press **SAT 4 times** to view the **FREQ** selection display, then press **N/S/E/W** five times to select **NID**.

If already in one of the SatID Receiver setting displays, continue pressing **N/S/E/W** repeatedly to select **NID**.

Use the appropriate NUMBER key to enter a numeric value.

Use a two key sequence (decimal point followed by a number key) to enter an alpha character. Key **"."** then **"1"** to enter an **A** up through **"."** then **"6"** to enter an **F**.

(***Example:*** to enter an NID of **1B3D** you would key in " **1**, **.**, **2**, **3**, **.**, **4** ").

Press **N/S/E/W** to select FREQ, Tone, Voltage, Baud or FEC for editing OR press **ENTER** to set the desired NID and return to overall **SAT** display.

System Action/What happens?

The NID setting will be accessed from memory in the ACU and displayed when selected. When you press the **ENTER** key the NID selection value in memory will be overwritten with the new value.

What do I see?

The NID setting and the AGC value will be displayed. New setting and the corresponding AGC will be displayed as changes are made.

1.6.11. To View ANTENNA Information

What button(s) do I push?

From any of the *other* main display/entry menus, Press **ANTENNA** and view the overall display.

If already in one of the ANTENNA sub-menus, continue pressing ANTENNA until the current ANTENNA information overall display is in view.

System Action/What happens?

The ANTENNA information will be accessed from memory in the ACU and displayed as the key is pressed.

What do I see?

The ANTENNA information display containing the current (True) Azimuth, Elevation and Relative position of the antenna and the current level of AGC.

1.6.12. Adjusting Azimuth (step, slew & target)

What button(s) do I push?

From any of the *other* main display/entry menus, Press **ANTENNA 2 times** and view the Azimuth entry mode display.

If already in one of the ANTENNA sub-menus, continue pressing ANTENNA until the current Azimuth entry mode display is in view.

System Action/What happens?

The current (True) Azimuth position of the antenna, Conscan signals and the current level of AGC will be displayed.

What do I see?

The Azimuth entry mode sub-menu display containing the current (True) Azimuth position of the antenna, Conscan tracking signals and the current level of AGC.

The Azimuth position (upper left of the display) will change as you step, slew or target the antenna.

Conscan AZ tracking signals (lower left of the display) will be 4 (indicating AZ needs to move DOWN) or 6 (indicating AZ needs to move UP). When the Azimuth position of the antenna is optimum the received signal level for the satellite will be peaked (highest AGC) and the number of Conscan signals will be minimal. As you step (or slew) the Azimuth position of the antenna off peak in one direction Conscan will signal a need to move to opposite direction. As you step (or slew) the Azimuth further off peak in that direction the Conscan signal will flash more rapidly. When you turn Tracking back ON, the Azimuth should move back toward peak, Conscan signals will become less rapid and AGC will increase back to maximum. [**Example:** As you step the antenna UP in AZ, a 4 will flash in the lower left of the display. As you continue to step UP in AZ, the 4 will flash more rapidly. When you turn Tracking ON, AZ will move back DOWN, the 4 will flash more slowly and AGC will increase. When the antenna has returned to peak signal position, Conscan signals will nearly cease (random 2, 4, 6 or 8) and AGC will be at its maximum value.]

AGC value will vary, representing the actual received signal level coming from the dish (to the Tracking RCVR), pointed at its' current Azimuth position. The AGC value will be minimum when the antenna is pointed off satellite and will be maximum when the antenna is pointed at peak satellite signal.

1.6.13. Adjusting Elevation (step, slew & target)

What button(s) do I push?

From any of the *other* main display/entry menus, Press **ANTENNA 3 times** and view the Elevation entry mode display.

If already in one of the ANTENNA sub-menus, continue pressing ANTENNA until the current Elevation entry mode display is in view.

System Action/What happens?

The current Elevation position of the antenna, Conscan signals and the current level of AGC will be displayed.

What do I see?

The Elevation entry mode sub-menu display containing the current Elevation position of the antenna, Conscan tracking signals and the current level of AGC.

The Elevation position (upper right of the display) will change as you step, slew or target the antenna.

Conscan EL tracking signals (lower left of the display) will be 2 (indicating EL needs to move DOWN) or 8 (indicating EL needs to move UP). When the Elevation position of the antenna is optimum the received signal level for the satellite will be peaked (highest AGC) and the number of Conscan signals will be minimal. As you step (or slew) the Elevation position of the antenna off peak in one direction Conscan will signal a need to move to opposite direction. As you step (or slew) the Elevation further off peak in that direction the Conscan signal will flash more rapidly. When you turn Tracking back ON, the Elevation should move back toward peak, Conscan signals will become less rapid and AGC will increase back to maximum. [**Example:** As you step the antenna UP in EL, a 2 will flash in the lower left of the display. As you continue to step UP in EL, the 2 will flash more rapidly. When you turn Tracking ON, EL will move back DOWN, the 2 will flash more slowly and AGC will increase. When the antenna has returned to peak signal position, Conscan signals will nearly cease (random 2, 4, 6 or 8) and AGC will be at its maximum value.]

AGC value will vary, representing the actual received signal level coming from the dish (to the Tracking RCVR), pointed at its' current Elevation position. The AGC value will be minimum when the antenna is pointed off satellite and will be maximum when the antenna is pointed at peak satellite signal.

1.6.14. Adjusting Polarization

Default setting of the system is Auto-Polarization operation. In this mode the ACU will calculate the polarization angle for the desired satellite (SAT), based on the current Latitude (LAT) & Longitude (LON) of the ship. The system automatically rotates the LINEAR feed periodically to maintain optimum received signal from the desired satellite as the ship travels. If a new satellite is targeted the ACU calculates the new Azimuth, Elevation & Polarization angles and drives the antenna & feed to those calculated angles. If you adjust the polarization of the feed while in Auto-Polarization mode, the feed will be driven back to the calculated orientation when the next update is calculated.

If Auto-Polarization is OFF you will need to manually adjust the polarization periodically as the ship travels. To adjust polarization, while in manual mode:

What button(s) do I push?

From any of the *other* main display/entry menus, Press **ANTENNA 4 times** and view the Polarization entry mode display. Sequentially press the **UP**, or **DOWN**, arrow key to step the polarization of the feed up or down as needed to optimize the AGC level.

If already in one of the ANTENNA sub-menus, continue pressing ANTENNA until the current Polarization entry mode display is in view. Sequentially press the **UP**, or **DOWN**, arrow key to step the polarization of the feed up or down as needed to optimize the AGC level.

System Action/What happens?

The POL information will be accessed from memory in the ACU and displayed as the key is pressed.

What do I see?

Polarization and the current value of AGC will be displayed. The polarization display you see may be an alpha or a numeric value, depending on your POL TYPE parameter setting. You will see the AGC increase as you adjust polarization the correct direction or will decrease if you go too far or go the wrong direction. When the AGC is as high as you can make it, the polarization of the feed will be optimum.

1.6.15. Change Tracking Band

You can set the system to Track a Ku, C or X band signal, as is appropriate, for the satellite signal that you are currently receiving. This will set the appropriate values in the STEP SIZE (AZ & EL) system parameters for the selected frequency band. On some antennas it will also toggle external coax relays and/or tone generators to route the selected frequency band signals from the antenna to the below decks equipment. Your system will not Track the satellite very well if the Band selection is not set correctly. When the tracking band selection is changed you will need to retune the tracking receiver to an appropriate frequency for the selected band.

What button(s) do I push?

From any of the *other* main display/entry menus, press **MODE** to access the Tracking menu, then press the **DOWN** arrow key **four times within 3 seconds** to toggle the BAND selection (KuHi/KuLow or C/X) as appropriate for the band of the signal you are currently receiving. On Dual Band TVRO antennas, this selection remotely controls coax relays on the antenna pedestal to route the selected Band of signals from the feed to the below decks equipment. Then press the **DOWN** arrow key once to toggle between **KuHi** and **KuLow**, OR toggle between **C** and **X**.

If already in one of the MODE sub-menus, press **ANTENNA**, press **MODE** to access the Tracking menu, then press the **DOWN** arrow key **four times within 3 seconds** to toggle the BAND selection (KuHi/KuLow or C/X) as appropriate for the band of the signal you are currently receiving. On Dual Band TVRO antennas, this selection remotely controls coax relays on the antenna pedestal to route the selected Band of signals from the feed to the below decks equipment. Then press the **DOWN** arrow key once to toggle between **KuHi** and **KuLow**, OR toggle between **C** and **X**.

System Action/What happens?

The CONTROL – TRACKING information will be accessed from memory in the ACU and displayed as the MODE key is pressed. The AZ & EL STEP SIZE values will be retrieved from memory in the Conscan controller and overwrite the previous values in the ACU memory in when the BAND is changed. Displayed BAND selection will change when the DOWN arrow key is pressed. On Dual Band TVRO antennas, coax relays on the antenna pedestal will toggle to route the selected Band of signals through the dual channel coax rotary joint to the below decks equipment.

What do I see?

The Tracking menu BAND and Tracking ON/OFF state will be seen initially. The displayed BAND selection will change when the DOWN arrow key is pressed. If the DOWN arrow key is not pressed ***four times*** within 3 seconds the display will revert to the previous BAND selection. If the DOWN arrow key is pressed ***four times*** within 3 seconds the display will remain set at the new BAND selection. If the DOWN arrow key is pressed once, the Band selection will toggle between the KuHI and KuLow, OR toggle between C and X.

1.6.16. Start a Search

If you are not on a satellite signal, simply start a search pattern from the current Azimuth and Elevation. The antennas' current position becomes the origin of an expanding square search pattern. Auto-Threshold will re-set Threshold value as the search is conducted.

You should not start a search if you are ON a satellite signal, as this will cause Auto-Threshold to re-set Threshold to too high a value. In this case you should re-target the satellite and then start search, or by manually searching by stepping Azimuth and Elevation.

What button(s) do I push?

From any of the *other* main display/entry menus, Press **MODE 2 times**, then press the **UP** arrow key.

If already in one of the MODE sub-menus, press **ANTENNA** then press **MODE 2 times**, then press the **UP** arrow key.

System Action/What happens?

The CONTROL – SEARCH information will be accessed from memory in the ACU and displayed as the MODE key is pressed.

What do I see?

The Search OFF status menu will be seen. When the UP arrow key is pressed a search pattern will begin and the Search LED will go ON.

1.6.17. Stop a Search

To stop a search pattern that has already begun:

What button(s) do I push?

From any of the *other* main display/entry menus, Press **MODE 2 times**, then press the **DOWN** arrow key.

If already in one of the MODE sub-menus, press **ANTENNA** the press **MODE 3 times**, then press the **DOWN** arrow key.

System Action/What happens?

The CONTROL – SEARCH information will be accessed from memory in the ACU and displayed as the MODE key is pressed.

What do I see?

The Search ON status menu will be seen. When the DOWN arrow key is pressed the search pattern will halt and the Search LED will go OFF.

1.6.18. To View ERROR(s)

What button(s) do I push?

From any of the *other* main display/entry menus, Press **MODE 3 times** and note/record the **right** hand 4 digit value.

If already in one of the MODE sub-menus, press ANTENNA the press MODE 3 times.

System Action/What happens?

The appropriate information will be accessed from memory in the ACU and displayed as the key is pressed.

What do I see?

The STATUS-ERROR information display containing the current Pedestal communications count (Left 4 digits) and the ERROR code (Right 4 digits). This 4 digit error code value is the ***SUM*** of the discrete errors that have occurred. The discrete errors are:

128	Satellite Out Of Range
64	Reserved for future use
32	Reserved for future use
16	Conscan Error
8	Pedestal Error
4	ACU-PCU Communication Failure
2	Wrong Synchro Converter Type
1	Gyro Read Error

Refer to the next scenario to Clear the ERROR(s).

Infrequent errors may not indicate a failure that requires immediate repair, however, these should be recorded/logged and cleared to ascertain how often they are occurring or if they are becoming more frequent. Frequent or constant errors indicate a need to troubleshoot and repair the source of the error(s).

Refer to the Troubleshooting section of this manual to troubleshoot and repair frequent or constant errors.

1.6.19. Clear ERROR(s)

What button(s) do I push?

Press **MODE 3 times,** note/record the right hand 4 digit value for historical log, the press **UP** arrow key to clear the error code and extinguish the Error LED.

System Action/What happens?

The error information in memory will be cleared as the key is pressed.

What do I see?

The STATUS-ERROR information display containing the current Pedestal communications count (Left 4 digits) and the ERROR code (Right 4 digits). When the UP arrow was pressed the ERROR code should become 0000 and the ERROR LED should extinguish.

If an ERROR is displayed constantly of returns frequently refer to the Troubleshooting section of this manual.

1.7. STABILIZED PEDESTAL ASSEMBLY OPERATION

The stabilized pedestal assembly is operated remotely at the ACU as described in previous sections. There are no operating instructions applicable to the pedestal assembly by itself.

1.8. RADOME ASSEMBLY OPERATION

When operating the system it is necessary that the radome access hatch be closed and secured in place at all times, otherwise wind gusts will disturb antenna pointing.

2. Installation

The 4003 pedestal comes completely assembled in its 48” radome. This section contains instructions for unpacking, final assembly and installation of the equipment. It is highly recommended that final assembly of the Model 4003 be performed by trained technicians.

2.1. UNPACKING AND INSPECTION

Exercise caution when unpacking the equipment. Carefully inspect the radome surface for evidence of shipping damage.

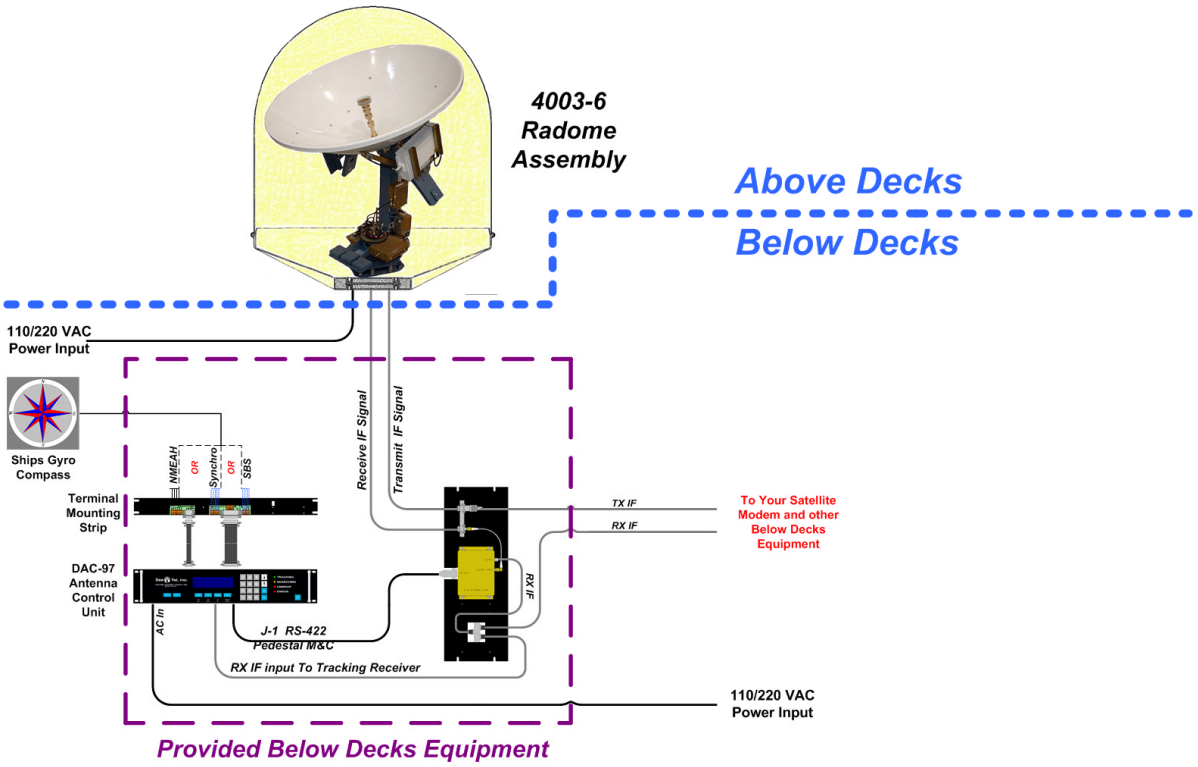


Figure 2-1 4003 System Components

2.2. SITE SELECTION ABOARD SHIP

The radome assembly should be installed at a location aboard ship where:

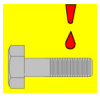
1. The antenna has a clear line-of-sight to as much of the sky (horizon to zenith at all bearings) as is practical.
2. The antenna is a minimum of 15 Feet from the ship's Radar, especially high power Radar arrays.
3. The antenna is not mounted on the same plane as the ship's Radar, so that it is not directly in the Radar beam path.
4. The antenna is a minimum of 15 Feet from high power short wave transmitting antennas are not in close proximity.

5 The Above Decks Equipment (ADE) and the Below Decks Equipment (BDE) should be positioned as close to one another as possible. This is necessary to reduce the losses associated with long cable runs.

6 Rigid mounting location that will not flex, or sway, in ships motion or vibration.

If these conditions cannot be entirely satisfied, the site selection will inevitably be a “best” compromise between the various considerations.

2.3. ASSEMBLY NOTES AND WARNINGS



NOTE: **Unless otherwise indicated, all nuts and bolts should be assembled with Locktite 271 or its equivalent.**

WARNING: **Assure that all nuts & bolts assembly are tightened according the tightening torque values listed below:**

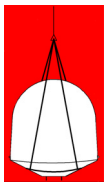
Bolt Size	Inch Pounds
1/4-20	75
5/I6-I8	132
7/16-14	376
1/2-13	517
5/8-11	1032

2.4. Installing the Above-Decks Equipment (ADE)

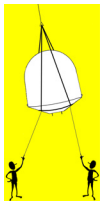
2.4.1. 48” Radome Assembly

1 The 4003 antenna pedestal is shipped completely assembled in its 48” radome.

2 Remove the shipping nuts which mount the ADE to its’ pallet.



WARNING: Hoisting with other than a webbed strap sling may result in catastrophic crushing of the radome. The radome assembly weighs approximately 350 pounds. Handling equipment must be rated accordingly.



CAUTION: Attach, and man, a tag line during hoisting. The radome assembly is very light for its size (350 pounds) and is subject to large swaying motions if hoisted under windy conditions.

3 Using a web strap lifting sling arrangement, and with a tag line attached near the radome base,

hoist the antenna assembly to its assigned location aboard ship by means of a suitably sized crane or derrick.

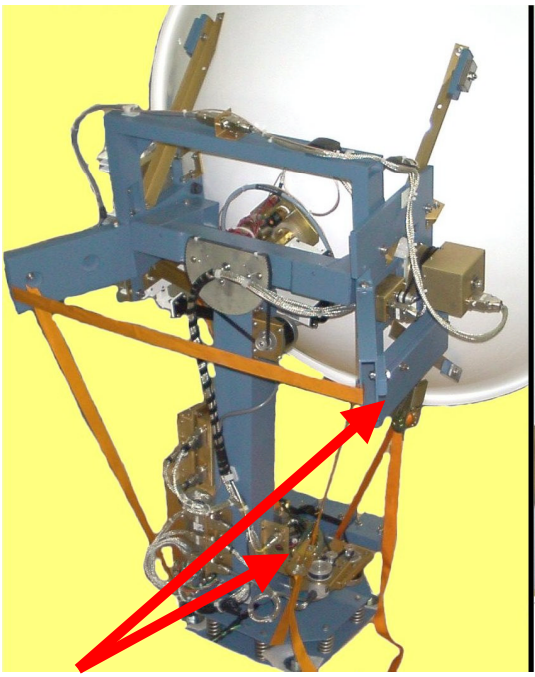
4 The radome assembly should be positioned with the BOW marker aligned as close as possible to the ship centerline. Any variation from actual alignment can be compensated with the AZIMUTH TRIM adjustment in the DAC- 97 so precise alignment is not required.

5 Bolt the radome base directly to the ship's deck or mounting plate. When completed the radome base should be as near level as possible.

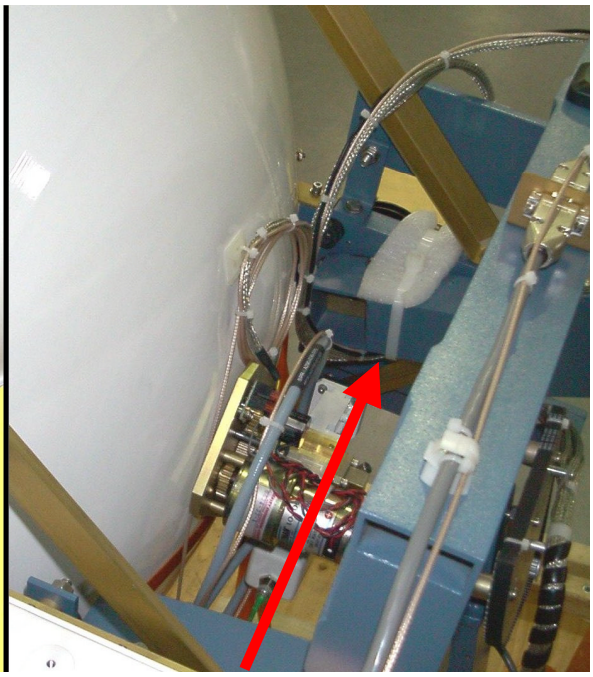
2.4.2. ANTENNA/PEDESTAL MECHANICAL CHECKLIST

1 Open the radome hatch and enter the radome.

2 Inspect the pedestal assembly and reflector for signs of shipping damage.



Web Strap(s)



Tie-wrap(s)

3 Remove the web strap shipping restraints from the pedestal. Save these straps to restrain the antenna in the event that the AC power will be turned off while the ship is underway.

4 Cut and discard the large white tie-wraps from the pedestal.

5 Check that the antenna moves freely in azimuth, elevation, and cross level without hitting any area of the interior of the radome.

6 Check that the antenna assembly is balanced front to back, top to bottom and side to side by observing that it remains stationary when positioned in any orientation. Refer to section 3.5 for complete information on balancing the antenna.

7 Check that all pedestal wiring and cabling is properly dressed and clamped in place.

8 See cable terminations section below.

2.5. CABLE INSTALLATION

2.5.1. SHIPBOARD CABLE INSTALLATION

The cables must be routed from the above-decks equipment group through the deck and through various ship spaces to the vicinity of the below-decks equipment group. When pulling the cables in place, avoid sharp bends, kinking, and the use of excessive force. After placement, seal the deck penetration gland and tie the cables securely in place.

CAUTION: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

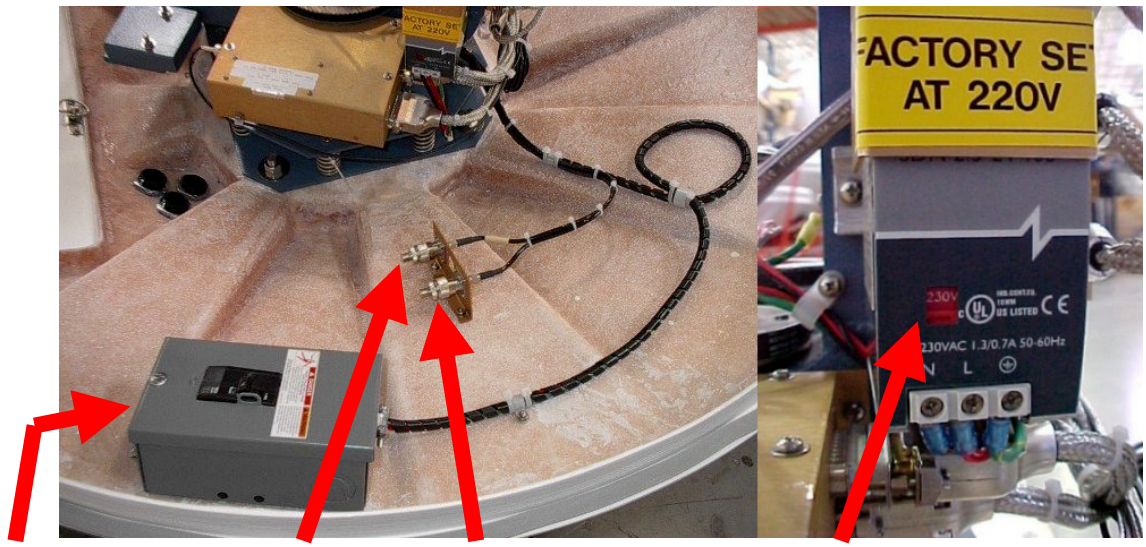
2.5.2. CABLE TERMINATION AT RADOME

The TX, RX and AC Power cables must be inserted through the cable strain relief(s) at the base of the radome. Apply RTV to the strain relief joints and tighten the compression fittings to make them watertight.

1 Route AC Power cable into the breaker box and terminate to the breaker terminals

2 Attach the TX and RX cables from below decks to the adapters. See the Radome Assembly and System Block Diagram drawings.

3 Set the 110/230 VAC selector switch on the power supply for the AC Voltage input that you will be supplying to the antenna.



AC Power Input **TX Cable** **RX Cable** **Select AC Voltage**

4 Close and fasten the radome hatch. Assure that the radome hatch is closed and secured when entry into the radome is no longer required.

2.6. Installing the Below Decks Equipment.

Refer to the system block Diagram.

2.6.1. ANTENNA CONTROL UNIT INSTALLATION

The DAC-03 ACU is to be mounted in a standard 19" Equipment Rack and is two rack units high. which has been intra-connected for you at the factory. installed in a BDE Rack. It includes a Terminal Mounting Strip mounted on the rear of the rack which is a one rack unit high plate.

The Antenna Control Unit is set for 220 VAC input at the factory. If you will be supplying 110 VAC, you must extract the Voltage Select/Fuse Block from the rear panel of the Antenna Control Unit, rotate it 180 degrees and re-insert it to set the Antenna Control Unit to 110 VAC operation.

2.6.2. TERMINAL MOUNTING STRIP CONNECTIONS

You will connect you Ships Gyro Compass input to the appropriate screw terminals on these strip for NMEA Input to J-13. SBS or Synchro are wire to the terminals as in 2.6.5 below.

2.6.3. CONTROL CABLE CONNECTIONS

The Serial Control Cable is connected from the Base Multiplexer to J1 on the DAC-03.

2.6.4. SHIPS GYRO COMPASS CONNECTIONS

Connect the cable from the ship's gyro compass repeater to TB1 or TB3 of the Terminal mounting strip. Use TB1 for a Step-By-Step gyro compass and match the connections to COM, A, B and C. Use TB3 for a Synchro gyro compass and match the connections to R1, R2, S1, S2 and S3.

2.6.5. IF CABLE CONNECTIONS

Attach the connectors on the TX and RX IF cables from above decks equipment to the below decks equipment. The TX cable has a label on it and has "TX COMCSAT LABS" printed on it. Attach the TX cable to the Satellite Modem "TX" connection. Attach the RX cable to the Base Multiplexer panel RX connector on the rear of the BDE Rack. RX IF cable from one output of the splitter mounted on the Base Multiplexer pane is connected to the Satellite Modem "RX" connection.

2.6.6. AGC TRACKING CONNECTIONS

The other output connection from the splitter mounted on the Base Multiplexer panel is connected to the RF input on the back of the DAC-03.

2.7. Broadband Connections Below Decks

Refer to System Block Diagram for the 4003 Ku-Band TX/RX System. The BASIC connections are described below. The TX & RX connections will be connected to the DVB Satellite modem provided by your dealer. This will be connected to other below decks equipment provided by your dealer.

2.8. Set-up & Configuration

The parameters in your DAC-03 Antenna Control Unit will have been set to default values at the factory. However, you will need to verify/change the GYRO TYPE parameter to reflect the type of Gyro Compass you are connecting it to. All other parameters should be set to factory default. Refer to "Antenna Control Unit Configuration" text below.

You will need to configure your LAN computer(s) as detailed in "Configuring Your LAN Computers" text below.

You may also need to configure other below decks components which were supplied with your system. Refer to the vendor supplied manuals for set-up, configuration and operation of those other below decks equipment components.

The Front Title Page of this manual provide spaces for you to record the ***Assigned*** settings provide by the ISP Network Operations Center (NOC). You may need to contact the Internet Service Provider (ISP) Network Operation Center (NOC) to obtain your ***ASSIGNED*** IP address, SubNet Mask and the Primary & Secondary DNS addresses to record in these spaces.

After these steps have been accomplished you will be able to acquire the satellite and use the system.

2.9. Turn Power ON

Apply AC power to the below decks equipment. The Antenna does NOT have to be powered-up at this time. If the Antenna Pedestal is powered-up, ***ASSURE*** that ***Tracking*** is **OFF** and that the antenna is **NOT *"ON"*** satellite.

2.10. Antenna Control Unit Parameters

The parameters of the Antenna Control Unit have been set at the factory. You MUST change the setting of the GYRO TYPE parameter to properly read the type of Gyro Compass input you are providing to the ACU. There are several other parameters you may change, if desired. These are discussed in the default parameters listed below.

To access the parameters you must press the MODE key 4 times, key in 7979 and then hit the ENTER key. You will then see the first parameter EL TRIM. Each subsequent time you press the MODE, or ENTER, key you will see the next parameter in the list. If you go down too far in the list, press the NSEW key to step UP through the list of parameters.

Also refer to the DAC-03 Manual for each more in-depth information on a specific parameter.

PARAMETER	***DEFAULT VALUE***
EL TRIM	**0000**

You may wish to modify this to optimize satellite targeting.

AZ TRIM	**0000**

You may wish to modify this to optimize satellite targeting.

AUTO THRES	**0128**
EL STEP SIZE	**0000**
AZ STEP SIZE	**0000**
STEP INTEGRAL	**0000**
SEARCH INCREMENT	**0018**
SEARCH LIMIT	**0200**

You may wish to reduce this value (i.e. to 0120) after you have optimized AND verified that the antenna accurately targets the satellite (repeatably) within +/- 0.5 degrees.

SEARCH DELAY	**0030**
STEP DELAY	**0002**
SYSTEM TYPE	**0012**
GYRO TYPE	**0002**

0002 selects NMEAH heading OR Step-By-Step gyro input

0001 selects 1:1 Synchro gyro input

0036 selects 36:1 Synchro gyro input

0090 selects 90:1 Synchro gyro input

0362 selects 360:1 Synchro gyro input

POLANG TYPE **0072**

0072 selects Auto-Polarization mode, you may wish to change this to 0009 (Manual Polarization) for troubleshooting or polarization alignment purposes.

POL OFFSET **0000**

May be incremented to adjust polarization while in Auto-Pol mode to optimize cross-pol isolation. Each increment equals one degree of polarization rotation (0008 = +8 degrees).

For minus polarization adjustment, enter a value of **256-n** for the desired number of negative degrees of change (256-8 = 248 for ***minus*** 8 degrees of polarization rotation).

POL SCALE **0090**

AZ LIMIT1 **0000**

Lower (CCW) Relative AZ limit for pattern blockage mapping.

AZLIMIT2 **0000**

Upper (CW) Relative AZ limit for pattern blockage mapping.

TX POLARITY **0002**

0002 selects Vertical Transmit Polarity and 0004 selects Horizontal Transmit Polarity. Currently, factory default value is 0002 if customer is using satellite 117W and 0004 if using satellite 129W.

SAVE NEW PARAMETERS You must press the **UP** arrow key and then press the **ENTER** key to save the changes you have made to NVRAM in the Antenna Control Unit.

2.11. Configuring Your LAN Computers

Each of your LAN computers which will be used to access the Internet through the 4003 must have its' TCP/IP network adapter settings set to obtain "IP address automatically".

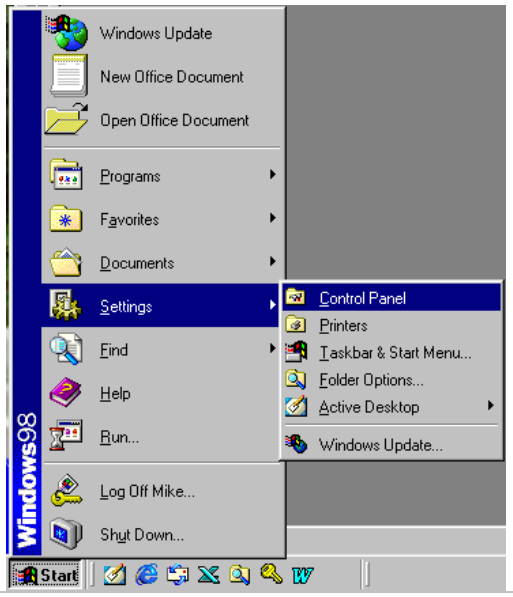
Your screens may look different that the ones shown below.

2.11.1. To configure Your Computer with MS Windows 98 operating system;

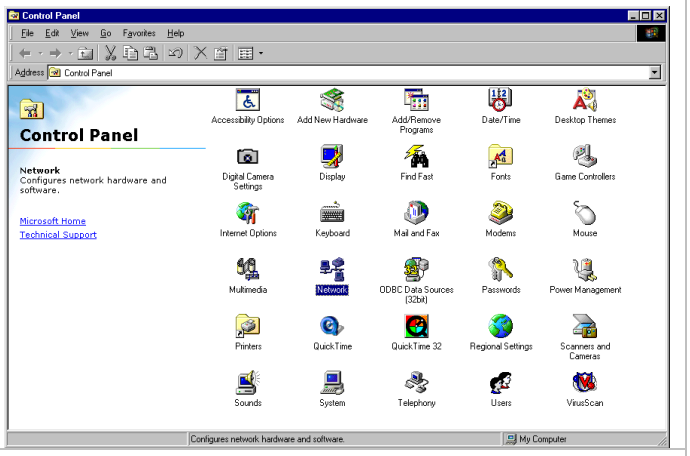
1 Click on '***Start***'

2 Select '***Settings***'

3 Select '***Control panel***'



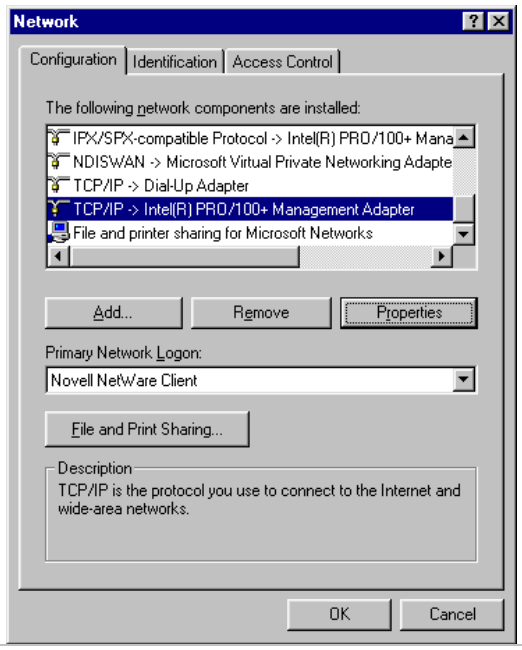
4 Double click on the '***Network***' icon



5 Select the '***Configuration***' tab

6 Scroll down the "The following network components are installed" list and select the '***TCP/IP***' PC Ethernet LAN card entry item

7 Click the '***Properties***' box

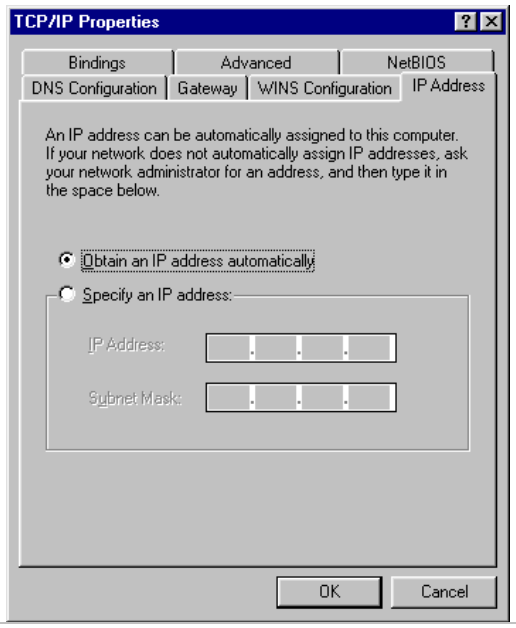


8 Select the '***IP Address***' tab,

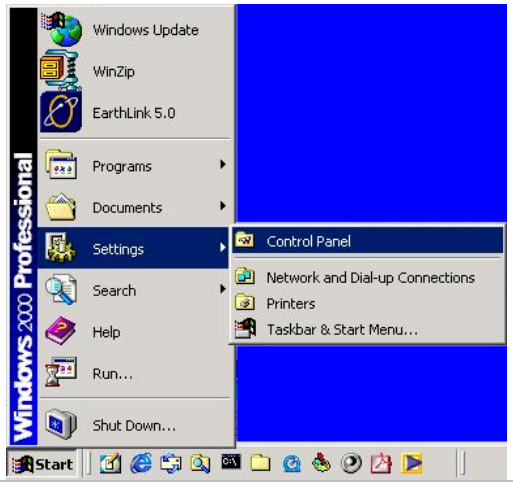
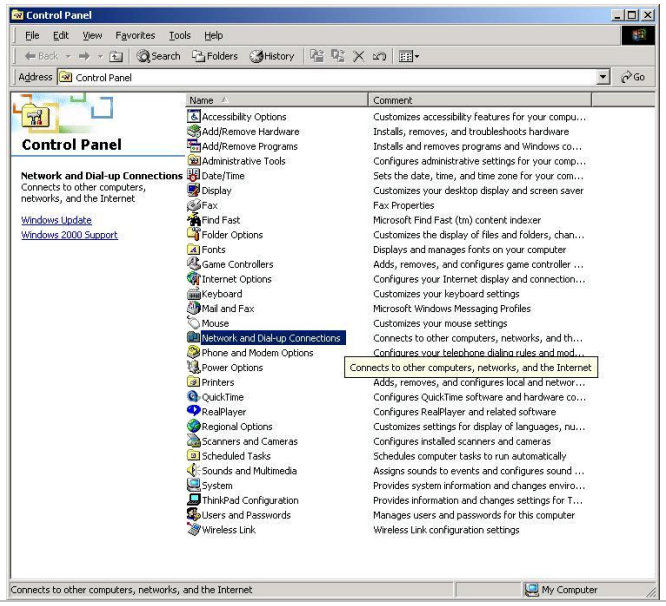
9 Select the radio button to '***Obtain an IP address automatically'***

10 Click on '***OK***'.

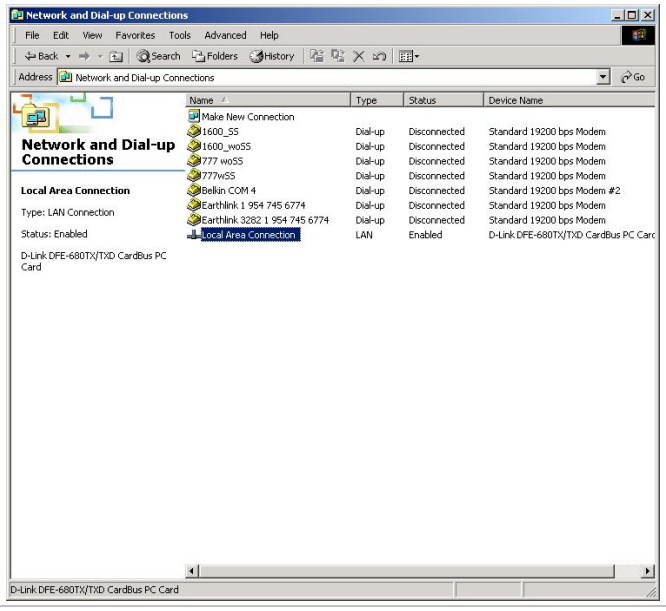
11 Close all other previously opened dialogue windows.



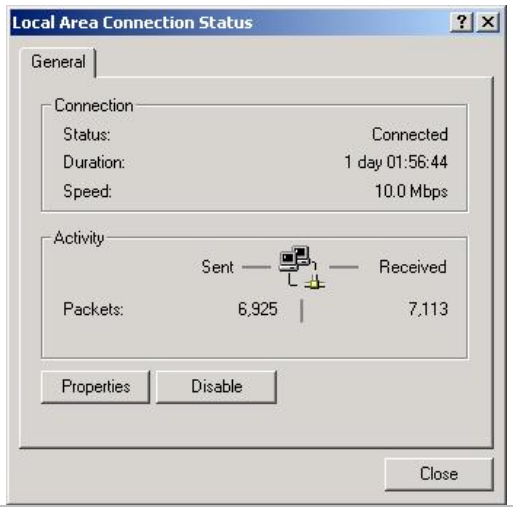
2.11.2. To configure Your Computer with MS Windows 2000 operating system;

1 Click on '***Start***' *2* Select '***Settings***' *3* Select '***Control panel***'	
4 Double click on the ***'Network and Dial-up Connections***' icon	

5 Double click on the '***Local Area Connection***' icon

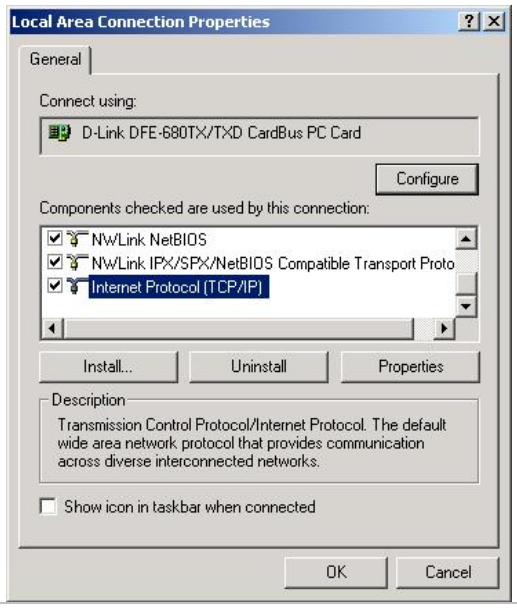


6 Click the '***Properties***' box



7 Scroll down the Components checked are used by this connection list and select the '***Internet Protocol (TCP/IP)***' item

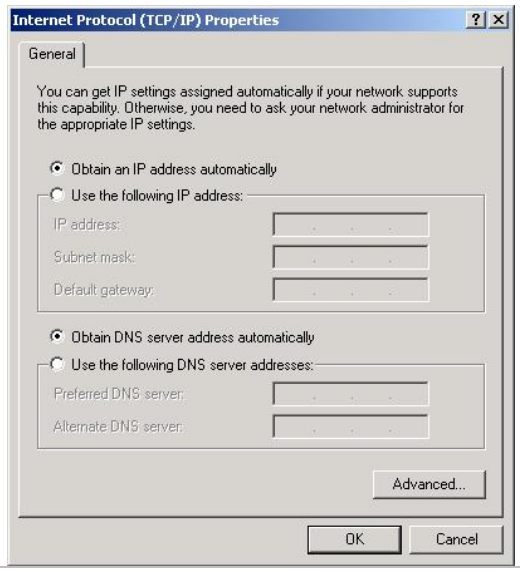
8 Click the '***Properties***' box



9 Select the radio button to '***Obtain an IP address automatically***'

10 Click on '***OK***'.

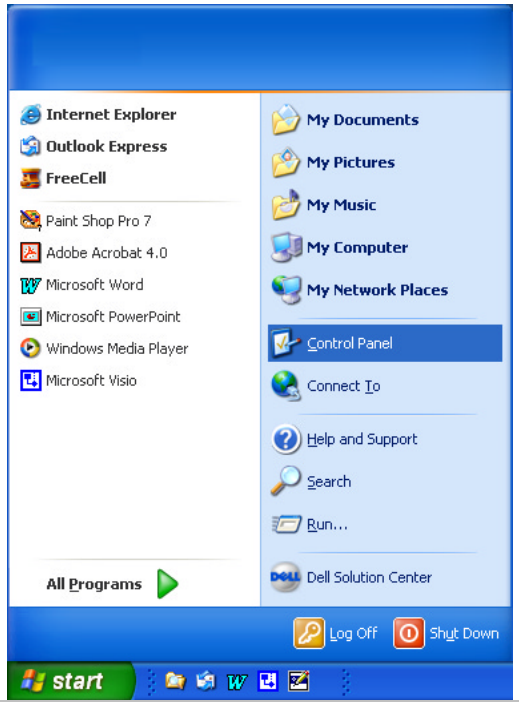
11 Close all other previously opened dialogue windows.

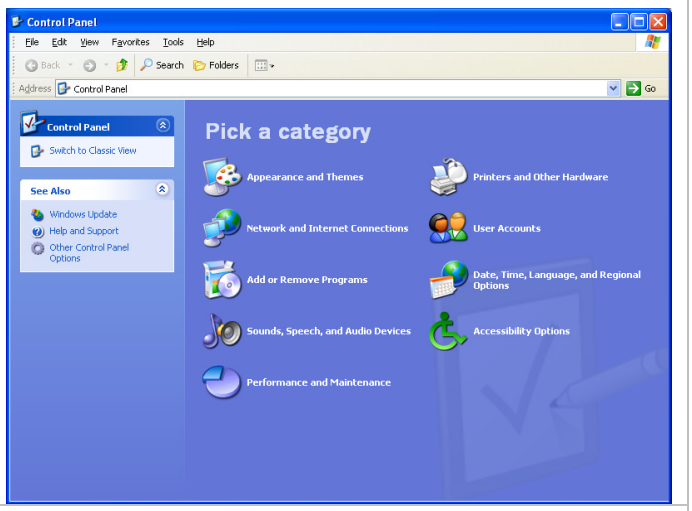
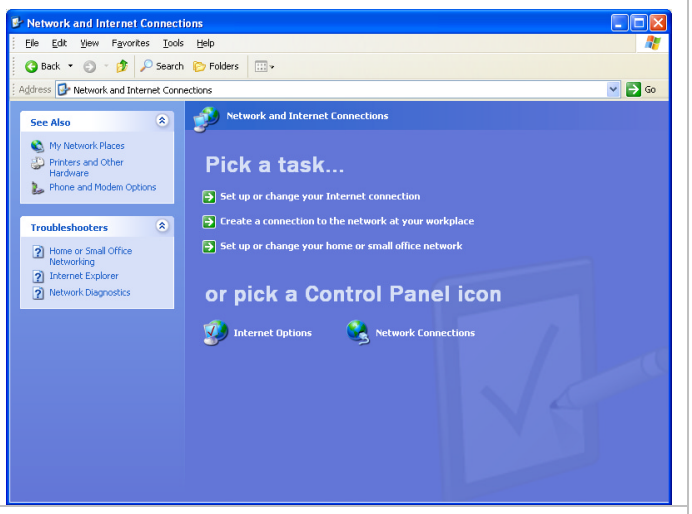
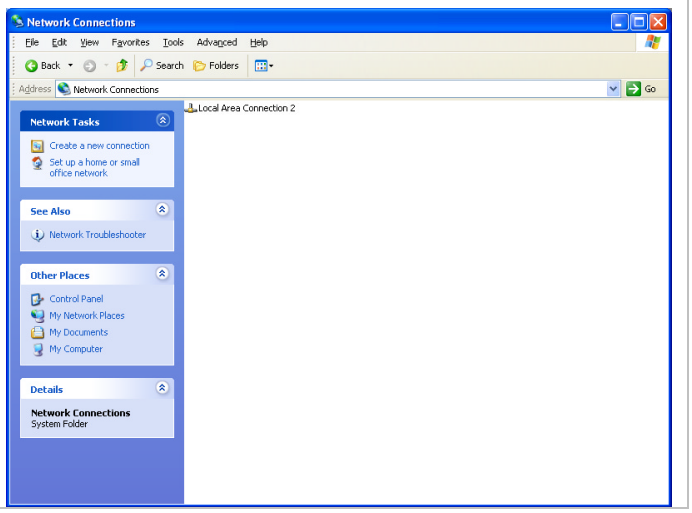


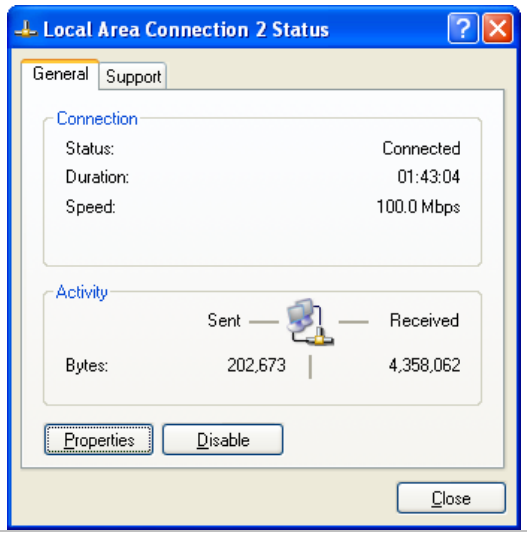
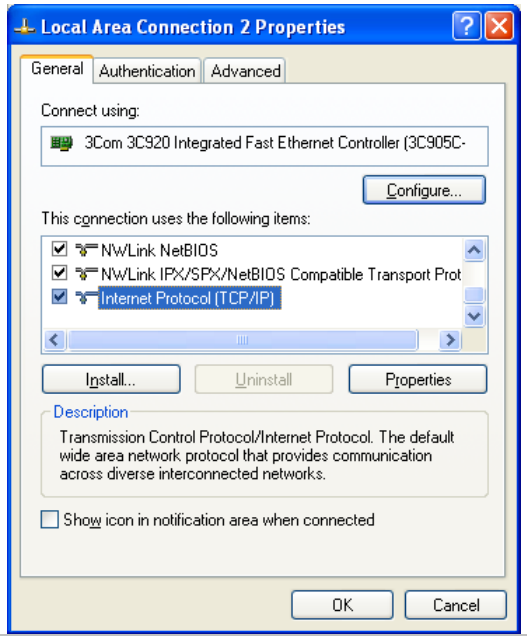
2.11.3. To configure Your Computer with MS Windows *XP* operating system;

1 Click on '***Start***'

2 Select '***Control panel'***



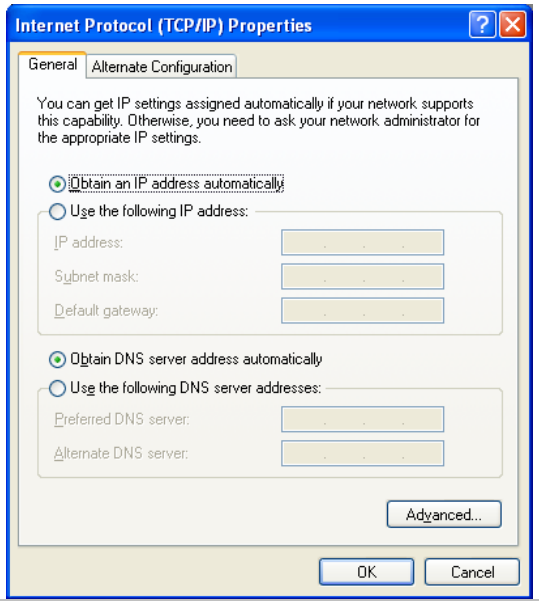
3 Click on the ***'Network and Internet Connections'*** icon	
4 Click on the ***'Network Connections'*** icon in the bottom portion of the screen	
5 Double click on the 'Local ***Area Connection'*** icon	

6 Click the '***Properties***' box	
7 Scroll down the This connection uses the following items list and select the '***Internet Protocol (TCP/IP)***' item 8 Click the '***Properties***' box	

9 Select the radio button to '***Obtain an IP address automatically***'

10 Click on '***OK***'.

11 Close all other previously opened dialogue windows.



2.12. Configuration Of The Other Below Decks Components

You may have to verify, or configure, the ***Assigned IP Address***, ***Subnet Mask*** and the ***Primary & Secondary DNS Addresses*** of the Modem, Gateway/Router, VOIP Adapter and/or any other below decks components provided with your system. Contact your dealer for this information, or refer to the vendor manuals for these devices for configuration and operation information.

2.13. Contact Your Dealer for your IP address information

Record your assigned information here, and also record it on the Front page of your manual for future reference.

Assigned IP Address: _____.____.____.____.____

Subnet Mask: _____.____.____.____.____

Primary DNS Address: _____.____.____.____.____

Secondary DNS Address: _____.____.____.____.____

2.14. FUNCTIONAL CHECKS

The following procedures provide instructions for performing a pre-operation check out of the system.

2.14.1. ANTENNA PEDESTAL

1 Turn AC power OFF and check that the antenna moves freely in azimuth, elevation, and cross level through the full range of motion without binding or hitting the radome.

2 Check that the antenna assembly is balanced front to back, top to bottom and side to side by observing that it remains stationary when positioned in any orientation. Refer to section 3 for complete information on balancing the antenna.

3 Turn AC power ON at the power supply and observe the initialization sequence: The level platform drives to the CCW stop and back 45 degrees; The antenna drives forward or back to level; The antenna drives left or right to level; The antenna drives CW in azimuth to find the home switch. Refer to section 3 for complete information on pedestal initialization.

2.14.2. ANTENNA CONTROL UNIT

1 Turn on the main power switch at the rear panel.

2 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. After 6 seconds the display will change to "SEA TEL INC -REMOTE INITIALIZING". After one minute the display will show the PCU software version number. If the system shows "REMOTE NOT RESPONDING" Refer to check the antenna connections. If all connections are good, above and below decks, contact your dealer for repair.

3 Press the SHIP key 4 times to select the HEADING entry display. Enter the correct ships heading on the numeric entry pad. Press ENTER to save this data. Observe that the heading display changes in the correct direction as the ship turns. If the heading display changes incorrectly or the red ERROR LED illuminates on the front panel, refer to section 3.

2.15. Target The Satellite

Refer to the Operation section of this manual to target the satellite. Once the satellite has been acquired the modem front panel LED will indicate that the modem has satellite service receive sync lock.

2.16. Test Broadband Operation

Open you Internet Browser and access several internet sites.

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3. TROUBLESHOOTING and ADJUSTMENTS

This section describes the theory of operation to aid in troubleshooting and adjustments of the antenna system. Refer to the Trouble shooting section of the DAC-03 for additional troubleshooting details.

3.1. THEORY OF OPERATION

The antenna system is mounted on a three axis stabilization assembly that provides free motion with 3 degrees of freedom. This assembly allows the inertia of the antenna system to hold the antenna pointed motionless in inertial space while the ship rolls, pitches and yaws beneath the assembly. Three low friction torque motors attached to each of the three free axes of the assembly provide the required force to overcome the disturbing torque imposed on the antenna system by cable restraints, bearing friction and small air currents within the radome. These motors are also used to re-position the antenna in azimuth and elevation.

The Pedestal Control Unit (PCU) uses inputs from the level cage sensors to calculate the amount of torque required in each axis to keep the antenna pointed within +/-0.2 degrees. The basic control loops for Cross Level, Level and Azimuth are shown in the Control Loop Diagram, drawing 116287. The primary sensor input for each loop is the rate sensor mounted in the Level Cage Assembly. This sensor reports all motion of the antenna to the PCU. The PCU immediately responds by applying a torque in the opposite direction to the disturbance to bring the antenna back to its desired position. Both the instantaneous output of the rate sensor (Velocity Error) and the integrated output of the rate sensor (Position Error) are used to achieve the high pointing accuracy specification.

The calculated torque commands are converted to a 5 volt differential analog signal by a Digital to Analog converter (D/A) and sent to each of three Brushless Servo Amplifiers. These amplifiers provide the proper drive polarities and commutation required to operate the Brushless DC Servo Motors in torque mode. The Torque acting on the mass of the antenna cause it to move, restoring the rate sensors to their original position, and closing the control loop.

Since the rate sensors only monitor motion and not absolute position, a second input is required in each axis as a long term reference to keep the antenna from slowly drifting in position. The Level and Cross Level reference is provided by a two axis tilt sensor in the level cage assembly. The Azimuth reference is provided by combining the ships gyro compass input and the antenna relative position.

3.2. INITIALIZATION SEQUENCE

A functional operation check can be made on the antenna stabilization system by observing its behavior during the 4 phases of initialization.

4 Turn on the AC power switch at the power supply. Verify the level platform motor drives the level cage CCW to the stop and back 45 degrees.

5 Verify the antenna moves forward or back to bring the top of the level cage to a level position in the for/aft direction. This step takes approximately 10 seconds. The cage may be tilted left or right at this time.

6 After the level cage is positioned in the for/aft direction, verify the antenna moves left or right to bring the top of the level cage to a level position in the left/right direction. This step takes approximately 10 seconds.

7 After the level cage is positioned in the left/right direction, verify the antenna moves CW in azimuth to trip the home sensor switch. After another 10 second wait, the antenna will report its version number at the DAC-03 Antenna Control Unit (ACU).

If any of theses steps fail, or the DAC-03 reports model "xx03" re-configure the PCU as described in section 3.3. If initialization still fails, this indicates a drive or sensor problem. See sections 4.6 and 4.7 for troubleshooting.

3.3. PEDESTAL CONTROL UNIT CONFIGURATION

The PCU is designed to be used with a variety of antenna pedestal configurations. The configuration information that is unique to each pedestal type is stored in a Non Volatile Random Access Memory (NVRAM) in the PCU enclosure. If the PCU is replaced or the NVRAM in the PCU should become corrupt, the PCU must be re-configured to operate with the pedestal it is installed on. The default configuration for the PCU is model 4003. In this configuration the PCU will not drive any of the three torque motors to prevent damage to the unknown pedestal.

To configure the PCU, select the REMOTE COMMAND window on the DAC-03 by pressing the MODE key until this window appears (if the DAC-03 will not advance beyond the REMOTE AUX window, enter 7979 and press ENTER). In the REMOTE COMMAND window, key in ".78 ENTER". "N0000" should appear in the command window. Key in "**0033**" to select a 4003 system. Press ENTER to send this system type command to the PCU. Press ENTER several time to select REMOTE PARAMETERS. Press UP arrow and ENTER to save the system type in the PCU. Press ANTENNA, MODE, N/S to display the Remote Version Number. It should now display "4003 VER 1.nn".

3.4. BALANCING THE ANTENNA AND EQUIPMENT FRAME

The antenna and equipment frame are balanced at the factory however, after disassembly for shipping or maintenance, balance adjustment may be necessary. Balancing must be done with the power supply turned off. No belt removal is required to balance the antenna pedestal. Balancing is accomplished by adding or removing balance trim weights at strategic locations to keep the antenna from falling forward/back or side to side. The antenna system is not pendulous so 'balanced' is defined as the antenna remaining at rest when left in any position. The antenna should be balanced within one or two ounces at the typical trim weight location of 2 feet from the axis of rotation.

The recommend balancing order is Elevation Axis with the antenna pointed at the horizon (referred to as front to back balance). Elevation Axis with the antenna pointed at zenith (referred to as top to bottom balance). Then Cross Level axis at any elevation position (referred to as side to side balance). The balance about azimuth axis is accomplished by accurately positioning the cross level beam in the azimuth stabilization assembly. This adjustment is done at the factory using special alignment tools. Do NOT attempt to adjust the cross level beam position in the field without the proper test fixtures.

3.5. ANTENNA POSITION ERROR MONITORING

The DAC-03 provides a means for monitoring the position error of the antenna for diagnostic purposes. If this error is excessive, it indicates external forces are acting on the antenna. These forces may be the result of static imbalance, excessive bearing friction, cable binding, or wind loading.

To view the position error, select the REMOTE COMMAND window on the DAC-03 by pressing the MODE key several times. Key in ".120 ENTER" (note the decimal point). "x0000" should appear in the command window. Press the MODE key once more to display the REMOTE MONITOR window. The lower display will show "iv" and three 4 digit hex numbers. The numbers indicate Cross Level, Level and Azimuth errors at a resolution of 1 part in 65536 or 0.0055 degrees. For example a display like "iv FFFF 0001 FFFD" indicates the Cross Level error is -.005 degrees, the Level error is + .005 degrees and the Azimuth error is -.016 degrees. The normal range of these numbers is FFF0 to 000F and they typically will bounce around randomly within this range.

3.6. OPEN LOOP SENSOR TEST

The DAC-03 provides a means for monitoring the output of the 3 solid state rate sensors and the 3 reference sensors for diagnostic purposes. The rate sensors and reference sensors are the primary inputs to the PCU for stabilization.

To monitor the rate sensors, select the REMOTE COMMAND window on the DAC-03 by pressing the MODE key several times. Key in ".119 ENTER" (note the decimal point). "w0000" should appear in the command window. Press the MODE key once more to display the REMOTE MONITOR window. The lower display will show "w" and three 4 digit decimal numbers. The numbers represent the Cross Level, Level and Azimuth rate sensor outputs respectively with an nominal display of 2048. The Cross Level display should decrease when the antenna is tilted to the left and increase when tilted to the right. The Level display should decrease when the antenna is tilted forward and increase when tilted back. The Azimuth display should decrease when rotated CCW and increase when rotated CW. The display change occurs during movement and returns to nominal when movement stops.

To monitor the reference sensors, select the REMOTE COMMAND window on the DAC-03. Key in ".118 ENTER" (note the decimal point). "v0000" should appear in the command window. Press the MODE key once more to display the REMOTE MONITOR window. The lower display will show "v" and three 4 digit decimal numbers. The numbers represent the Cross Level and Level Tilt Sensor outputs and the azimuth home flag respectively. The nominal display is 2048 for the tilt sensors and either 0020 or 4050 for the home flag. The Cross Level Tilt display should decrease when the antenna is tilted to the left and increase when tilted to the right. The Level tilt display should decrease when the antenna is tilted forward and increase when tilted back. The Home Flag display will show 4050 when the home flag magnet is away from the sensor and 0000 when the home flag magnet is under the sensor. The display changes are static and remain displaced as long as the level platform is disturbed or the home flag sensor is activated.

3.7. OPEN LOOP MOTOR TEST

The DAC-03 provides a means for driving each individual torque motor to test that motors functionality. By driving each axis and observing the resulting motion of the antenna, a coarse operational status of the motor and motor driver can be established.

To manually drive the motors, select the REMOTE COMMAND window on the DAC-03. Key in ".94 ENTER" (note the decimal point). "^0000" should appear in the command window. To drive the Cross Level motor, key in 1064, 1128 or 1192 to drive the Cross Level axis left, off and right respectively. To drive the Level motor, key in 2064, 2128 or 2192 to drive the level axis forward, off or back. To drive the Azimuth motor, key in 3064, 3128 or 3192 to drive the azimuth axis CW, off or CCW.

4. Technical Description & Specifications

4.1. GENERAL WARNING

It is the facility operators' responsibility to make sure that everyone involved in the installation, operation and maintenance of this system is thoroughly acquainted with the required safety procedures BEFORE they perform any actual work on this system.

4.2. SCOPE

This manual describes the Sea Tel Model 4003 Ku-Band Stabilized Transmit/Receive antenna system with unlimited azimuth and provides installation and operating instructions.

4.3. PURPOSE

The Model 4003 Ku-Band system provides a fully stabilized antenna system that permits two-way satellite Broadband data communications while underway on an ocean-going vessel. The Unlimited Azimuth feature allows uninterrupted communications regardless of vessel turning motions.

4.4. GENERAL CHARACTERISTICS

The Model 4003 Ku-Band system utilizes a new torque mode servo stabilization system that provides unprecedented pointing accuracy to assure stable system performance under all possible sea state conditions. The system has been designed and manufactured 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 permits unattended operation.

4.5. DESCRIPTION

The Model 4003 Ku-Band system consists of two major groups of equipment; an above-decks group and a below-decks group. Each group is comprised of the items listed below.

ABOVE-DECKS EQUIPMENT GROUP

1 Antenna Reflector

2 Feed, Filter and Low Noise Amplifier

3 SSPB Radio/Amplifier Package

4 Stabilized antenna pedestal assembly

5 Pedestal Control Unit

6 Unlimited Azimuth Multiplexer

7 48” Radome assembly

B. BELOW-DECKS EQUIPMENT GROUP

1 Antenna Control Unit (ACU)

2 Unlimited Azimuth Multiplexer

4.6. TECHNICAL DATA ABOVE DECKS EQUIPMENT

The technical characteristics of each of the above decks equipment subsystems are listed below:

4.6.1. ANTENNA REFLECTOR 4003

Type	Spun Aluminum reflector
Size	40 inch (101.6cm)
Feed	Cassegrain feed with center focus splash plate
LNB (s)	Single Linear (Horizontal or Vertical) output LNB is provided for the area of operation and will pass a sub-band of the overall 10.95-12.75 GHz frequency band.
Polarization	Linear w/motorized skew adjustment
Polarization control	24 volt DC motor with pot feedback
Antenna Gain	
TX Gain	40 dBi at 14.0 GHz Typical
RX Gain	39 dBi at 12.5 GHz Typical
Transmit frequency range	14.0-14.5 GHz Ku Band
Receive frequency range	10.95-12.75 GHz Ku Band

4.6.2. STABILIZED ANTENNA PEDESTAL ASSEMBLY

Type:	Three-axis (Level, Cross Level, AZ)
Stabilization:	Torque Mode Servo
Stab Accuracy:	0.2 degrees MAX, 0.1 degrees RMS in presence of specified ship motions.
LV, CL, AZ motors:	Size 23 Brushless DC Servo.
Inertial Reference:	Solid State Rate Sensors
Gravity Reference:	Two Axis Fluid Tilt Sensor
AZ transducer:	256 line optical encoder / home switch
Range of Motion:	
Elevation	-15 to +85
Cross Level	+/- 30 degrees
Azimuth	Unlimited
Elevation Pointing:	
Elevation	+10 to +55 degrees in full rated motion

4.6.3. PEDESTAL CONTROL UNIT

Size	5.2 x 7.3 x 2.1 inches
Connectors	
Antenna Pedestal	44 Pin D-Sub connector
Motor Harness	25 Pin D-Sub connector
Interface	15 Pin D-Sub connector
M&C Interface	9600 Baud RS-422

4.6.4. RADIO PACKAGE

SSPBUC (Block Up-Converter)	Atlantic Microwave, 4 Watt

4.6.5. UNLIMITED AZIMUTH MULTIPLEXER (4 Channel)

Combined Signals	950-1450 MHz RX IF and 1.1/1.5 MHz FSK Pedestal M&C.
Connectors:	
RX IF	F Connector
DC / Ped M&C	9 pin D-Sub Connector

4.6.6. Radome Assembly, 48”

Type/Material:	Rigid fiberglass dome
Material:	Composite foam/fiberglass
Size:	
Diameter:	48 inches
Height:	49 inches
Installed weight	350 pounds including antenna
RF attenuation:	1.5 dB at 12 GHz, dry
	1.5 dB @ 14 GHz, dry

4.6.7. ENVIRONMENTAL CONDITIONS ABOVE-DECKS EQUIPMENT

Temperature:	-30 degrees C to 55 degrees C.
Humidity:	Up to l00% @ 40 degrees C., non-condensing
Spray:	Resistant to water penetration sprayed from any direction.
Icing:	Survive ice loads of 4.5 pounds per square foot. Degraded RF performance will occur under icing conditions.
Rain:	Up to 4 inches per hour. Degraded RF performance may occur when the radome surface is wet.
Wind:	Withstand relative average winds up to 100 MPH from any direction.
Vibration	Withstand externally imposed vibrations in two horizontal directions and in the vertical direction, at sweep rates no greater than 0.2 octaves per minute having peak single amplitudes as follows:
Frequency Range, Hz	Peak Single Amplitude, Inch
4 - 10	0.100
10 - 15	0.030
15 - 25	0.016
25 - 33	0.009
Corrosion	Parts are corrosion resistant or treated to endure effects of salt air and salt spray. The equipment is specifically designed and manufactured for marine use.
Ship Motions:	
Roll:	+/-25 degrees with 6-12 sec periods
Pitch:	+/-15 degrees with 6-12 sec periods
Yaw:	+/-8 degrees with 15 to 20 sec periods
Turning rate:	Up to 12 deg/sec.
Headway:	Up to 50 knots
Mounting height:	Up to 150 feet.

4.6.8. ADE Power Requirements:

Antenna AC Input Power	110/220 VAC, 60/50 Hz
Antenna Power Consumption	100 Watts ***MAX***

4.7. TECHNICAL DATA BELOW DECKS EQUIPMENT

Technical characteristics of each of the below decks equipment subsystems are listed below:

BDE Rackmount Assembly includes the following Equipment which has been installed and interconnected at the factory:

4.7.1. ENVIRONMENTAL CONDITIONS BELOW-DECKS EQUIPMENT

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

4.7.2. DAC-03 Antenna Control Unit Specifications

4.7.2.1. General

Physical Dimensions:	3.5 x 19" x 14"
Mounting:	2 Unit high Rackmount
Input Voltage:	110/220 VAC, 50/60 Hz
Power Requirements:	100-Watts maximum
Fuses:	2 Amp 110v input, both lines fused, 1 Amp 220v input, both lines fused

4.7.2.2. Front Panel

Keyboard:	4 Mode Select Keys
	14 Numeric Input Keys
	2 Up/Down Keys
	2 Auxiliary Keys
	1 Reset Key
AlphaNumeric Display:	40 Character (2x20) Vacuum Fluorescent Alpha Numeric
Status Indicator Display:	4 LED enunciators

4.7.2.3. Rear Panel

Controls:	Power On/Off
	Voltage Select
Connectors:	
External AGC	37 pin female D-Subminiature
Gyro Compass input	25 pin female D-Subminiature
RS-232/422 M&C	9 pin male D-Subminiature
RS-422 PCU interface	9 pin male D-Subminiature
RF Tracking Input	Type F female L Band input or BNC 70 MHz input
AC Input Power	IEC type receptacle

4.7.2.4. RF Tracking Input

Internal Satellite Identification Receiver

Input Range	-75 to -45 dBm
Sensitivity	30 mV / dB typical
Bandwidth	27 MHz
Tuning range	950 to 2150 MHz in 1 MHz increments
Polarity switching	13/18 volts from receiver
DiSEqC detection:	22kHz continuous tone for band switching (Europe)
	22kHz pulse tone for satellite switching (Europe)
	22kHz continuous tone for satellite switching (US)
Satellite ID	Network ID for DVB signals. QPSK demodulator lock for DSS signal.
QPSK Demodulator	5000 to 30000 symbols per second range
FEC Decoder	1/2, 2/3, 3/4, 5/6, 6/7, 7/8 rates. Automatically detected
Pipeline Decoder	DVB or DSS compatible.

4.7.2.5. RS-232 Monitor and Control Interface

Communications Parameters:	4800/9600 Baud, 8,N,1
Device Type	DTE
Interface Protocol	RS-232 or RS-422
Interface Connector	DE9P (J11)

4.7.2.6. NMEA Interface

Communications Parameters:	4800 Baud, 8,N,1
Interface Protocol	Optically isolated RS-422
Interface Connector	DE9P (J11 or J13)
NMEA GPS Sentence:	GPGLL, LCGLL
NMEA Heading Sentence:	HCHDM

4.7.2.7. Terminal Mounting Strip

Synchro Interface:	5 screw terminal connections
SBS Interface	4 screw terminal connections
External AGC	2 screw terminal connections
NMEA GPS	4 Screw terminal connections

4.8. CABLES

4.8.1. Antenna CONTROL CABLE

RS-422 Pedestal Interface

Type	Shielded Twisted Pair
Number of wires	
Wire Gauge	24 AWG or larger
Communications Parameters:	9600 Baud, 8 bits, No parity
Interface Protocol:	RS-422
Interface Connector:	DE-9P

4.8.2. AC POWER CABLE ABOVE DECKS

Voltage:	110 or 220 volts AC
Power:	75 Watts for Pedestal only

4.8.3. AC POWER CABLE BELOW DECKS

Voltage:	110 or 220 volts AC
Power:	100 Watts for the Antenna Control Unit only

4.8.4. 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

5. DRAWINGS

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

5.1. MODEL 4003-6 Ku-Band

5.2. SERIES 03 General Drawings

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SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	122406-1	X1	GENERAL ASS'Y, 4003-6, 4W	
2	0 EA	121940	A	SYSTEM BLOCK DIAGRAM, 4003-6	(NOT SHOWN)
4	1 EA	121244	A2	RADOME ASS'Y, 48 IN, FOAM, 0 DRAFT	
7	1 EA	113105-83913	B	DAC-97 ASS'Y, W/DVB	(NOT SHOWN)
9	1 EA	122401-3CFE		SSPB, KU-BAND, 4W, TML BUC, CFE	
11	1 EA	122188-1CFE		LNB, 11.70 TO 12.20 GHz, PLL, +/- 3 ppm, T	(NOT SHOWN)
13	1 EA	116881-8	A	BASE MUX RACK PANEL ASS'Y, SINGLE C	(NOT SHOWN)
17	1 EA	116676	A	TERMINAL MOUNTING STRIP ASS'Y, ACU	(NOT SHOWN)
18	1 EA	116670-1	G	CABLE ASS'Y, RS-232	(NOT SHOWN)
20	1 EA	116300	D1	SOFTWARE, PC-DAC, VER. 1.27	(NOT SHOWN)
21	1 EA	116298-1	F1	HARNESS ASS'Y, ACU TO MUX	(NOT SHOWN)
31	1 EA	121711	A	BALANCE WEIGHT KIT, 4003-2	(NOT SHOWN)
33	1 EA	121816	B	CUSTOMER DOC PACKET, 4003	(NOT SHOWN)
34	3 EA	111115-6	B	CABLE ASS'Y, F(M)-F(M), 6 FT.	NOT SHOWN

Sea Tel

SYSTEM, 4003-6, CFE RF

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
SERIES 03	14-Nov-03	1 OF 1	**121937-1**	**X1**

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SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	122406-1	X1	GENERAL ASS'Y, 4003-6, 4W	
2	1 EA	122067	B	FEED ASS'Y, 4003	
3	1 EA	117858		FILTER, KU TX REJECT	
4	1 EA	122188-1CFE		LNB, 10.95 TO 11.70 GHz, PLL, +/- 3 ppm, T	
5	1 EA	117429-2	D	E-BEND, KU-BAND, 180DEG	
6	1 EA	117168-1	E	MODEM ASS'Y, PEDESTAL, RF 3-CHANNE	
7	1 EA	116024-5	J1	SHIELDED POLANG RELAY ASS'Y	
8	1 EA	121185	C	PCU ENCLOSURE ASS'Y, INTEGRATED	
9	1 EA	115708-5	A	CIRCUIT BREAKER BOX ASS'Y, 4003 110V	
10	1 EA	121446	B	POWER SUPPLY ASS'Y, 4003-2	
11	1 EA	121966	A	ANTENNA, GPS, RETERMINATED, FURUN	
12	1 EA	113105-83913	B	DAC-97 ASS'Y, W/DVB	
13	1 EA	116676	A	TERMINAL MOUNTING STRIP ASS'Y, ACU	
14	1 EA	116298-1	F1	HARNESS ASS'Y, ACU TO MUX	
15	1 EA	121485-1	B1	HARNESS ASS'Y, REFLECTOR	
16	1 EA	122177-1	A1	HARNESS ASS'Y, PEDESTAL (4003)	
17	1 EA	121425-1	C	HARNESS ASS'Y, INTERFACE	
18	3 EA	111115-6	B	CABLE ASS'Y, F(M)-F(M), 6 FT.	
19	1 EA	116881-8	A	BASE MUX RACK PANEL ASS'Y, SINGLE C	
20	1 EA	113303-10	N	CABLE ASS'Y, RF, 7 IN, SMA 90 DEGREE	
21	1 EA	116670-1	G	CABLE ASS'Y, RS-232	
22	3 EA	110567-11		ADAPTOR, N(M)-F(F), STRAIGHT	
23	1 EA	110873-2		RF SPLITTER, 2-WAY	
24	1 EA	117168-2	E	MODEM ASS'Y, BASE, RF 3-CHANNEL	
25	1 EA	121174	A	CABLE ASS'Y, MOTOR DRIVER	
26	2 EA	114972-4	H1	CABLE ASS'Y, RF, 30 IN, SMA STRAIGHT	
27	1 EA	121281	A	CABLE ASS'Y, SMA(F)-SMA(M), 3 IN.	
28	4 EA	115492-1	C	ADAPTOR, N(F)-SMA(F), W/FLANGE	
29	1 EA	121483	A	CABLE ASS'Y, DUAL RG-6, TYPE F, 100 FT	CFE

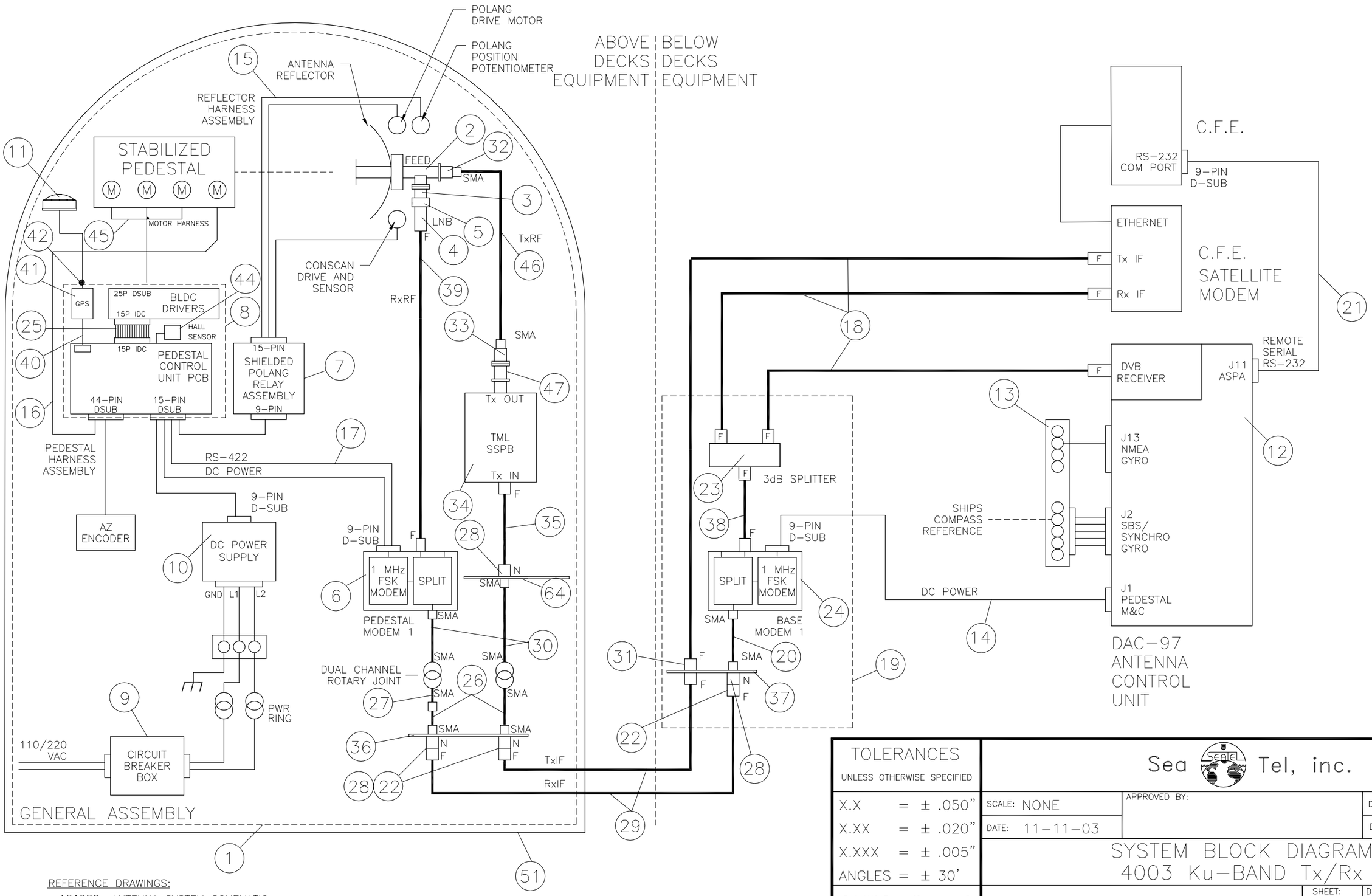
Sea Tel

SYSTEM BLOCK DIAGRAM, 4003-6

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
LIT	14-Nov-03	1 OF 2	**121940**	**A**

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
30	2 EA	113303-12	N1	CABLE ASS'Y, RF, 13 IN, SMA 90 DEGREE	
31	1 EA	109391	A	F BULLET	
32	1 EA	121116		WR 62 ADAPTOR 12 - 14.5 GHz	
33	1 EA	121592-4	A	ADAPTER, WR-75 WAVEGUIDE, 14-14.5 GH	
34	1 EA	122401-3CFE		SSPB, KU-BAND, 4W, TML BUC, CFE	CFE
35	1 EA	116700-6		CABLE ASS'Y, RG223, N(M)-F(M), 6 FT.	
36	1 EA	116388	B	BRACKET, CONNECTOR	
37	1 EA	121370	B	BRACKET, CONNECTOR, 2 HOLE ADAPTO	
38	1 EA	111115-1	B	CABLE ASS'Y, F(M)-F(M), 1 FT.	
39	1 EA	117164-114	A	CABLE ASS'Y, COAX, F-F, 114 IN, BLK H/S	
40	1 EA	121531	A1	CABLE ASS'Y, GPS RECEIVER TO PCU	
41	1 EA	121428	A	GPS RECEIVER, 12 CHANNEL, OEM, 5VDC	
42	1 EA	121430		RF PIGTAIL, HIROSE TO BNC	
44	1 EA	121447	B1	PCB ASS'Y, HALL SENSOR, BASIC	
45	1 EA	122179-1	A	HARNESS ASS'Y, MOTOR, 3BLDC	
46	1 EA	114520-6	E	CABLE ASS'Y, SUPERFLEX 6 FT.	
47	1 EA	119269-1		GASKET, O-RING, WR-75 (1/2)	
51	1 EA	122353-2	X1	RADOME ASS'Y, 48 IN, W/ LIP, FOAM	
61	1 EA	108929-2	C1	POWER CORD, 110V AC	
61	1 EA	109752-3		POWER CORD, 220V AC	
64	1 EA	122175	B	BRACKET, CONNECTOR, INTERFACE	



REFERENCE DRAWINGS:

121980 ANTENNA SYSTEM SCHEMATIC

TOLERANCES UNLESS OTHERWISE SPECIFIED	Sea Tel, inc.		
X.X = ± .050"	SCALE: NONE	APPROVED BY:	DRAWN BY: LK
X.XX = ± .020"	DATE: 11-11-03		DRAWING SIZE: B
X.XXX = ± .005"	SYSTEM BLOCK DIAGRAM 4003 Ku-BAND Tx/Rx		
ANGLES = ± 30'	MODEL: 4003-6	SHEET: 1 OF 1	DRAWING NUMBER 121940 / REVISION A
3rd ANGLE PROJECTION			

REV.	ECO#	DATE	DESCRIPTION	BY
A	N/A	7-2-03	NEW DRAWING FOR 4003-5	MSF

PCU PCB ASSY

REFER TO DRAWING 120974
ANTENNA SYSTEM SCHEMATIC, PEDESTAL
FOR 44 PIN AND 25 PIN
CONNECTION DETAILS

POLANG MOTOR 114806

POLANG POT SCALAR SIDE P/N 115425-3

CW 3 RED (BRN)
CCW 1 BRN (RED)
SLIDER 2 GRY

BLK
RED

2X22 RED IDC P/N 110927-2

(BRN) RED
GRY
(RED) BRN

4X22 RED IDC P/N 110927-4

J2 J1

MOTOR TERMINATION PCB ASSEMBLY

6X22 RED IDC P/N 110927-6

YEL POL+
VIO/WHT POL-
RED POL HI
GRY POL POT
BRN POL LO

REFLECTOR HARNESS ASSEMBLY P/N 121485-1

J3 DB25-S

SHIELDED POLANG AUX RELAY

Ku-BAND FEED P/N 121149

WAVEGUIDE COAX ADAPTER
SMA
TxRF
WR-75 E-BAND
F
TRANSMIT REJECT FILTER
Ku-BAND LNB
RxRF
WAVEGUIDE COAX ADAPTER
SMA
WG EXT.
TxRF O/P
1 WATT BLOCK UP CONVERTER
TxIF I/P
F
N
SMA

TO AC SLIP RINGS

AC TERMINAL BLOCK

FROM 44 PIN PEDESTAL HANRESS

W1 9-PIN D-SUB

15-PIN D-SUB

AUX BLK/BLU 9
M1 WHT/YEL 1
M2 WHT/BLU 10
CONS WHT/GRN 2
PWM- BLK/WHT 3
+24V BLU 8
GND BRN 12
POL POT BLU/WHT 11
4

J2 DB-15P
DO0
DO1
DO2
DI0
DI1
+24V OUTPUT
GND
DI2
DI3

POWER SUPPLY

W3 9 PIN D-SUB

+24V BLU 15
GND BRN 14
GND WHT/VIO 5
+24V VIO 7
BLK 13
WHT/BRN 6

RX-
RX+
TX+
TX-

J1 DB-44S

TX L BAND SMA
RX L BAND SMA
DUAL CHANNEL ROTARY JOINT
SMA
SPLIT
1 MHz MODEM
F
3 CH. RF MODEM ASSEMBLY PEDESTAL MODEM 1

W2 9-PIN D-SUB

BLU +24V
BRN GND
WHT/VIO Tx-
VIO Tx+
BLK Rx+
WHT/BRN Rx-

INTERFACE HARNESS ASSEMBLY P/N 121425-1

NOTES:

1. NOT REQUIRED FOR NONSCAN FEEDS.

REFERENCE DRAWINGS:

121425-1 INTERFACE HARNESS ASSEMBLY / SCHEMATIC
116280 SHIELDED POLANG AUX RELAY PCB SCHEMATIC
120924-1 PEDESTAL HARNESS SCHEMATIC
120974 ANTENNA SYSTEM SCHEMATIC, PEDESTAL

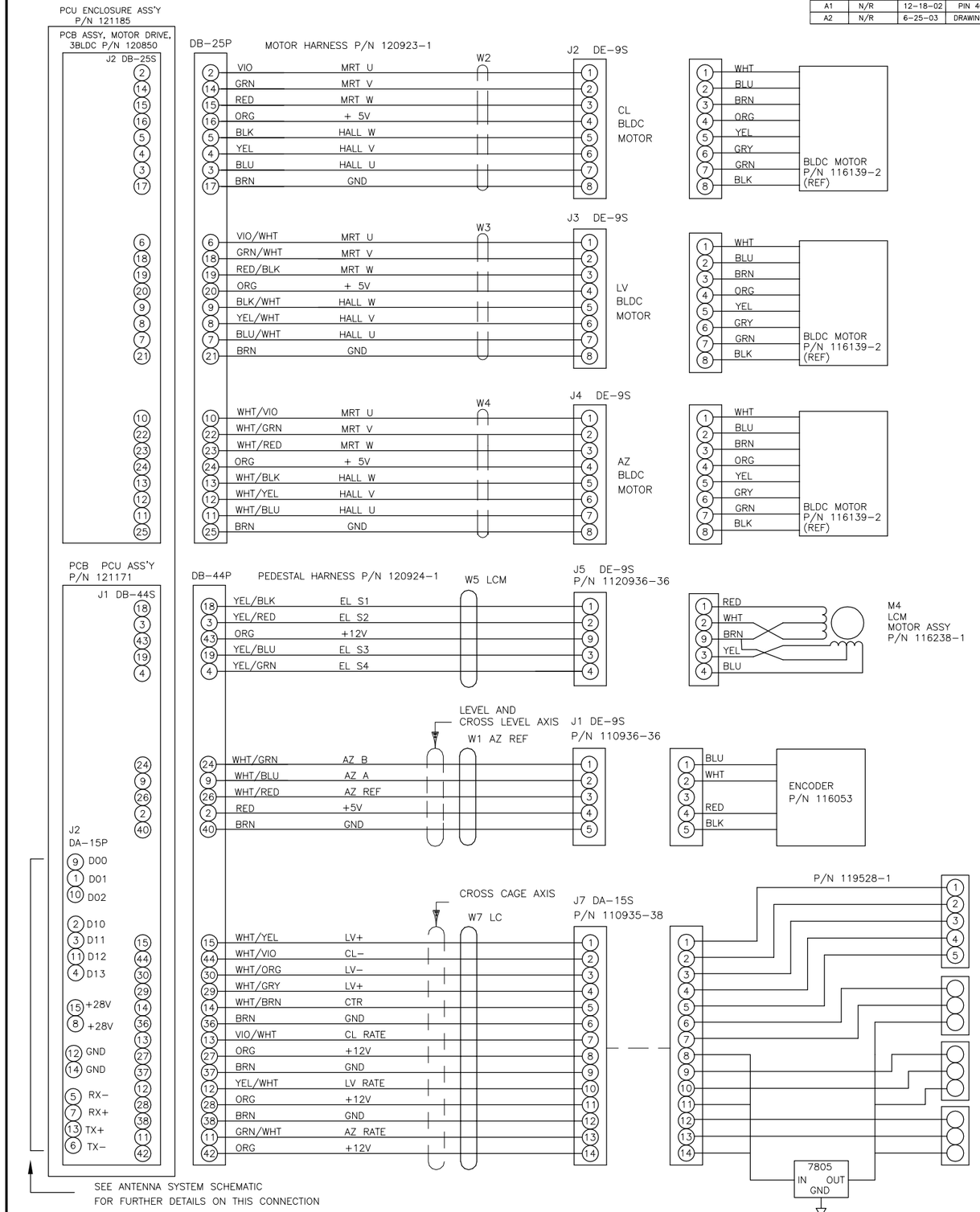
Sea Tel, Inc.
CONCORD, CA

SCALE: NONE	APPROVED BY:	DRAWN BY MSF
DATE: 7-2-03		DRAWING SIZE: C

ANTENNA SYSTEM SCHEMATIC

MODEL: 4003-5	SHT 1 OF 1	DRAWING NUMBER 121980	REV. A

REV.	ECO#	DATE	DESCRIPTION	BY
A1	N/R	12-18-02	PIN 40 WS 4	MSF
A2	N/R	6-25-03	DRAWING UPDATED	MSF



NOTES: UNLESS OTHERWISE SPECIFIED

1. FOR WIRE LENGTHS AND ASSEMBLY DETAILS. SEE PEDESTAL HARNESS ASSEMBLY.

REFERENCE DRAWINGS:
121172 PCU PCB SCHEMATIC
121148 ANTENNA SYSTEM SCHEMATIC

TOLERANCES			
UNLESS OTHERWISE SPECIFIED			
X.X	= ± .050"		
X.XX	= ± .020"		
X.XXX	= ± .005"		
ANGLES	= ± 30'		
3rd ANGLE PROJECTION			

Sea Tel

SCALE: MSF	APPROVED BY:	DRAWN BY: MSF	
DATE: 8-20-02		DRAWING SIZE: C	
TITLE: ANTENNA SYSTEM SCHEMATIC, PEDESTAL			
MODEL: XX03	SHEET: 1 OF 1	DRAWING NUMBER: 120974	REVISION: A2

DOCUMENT NO. 117085 REV. C

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	121193	J	STABILIZED PEDESTAL ASS'Y, 4003-2	
3	1 EA	122407	X1	EQUIPMENT FRAME ASS'Y, 4003-6	
4	2 EA	121151-1	A	DISH CLIP	
5	2 EA	121151-2	A	DISH CLIP	
6	2 EA	121166-1	C	STRUT, REFLECTOR	
7	2 EA	121166-2	B	STRUT, REFLECTOR	
8	1 EA	122063	A	ANTENNA ASS'Y, 4003	
10	1 EA	121592-4	A	ADAPTER, WR-75 WAVEGUIDE, 14-14.5 GH	
11	2 EA	110142-8	E	STANDOFF	
13	1 EA	116700-6		CABLE ASS'Y, RG223, N(M)-F(M), 6 FT.	(NOT SHOWN)
14	1 EA	117164-114	A	CABLE ASS'Y, COAX, F-F, 114 IN, BLK H/S	(NOT SHOWN)
16	1 EA	121966	A	ANTENNA, GPS, RETERMINATED, FURUN	
17	8 EA	109270	0	WASHER, ISO DAMP	
19	16 EA	114580-011		WASHER, FLAT, #10, S.S.	
21	8 EA	114583-011	A	NUT, HEX, 10-32, S.S.	
22	8 EA	114588-827		SCREW, PAN HEAD, PHILLIPS, 10-32 x 3/8,	
23	1 EA	114586-537		SCREW, HEX HD, 1/4-20 x 3/4, S.S.	
24	10 EA	114580-029		WASHER, FLAT, 1/4, S.S.	
26	5 EA	114583-029		NUT, HEX, 1/4-20, S.S.	
27	2 EA	119269-1		GASKET, O-RING, WR-75 (1/2)	
28	1 EA	115697		TIE MOUNT	
29	1 EA	121485-1	B1	HARNESS ASS'Y, REFLECTOR	(NOT SHOWN)
30	1 EA	114520-6	E	CABLE ASS'Y, SUPERFLEX 6 FT.	(NOT SHOWN)
32	1 EA	108894-4	F	WEIGHT, TRIM, 1/4 X 3 X 10	
33	1 EA	108894-3	F	WEIGHT, TRIM, 1/2 X 3 X 10	
34	2 EA	108894-5	F	WEIGHT, TRIM, 1/2 X 1 X 10	
35	2 EA	114586-543		SCREW, HEX HD, 1/4-20 x 2, S.S.	
36	1 EA	114586-542		SCREW, HEX HD, 1/4-20 x 1-3/4, S.S.	
37	1 EA	114586-546		SCREW, HEX HD, 1/4-20 x 2-3/4, S.S.	

Sea Tel

GENERAL ASS'Y, 4003-6, 4W

PROD FAMILY	EFF. DATE	SHT 1 OF 2	DRAWING NUMBER	REV
COMMON	14-Nov-03		**122406-1**	**X1**

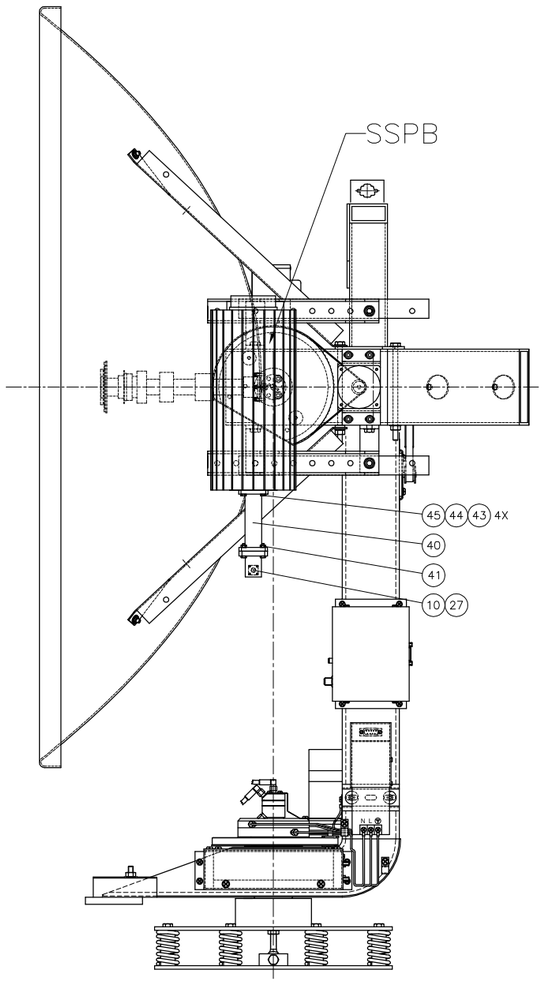
SINGLE LEVEL MFG BILL OF MATERIAL

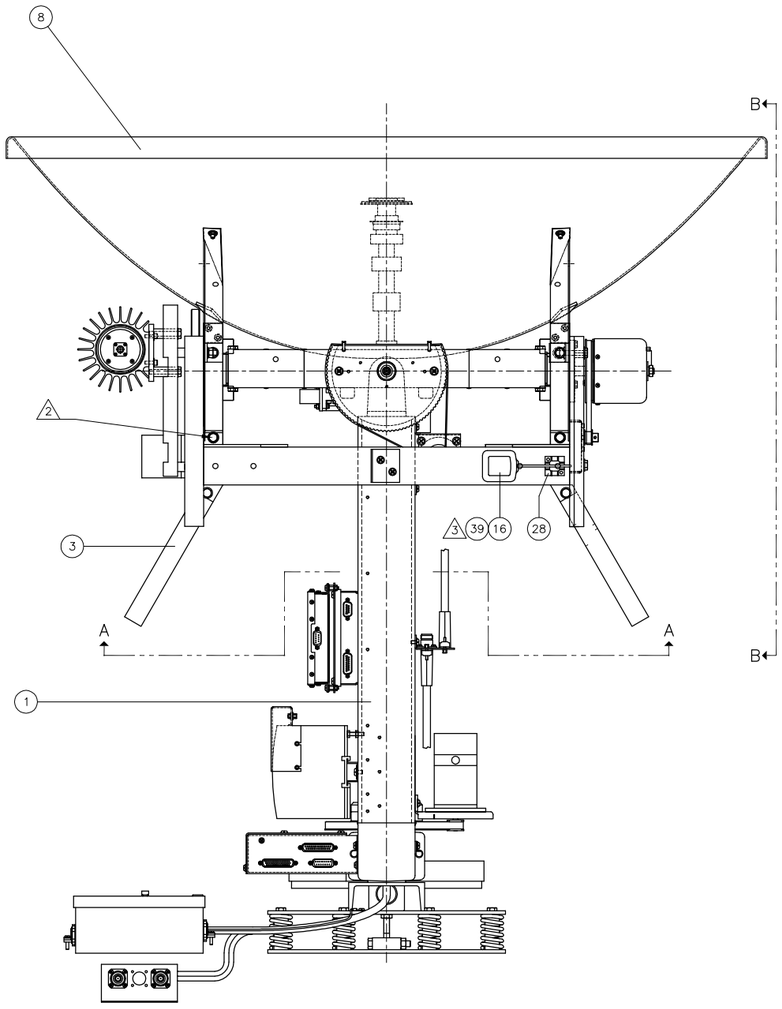
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
38	8 EA	121810-2	X1	POP RIVET, 3/16 IN. DIA, 1/4-3/8 GRIP, AL.	
39	1 IN	118144-13		TAPE, DOUBLE-SIDED FOAM, .04 THH, 1.0	
40	1 EA	115551-230	D	WAVEGUIDE EXTENSION, WR-75, 3 IN	
41	1 EA	118294-1	A	HARDWARE KIT, WR-75 FLANGE	
43	8 EA	119973-116		SCREW, SOCKET HD, M4 X 10	
44	8 EA	114580-009		WASHER, FLAT, #8, S.S.	
45	8 EA	114581-009		WASHER, LOCK, #8, S.S.	

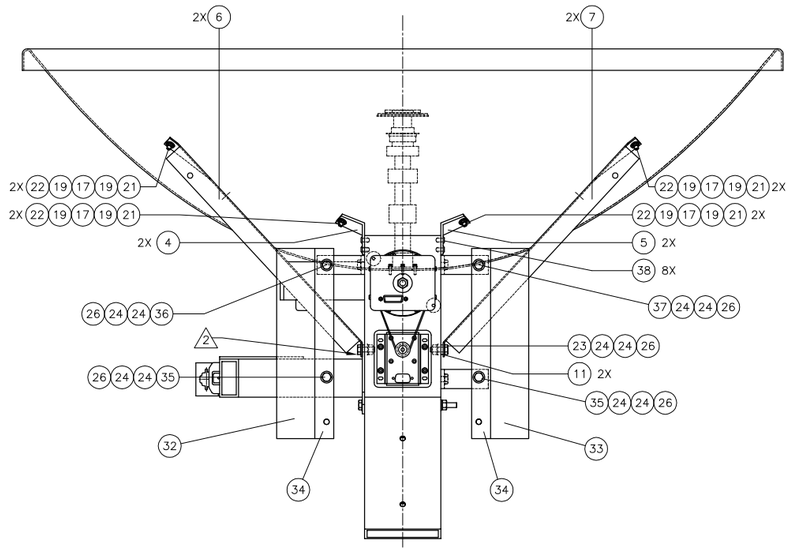
Sea Tel

GENERAL ASS'Y, 4003-6, 4W

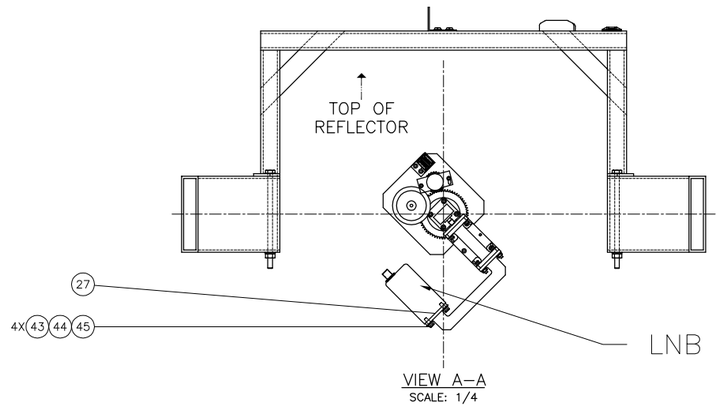
PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	14-Nov-03	2 OF 2	**122406-1**	**X1**







VIEW B–B
SCALE: 1/4



VIEW A–A
SCALE: 1/4

NOTES, UNLESS OTHERWISE SPECIFIED:

1. APPLY ADHESIVE PER SEA TEL SPEC. 121730.

2 REMOVE HARDWARE, AND REASSEMBLE.

3 CLEAN EQUIPMENT FRAME AND ANTENNA, ITEM 16, THROUGHLY WITH RUBBING ALCOHOL. ATTACH ANTENNA, ITEM 16, WITH DOUBLE SIDED TAPE, ITEM 39, TO EQUIPMENT FRAME.

TOLERANCES UNLESS OTHERWISE SPECIFIED	Sea Tel			
X.X = ± .050"	SCALE: 1/4	APPROVED BY:	DRAWN BY: VS	
X.XX = ± .020"	DATE: 10–22–03		DRAWING SIZE: D	
X.XXX = ± .005"	TITLE: GENERAL ASSEMBLY - MODEL 4003-6			
ANGLES = ± 30'	MODEL: 4003–6	SHEET: 1 OF 1	DRAWING NUMBER 122406-1	REVISION X1
3rd ANGLE PROJECTION				

DOCUMENT NO. 117086 REV. C

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	121105	E	BASE SPINDLE ASSEMBLY	
2	1 EA	121189	A	CROSS LEVEL ASS'Y, 4003	
3	1 EA	121186	B	EQUIPMENT FRAME ASS'Y, BASIC 4003-2	
7	1 EA	121187	A	LEVEL BEAM ASS'Y, 4003	
9	1 EA	121427-1	B	LEVEL CAGE ASS'Y, SHIELDED	
10	1 EA	122179-1	A	HARNESS ASS'Y, MOTOR, 3BLDC	(NOT SHOWN)
11	1 EA	122177-1	A1	HARNESS ASS'Y, PEDESTAL (4003)	(NOT SHOWN)
12	1 EA	121425-1	C	HARNESS ASS'Y, INTERFACE	(NOT SHOWN)
13	1 EA	121446	B	POWER SUPPLY ASS'Y, 4003-2	
14	1 EA	117168-1	E	MODEM ASS'Y, PEDESTAL, RF 3-CHANNE	
15	1 EA	116024-5	J1	SHIELDED POLANG RELAY ASS'Y	
16	1 EA	119599-1	B	BRACKET, DE-9	
17	4 EA	114588-192		SCREW, PAN HEAD, PHILLIPS, 8-32 x 3/8, S	
18	8 EA	114580-009		WASHER, FLAT, #8, S.S.	
19	1 EA	116388	B	BRACKET, CONNECTOR	
20	3 EA	115492-1	C	ADAPTOR, N(F)-SMA(F), W/FLANGE	
21	3 EA	110567-11		ADAPTOR, N(M)-F(F), STRAIGHT	
23	1 EA	121185	C	PCU ENCLOSURE ASS'Y, INTEGRATED	
24	1 EA	121082	D	AZ POST WELDMENT/MACH	
25	4 EA	114588-203		SCREW, PAN HEAD, PHILLIPS, 8-32 x 1-1/2,	
28	1 EA	120901		MODEM - ADAPTER PLATE	
29	4 EA	114719-1		STANDOFF, HEX M-F (6-32 X 1/4 IN L)	
30	4 EA	114588-143		SCREW, PAN HEAD, PHILLIPS, 6-32 x 3/16,	
31	4 EA	114583-007		NUT, HEX, 6-32, S.S.	
32	1 EA	121443	A	BRACKET, DIN RAIL MOUNTING, 3 IN	
33	2 EA	114588-826		SCREW, PAN HEAD, PHILLIPS, 10-32 x 5/16	
34	2 EA	114625-103		WASHER, FENDER, #10, 18-8 S.S. (11/16 O	
35	1 EA	109770-4		BELT, TIMING, 40 DP, 163 GROOVES	
36	1 EA	115708-5	A	CIRCUIT BREAKER BOX ASS'Y, 4003 110V	

Sea Tel

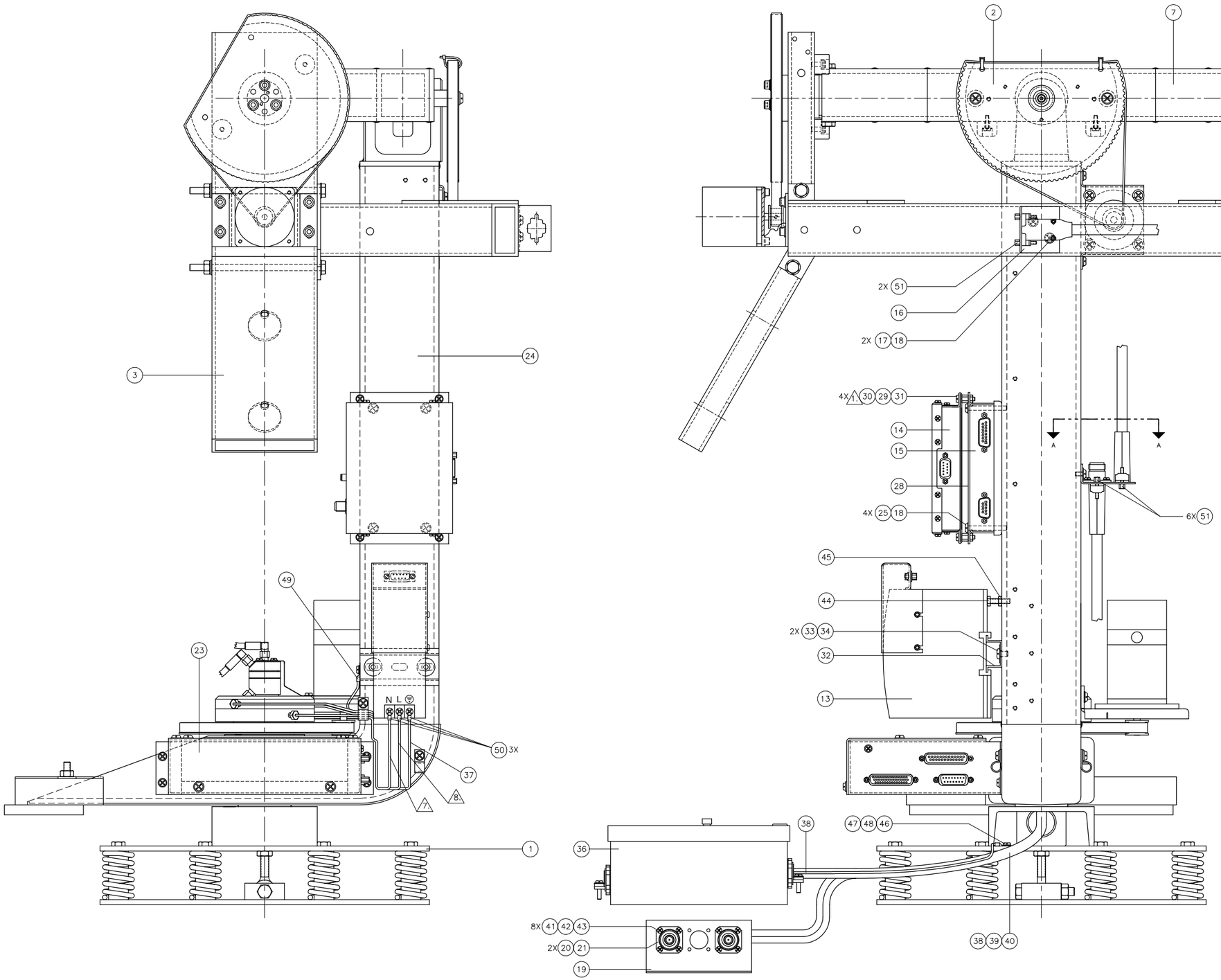
STABILIZED PEDESTAL ASS'Y, 4003-2

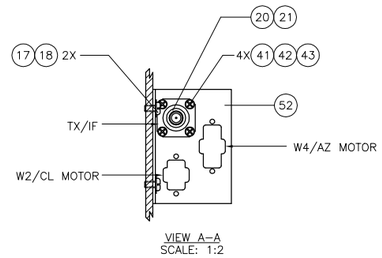
PROD FAMILY	EFF. DATE	SHT 1 OF 2	DRAWING NUMBER	REV
COMMON	14-Nov-03		**121193**	**J**

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
37	14 IN	113343-0254		WIRE, 12G, COPPER STRAND, GRN/YEL	
38	66 IN	113343-0254		WIRE, 12G, COPPER STRAND, GRN/YEL	
40	60 IN	108955-10		SPIRAL WRAP, BLACK, 3/8	
41	12 EA	114588-106		SCREW, PAN HEAD, PHILLIPS, 4-40 x 1/4, S	
42	12 EA	114580-005		WASHER, FLAT, #4, S.S.	
43	12 EA	114583-005		NUT, HEX, 4-40, S.S.	
44	1 EA	120241-831		SCREW, HEX HD, 10-32 X 3/4, S.S.	
45	1 EA	114583-011	A	NUT, HEX, 10-32, S.S.	
46	1 EA	110234-10		RING TERMINAL, INSULATED, 12-10, 1/4 IN	
47	1 EA	119745-424		SCREW, PAN HEAD, PHILLIPS, M6 x 12, S.	
48	1 EA	114581-250		WASHER, LOCK, M6, S.S.	
49	1 EA	110234-8		RING, TERMINAL, INSULATED, 12-10, #8	
50	3 EA	121899-12		PIN TERMINAL, CRIMP, 12 AWG, ORG	
51	8 EA	110941-4	B	SCREW, JACK, 4-40 x 5/8 IN. LG., S.S.	
52	1 EA	122175	B	BRACKET, CONNECTOR, INTERFACE	

REV.	ECO#	DATE	DESCRIPTION	BY
A	N/A	4-18-03	RELEASED TO PRODUCTION. CHANGED REV FROM X10 TO A.	LK
B	3941	5-6-03	ITEM 36 WS P/N 115708-4	MSF
C	3945	5-12-03	ITEM 37 WS QTY. 10"; ITEM 39 WS P/N 111398-2; NOTE 7 & 8 UPDATED; NOTE 1 WS "APPLY LOCTITE 222 (PINK) AT ASSEMBLY"	MSF
D	3978	6-9-03	ITEM 39 WS P/N 121836-2 QTY. 3; ITEM 50 ADDED	MSF
E	3995	06-25-03	ITEM 16 QTY WS 4, ITEM 17 QTY WS 8, ITEM 18 QTY WS 12, ITEM 19 QTY WS 2; DELETED ITEMS 26 & 27; ADDED ITEMS 51 & 52; VIEW A-A ADDED.	AEF
F	4059	7-29-03	DEL ITEM 39 PIN TERMINALS 121899-16, 2EA CHANGE ITEM 50 PIN TERMINALS FROM QTY 1 TO 3. UPDATE NOTE 7 & 8.	LK
G	4067	8-12-03	ITEM 52 P#122175 WAS P#121881. BASE SPINDLE ASS'Y UPDATED WITH DOUBLE STACK AZ MOTOR.	VS
H	3966	9-3-03	ITEM 13 WAS 121466; ITEM 17 WAS QTY. 4; ITEM 18 WAS QTY. 8; ITEM 50 WAS QTY. 3; ITEMS 32, 33, 34, 44, 45 AND 49 DELETED; NOTES 2-6 DELETED; ITEM 53 ADDED	JP
J	4140	9-29-03	REVERSE ECO # 3966; BOM & DWG UPDATED THE SAME AS REV. G	MSF





VIEW A-A
SCALE: 1:2

NOTES, UNLESS OTHERWISE SPECIFIED:

1. APPLY ADHESIVE PER SEATEL SPEC. 121730
2. THREAD #10-32 HEX NUT, ITEM 45, ONTO #10-32 HEX HD. SCREW, ITEM 44, AND THREAD SCREW ALL THE WAY INTO AZ POST.
3. ATTACH POWER SUPPLY ASS'Y, ITEM 13, TO DIN RAIL, ITEM 32.
4. BACK OUT THE #10-32 HEX HD. SCREW, ITEM 44, UNTIL IT PRESSES FIRMLY AGAINST BLACK PLASTIC ON POWER SUPPLY ASS'Y.
5. THREAD #10-32 HEX NUT, ITEM 45, AGAINST AZ POST, WHILE HOLDING #10-32 HEX HD. SCREW, ITEM 44, IN POSITION.
6. CHECK TO SEE THAT THERE IS NO PLAY IN THE POWER SUPPLY WHEN PRESSED DOWN FROM THE TOP. IF THERE IS PLAY IN THE POWER SUPPLY ASS'Y, THREAD THE #10-32 HEX HD. SCREW, ITEM 44, FURTHER AGAINST POWER SUPPLY ASS'Y. AND RETIGHTEN HEX NUT, ITEM 45, AGAINST AZ POST.
7. CUT POWER RING WIRES TO LENGTH SO THAT THEY RUN UNDER PCU HARNESSES. TERMINATE THE 2 BLACK WIRES INTO PIN TERMINAL CONNECTOR, ITEM 50. INSTALL PIN INTO "N" TERMINAL OF POWER SUPPLY.
8. TERMINATE THE 2 RED WIRES INTO PIN TERMINAL CONNECTOR, ITEM 50, INSTALL PIN INTO "L" TERMINAL OF POWER SUPPLY.

TOLERANCES			
UNLESS OTHERWISE SPECIFIED			
X.X	= ± .050"		
X.XX	= ± .020"		
X.XXX	= ± .005"		
ANGLES	= ± 30'		
3rd ANGLE PROJECTION			

Sea Tel

SCALE: 1/2	APPROVED BY:	DRAWN BY: JP	
DATE: 1-23-03		DRAWING SIZE: B	
TITLE: STABILIZED PEDESTAL ASSEMBLY			
MODEL: 4003-2	SHEET: 1 OF 1	DRAWING NUMBER 121193	REVISION J

DOCUMENT NO. 117086 REV. C

SINGLE LEVEL MFG BILL OF MATERIAL

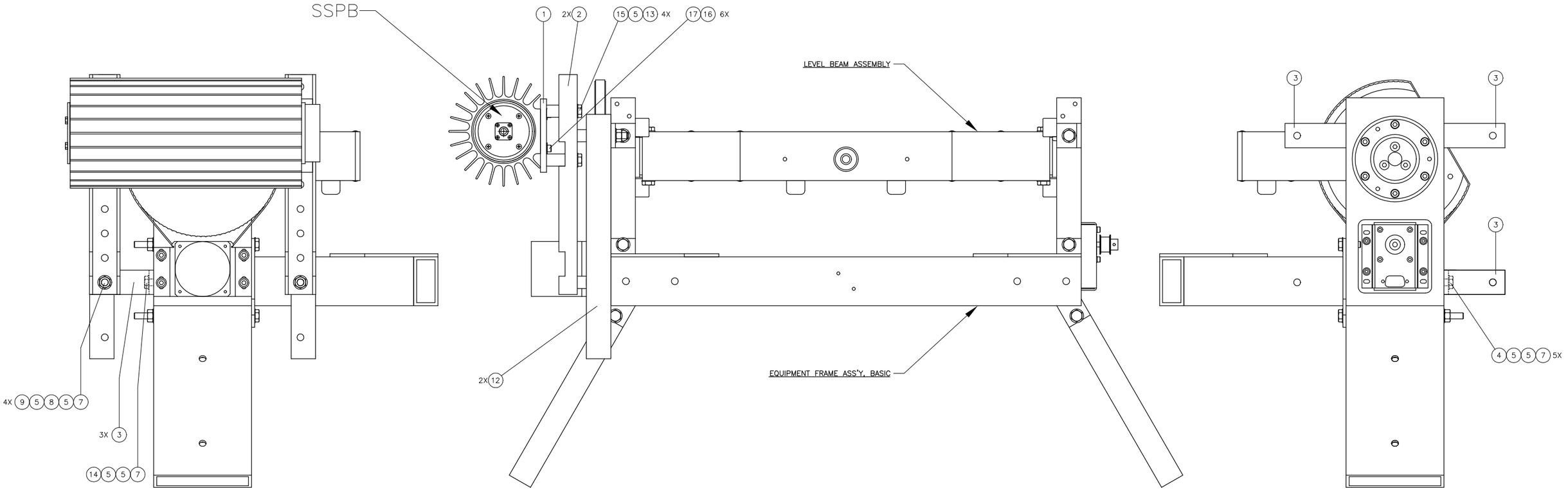
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	122410	X2	MOUNTING BRACKET, TML BUC	
2	2 EA	121234	B	BRACKET, SSPA, 9 IN. LONG	
3	6 EA	121138	B	BRACKET, SSPA MOUNTING	
4	5 EA	114586-537		SCREW, HEX HD, 1/4-20 x 3/4, S.S.	
5	24 EA	114580-029		WASHER, FLAT, 1/4, S.S.	
7	10 EA	114583-029		NUT, HEX, 1/4-20, S.S.	
8	4 EA	110142-5		SPACER, 1/4 CLEARANCE, 3/8 LENGTH, AL	
9	4 EA	114586-544		SCREW, HEX HD, 1/4-20 x 2-1/4, S.S.	
12	2 EA	108894-7		WEIGHT, TRIM, 1 X 1 X 10	
13	4 EA	114586-541		SCREW, HEX HD, 1/4-20 x 1-1/2, S.S.	
14	1 EA	114586-553		SCREW, HEX HD, 1/4-20 x 5, S.S.	
15	4 EA	110142-9		STANDOFF, .50 OD X 1.13L	
16	6 EA	119973-038		SCREW, SOCKET HD, M4 X 14	
17	6 EA	114580-230		WASHER, FLAT, M4, S.S.	

Sea Tel

EQUIPMENT FRAME ASS'Y, 4003-6

PROD FAMILY	EFF. DATE	SHT 1 OF 1	DRAWING NUMBER	REV
COMMON	14-Nov-03		**122407**	**X1**

REV.	ECO#	DATE	DESCRIPTION	BY
X1	N/A	10-22-03	NEW DRAWING	VS



NOTES, UNLESS OTHERWISE SPECIFIED:

1. APPLY ADHESIVE PER SEATEL SPEC 121730.

TOLERANCES					
UNLESS OTHERWISE SPECIFIED		Sea Tel			
X.X = ± .050"	SCALE: 1/2	APPROVED BY:	DRAWN BY: VS		
X.XX = ± .020"	DATE: 10-22-03		DRAWING SIZE: D		
X.XXX = ± .005"	TITLE: EQUIPMENT FRAME ASSY				
ANGLES = ± 30'	MODEL: 4003-6	SHEET: 1 OF 1	DRAWING NUMBER 122407	REVISION X1	
3rd ANGLE PROJECTION					

DOCUMENT NO. 117086 REV. C

SINGLE LEVEL MFG BILL OF MATERIAL

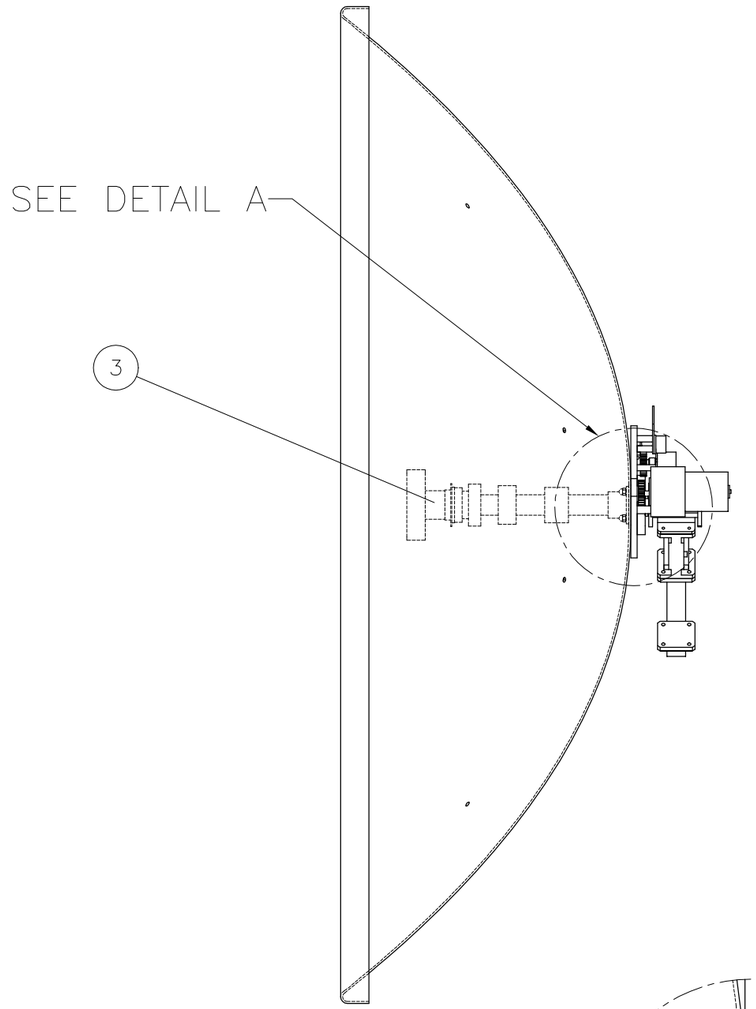
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	122065	A	REFLECTOR MACHINING, 40 IN	
2	1 EA	122067	B	FEED ASS'Y, 4003	
3	1 EA	122066	A	VERTEX FEED, MOD. 4003	
4	4 EA	120731-005	A	NUT, ACORN, 4-40 X 1/8 DP., S.S.	
5	4 EA	114581-005		WASHER, LOCK, #4, S.S.	

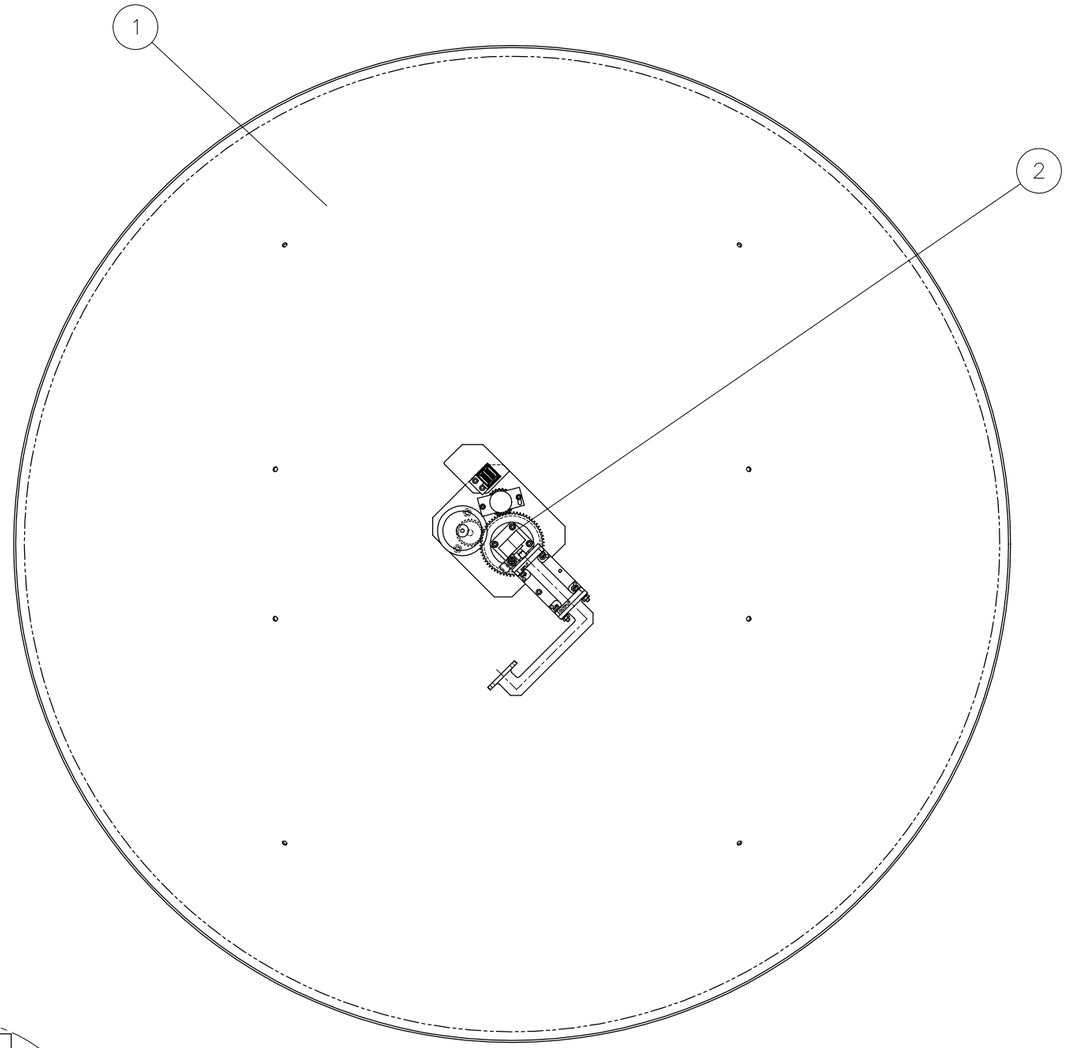
Sea Tel

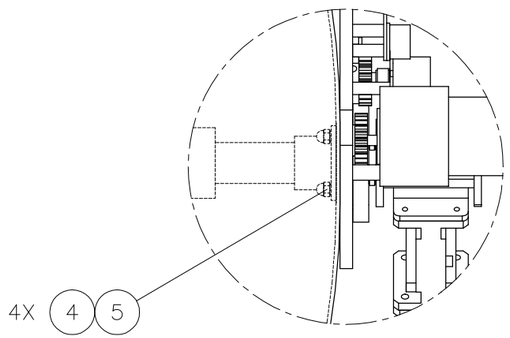
ANTENNA ASS'Y, 4003

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	14-Nov-03	1 OF 1	**122063**	**A**

REV.	ECO#	DATE	DESCRIPTION	BY
A	4032	9-02-03	RELEASED TO PRODUCTION.	VS







DETAIL A
SCALE: 1/2

NOTES, UNLESS OTHERWISE SPECIFIED:

1. APPLY ADHESIVE PER SEA TEL SPEC. 121730.

TOLERANCES UNLESS OTHERWISE SPECIFIED	Sea Tel		
X.X = ± .050"	SCALE: 1/4	APPROVED BY:	DRAWN BY: VS
X.XX = ± .020"	DATE: 9-02-03		DRAWING SIZE: C
X.XXX = ± .005"	TITLE: ANTENNA ASSEMBLY, KU, TX/RX.		
ANGLES = ± 30'	MODEL: 4003	SHEET: 1 OF 1	DRAWING NUMBER 122063 / REVISION A
3rd ANGLE PROJECTION			

DOCUMENT NO. 117085 REV. C

SINGLE LEVEL MFG BILL OF MATERIAL

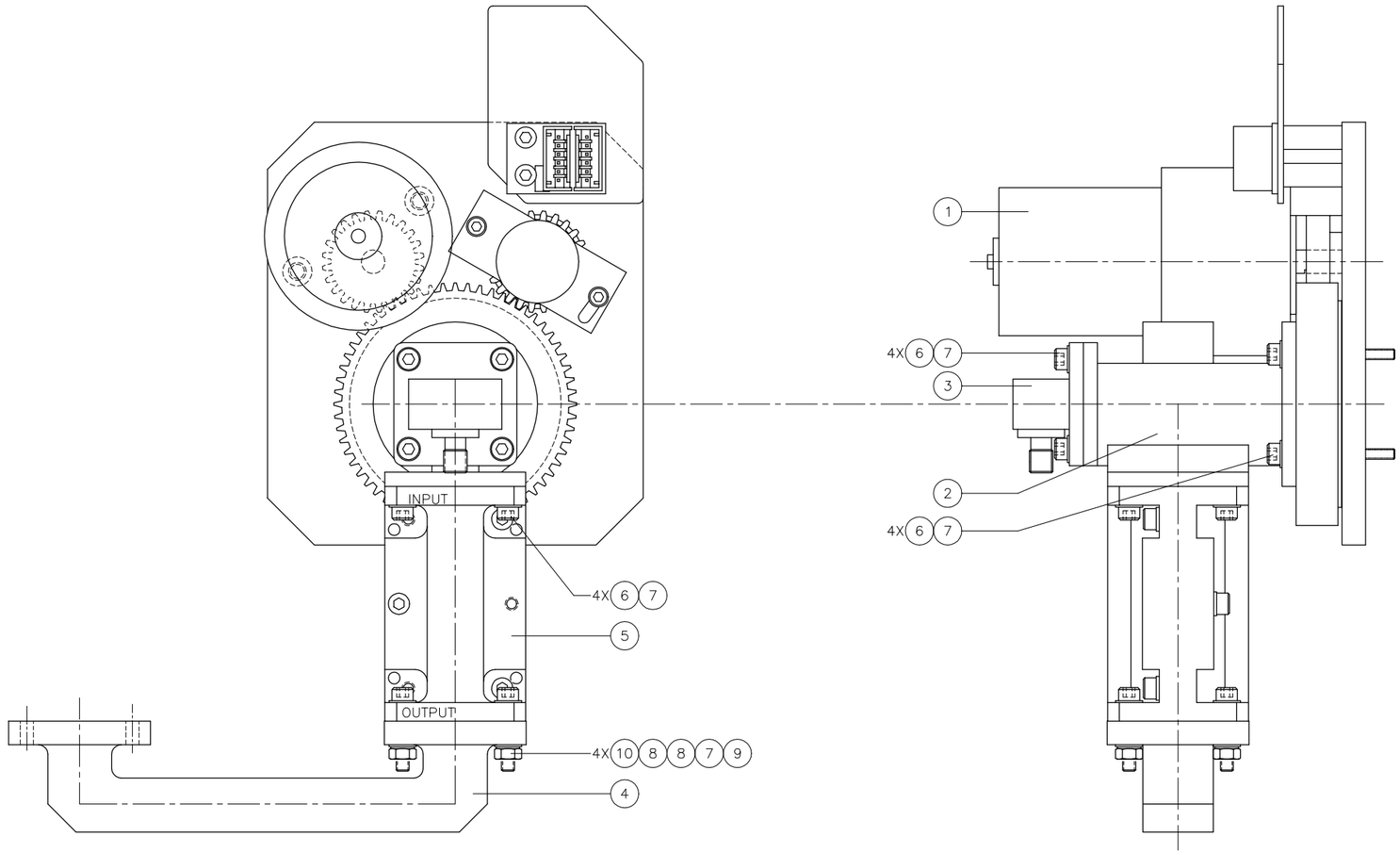
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	122068	A	MOTOR ASSY, POLANG, 4003	
2	1 EA	121184		OMT, KU-BAND WR-62 TX/WR-75 RX, .7IN	
3	1 EA	121116		WR 62 ADAPTOR 12 - 14.5 GHz	
4	1 EA	117429-2	D	E-BEND, KU-BAND, 180DEG	
5	1 EA	117858		FILTER, KU TX REJECT	
6	12 EA	114593-124		SCREW, SOCKET HD, 6-32 x 1/2, S.S.	
7	16 EA	114581-007		WASHER, LOCK, #6, S.S.	
8	9 EA	114580-007		WASHER, FLAT, #6, S.S.	
9	4 EA	114583-007		NUT, HEX, 6-32, S.S.	
10	4 EA	114593-127		SCREW, SOCKET HD, 6-32 x 3/4, S.S.	

Sea Tel

FEED ASS'Y, 4003

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	14-Nov-03	1 OF 1	**122067**	**B**

REV.	ECO#	DATE	DESCRIPTION	BY
A	4032	8/01/03	RELEASED TO PRODUCTION.	VS
B	4194	11-10-03	REMOVED ITEMS 11, 12, 13. ITEM 6 WS QTY 11 AND P/N 114593-121. ITEM 10 WS P/N 114593-126.	V.S.



TOLERANCES			
UNLESS OTHERWISE SPECIFIED			
X.X	= ± .050"		
X.XX	= ± .020"		
X.XXX	= ± .005"		
ANGLES	= ± 30'		
3rd ANGLE PROJECTION			

Sea Tel

SCALE: B	APPROVED BY:	DRAWN BY: VS	
DATE: 8/01/03		DRAWING SIZE: C	
TITLE: FEED ASSEMBLY			
MODEL: 4003	SHEET: 1 OF 1	DRAWING NUMBER 122067	REVISION B

DOCUMENT NO. 117085 REV. C

SINGLE LEVEL MFG BILL OF MATERIAL

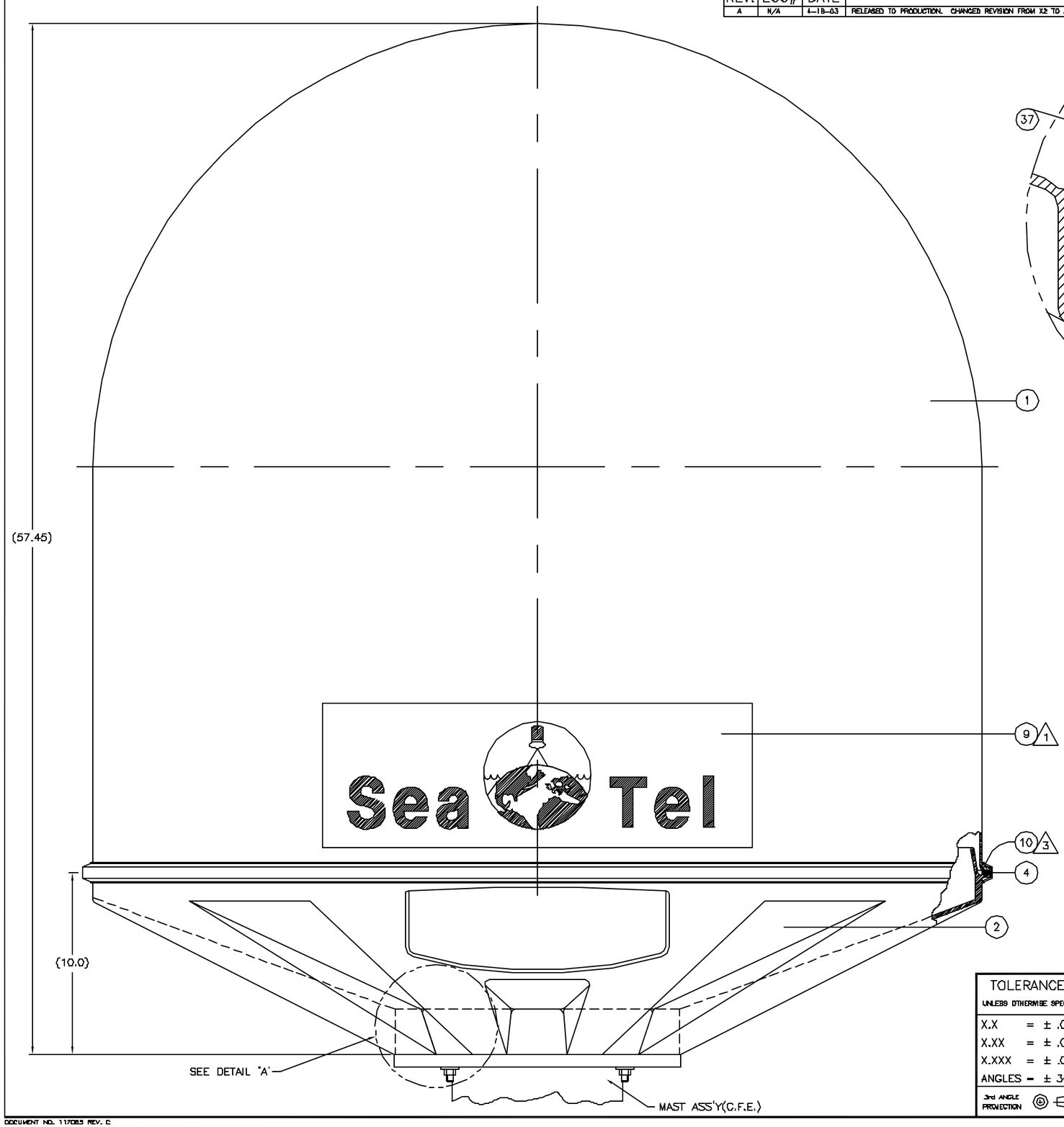
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	121247-2	A	RADOME FAB, 48 IN, 0 DRAFT	
2	1 EA	114612	J	RADOME BASE MACHINING, 48 INCH	
4	14 FT	109640		RUBBER SPONGE STRIP, GRAY, .50" W x .	
5	3 EA	109258-8	F	STRAIN RELIEF, W/SEALING LOCK NUT	
6	1 EA	118569	A	MOUNTING KIT, RADOME	
7	7 EA	109172	A	LATCH, SPRING	
8	7 EA	109250	B	PLATE, LATCH	
9	2 EA	110481-3		DECAL, LOGO, 8 X 24 IN	
10	1 EA	112820-4	F	RADOME BAND, PAINTED, 50.50 DIA.	
14	3 EA	113974-7		RUBBER STOPPER	
23	13 EA	114588-148		SCREW, PAN HEAD, PHILLIPS, 6-32 x 1/2, S	
24	4 EA	114588-108		SCREW, PAN HEAD, PHILLIPS, 4-40 x 3/8, S	
25	8 EA	114580-005		WASHER, FLAT, #4, S.S.	
26	4 EA	114583-005		NUT, HEX, 4-40, S.S.	
27	2 EA	114588-150		SCREW, PAN HEAD, PHILLIPS, 6-32 x 5/8, S	
28	32 EA	114580-007		WASHER, FLAT, #6, S.S.	
29	16 EA	114583-007		NUT, HEX, 6-32, S.S.	
30	1 EA	114588-194		SCREW, PAN HEAD, PHILLIPS, 8-32 x 1/2, S	
31	2 EA	114580-009		WASHER, FLAT, #8, S.S.	
32	1 EA	114583-009		NUT, HEX, 8-32, S.S.	
33	1 EA	108964-1	B1	CABLE, TETHER, 28.25 INCH	
34	1 EA	109783-2		WRENCH, L	
37	1 EA	118576	A	MOUNTING KIT, PEDESTAL	
40	1 EA	114588-151		SCREW, PAN HEAD, PHILLIPS, 6-32 x 3/4, S	

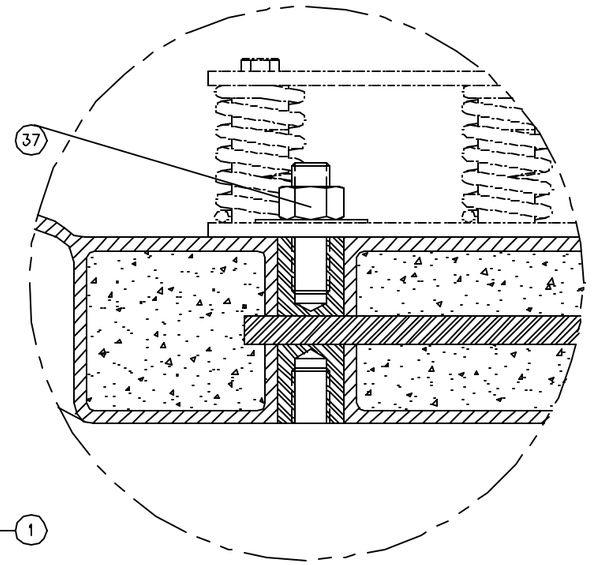
Sea Tel

RADOME ASS'Y, 48 IN, FOAM, 0 DRAFT

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	14-Nov-03	1 OF 1	**121244**	**A2**

REV.	ECO#	DATE	DESCRIPTION	BY
A	N/A	4-18-03	RELEASED TO PRODUCTION. CHANGED REVISION FROM X2 TO A.	LK





DETAIL 'A'
SCALE: NONE

NOTES: UNLESS OTHERWISE SPECIFIED

1. POSITION DECALS AS SHOWN AT BOTH BOW AND AFT LOCATIONS.
2. USE LOCTITE 271(RED) AT ASSEMBLY.
3.

WARNING

FOR MAXIMUM INTEGRITY THE RADOME BAND MUST BE INSTALLED AS FOLLOWS:

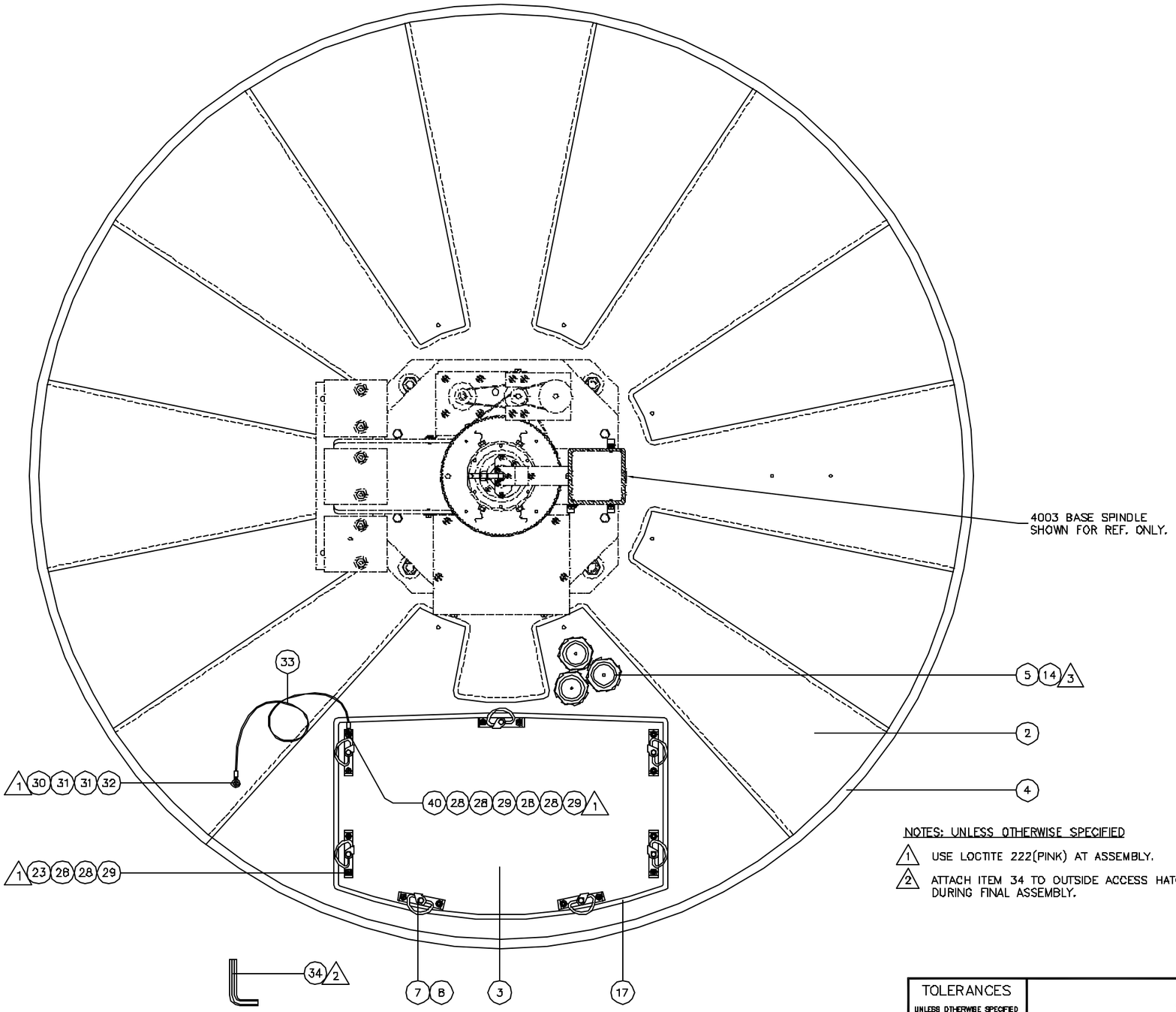
1. PLACE THE BAND AROUND THE RADOME LIPS AND TIGHTEN BOTH CINCH ASSEMBLY NUTS FOR MEDIUN BAND TENSION (3 TO 3.5 FT-LBS).
2. WITH A MALLET TAP THE BAND ALL ARDUND TO SEAT IT ON THE RADOME LIPS.
3. RE-TIGHTEN BOTH RADOME BAND NUTS TO 5-5.5 FT-LBS TORQUE.
4. WITH A MALLET AGAIN TAP THE BAND ALL AROUND TO FULLY SEAT THE BAND ON THE RADOME LIPS.
5. REPEAT STEPS 3 AND 4 UNTIL FURTHER REPETITIONS DO NOT RESULT IN THE BAND LOSING ANY AF ITS PREVIOUS TENSION.

5. WHEN SHIPPING INDIVIDUAL RADOME PROVIDE PEDESTAL MOUNTING KIT (118576) BAGGED SEPARATELY.

TOLERANCES			
UNLESS OTHERWISE SPECIFIED			
X.X	= ± .050"		
X.XX	= ± .020"		
X.XXX	= ± .005"		
ANGLES	= ± 30'		
3rd ANGLE PROJECTION			

Sea Tel

SCALE: 1/4	APPROVED BY:	DRAWN BY: AFE	
DATE: 02-06-03		DRAWING SIZE: C	
TITLE: RADOME ASSEMBLY, 48 IN. WITH FOAM, (0 DRAFT)			
MODEL: 4003	SHEET: 1 OF 2	DRAWING NUMBER 121244	REVISION A



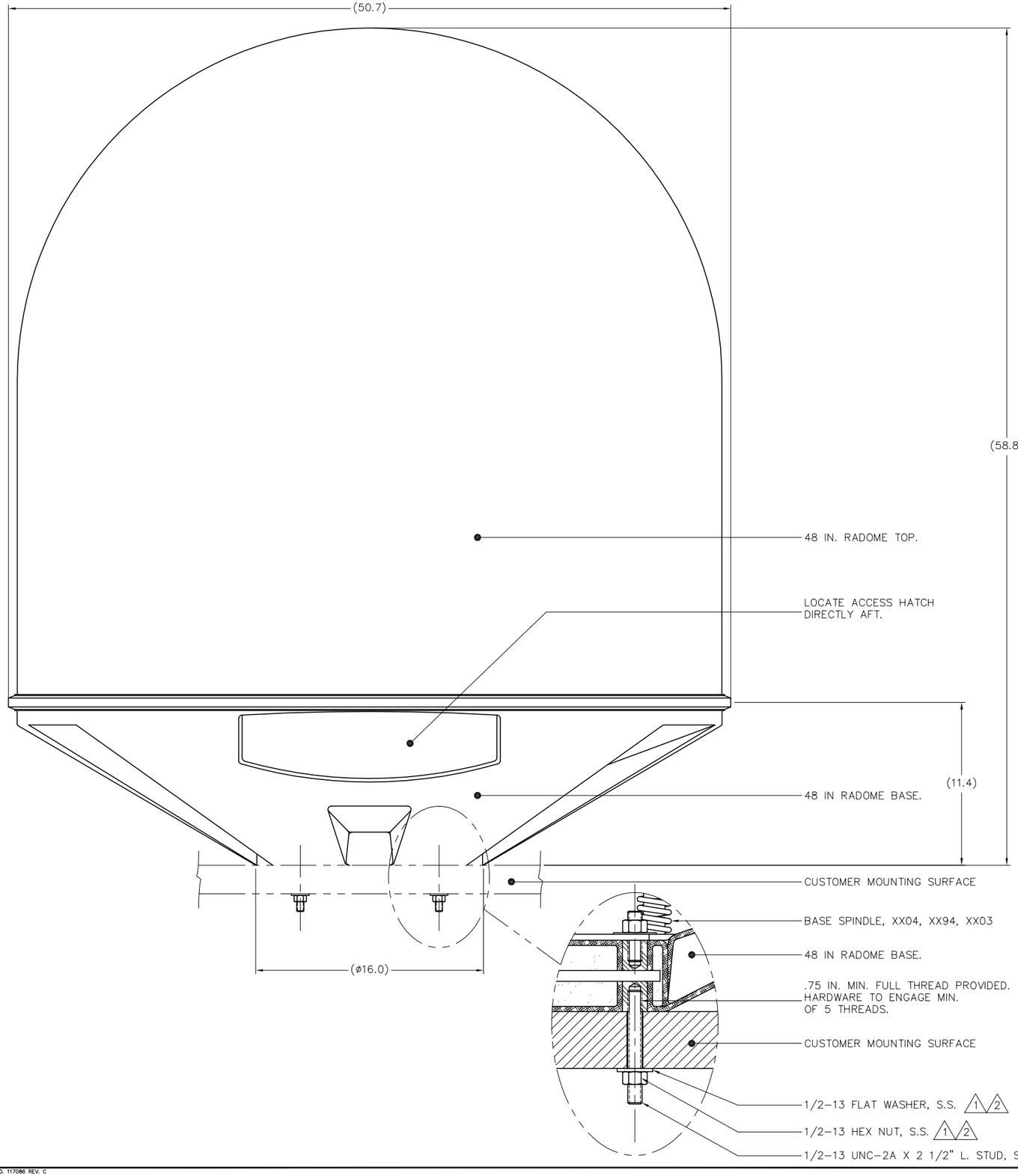
NOTES: UNLESS OTHERWISE SPECIFIED

1. USE LOCTITE 222(PINK) AT ASSEMBLY.
2. ATTACH ITEM 34 TO OUTSIDE ACCESS HATCH DURING FINAL ASSEMBLY.

TOLERANCES UNLESS OTHERWISE SPECIFIED	Sea Tel		
X.X = ±.050"	SCALE: 1:4	APPROVED BY:	DRAWN BY: AEF
X.XX = ±.020"	DATE: 02-06-03		DRAWING SIZE: C
X.XXX = ±.005"	TITLE: RADOME ASSEMBLY, 48 IN. WITH FOAM, (0 DRAFT)		
ANGLES = ±30'	MODEL: 4003	SHEET: 2 OF 2	DRAWING NUMBER 121244 / REVISION A
3rd ANGLE PROJECTION			

DOCUMENT NO. 117085 REV. C

REV.	ECO#	DATE	DESCRIPTION	BY
A		11-10-95	#7/16, 8 PLC'S WS 4 PLC'S; 4.00 (TYP) ADD'D.	
B		01-31-96	48" RADOME ASS'Y DWG No. 114449 WS 48" RADOME ASS'Y DWG No. 114038; 4094/48" RADOME WS 3995/4094/48" RADOME	
			#7/16 4 PLC'S WS #7/16 8 PLC'S; 4.00 (TYP) DLT'D; MOUNTING CROSS P/N 114119 DLT'D.	
C	1802	02-16-99	REDRAWN IN CAD WITHOUT CHANGES.	MAB
D	1802	05-22-00	LIST OF MATERIALS ADD'D; DETAIL 'B' ADD'D; DIM. #9/16 WS #7/16.	AEF
E	4100	08-22-03	REMOVED LM & BUBBLES FROM DWG; DWG UPDATED TO BE CURRENT WITH NEW XX04 & XX03 BASE SPINDLES; REF. DWG P/N: 121244 ADD'D; NOTES 1 & 2 ADD'D.	AEF



MOUNTING SURFACE PATTERN
SCALE: 1:2

REFERENCE DRAWINGS:
114449 RADOME ASSEMBLY, 48 IN.
121244 RADOME ASSEMBLY, 48 IN. WITH FOAM, (0 DRAFT)

NOTES: UNLESS OTHERWISE SPECIFIED

1. INDICATED ITEMS ARE PART OF MOUNTING KIT P/N: 118569
2. APPLY ADHESIVE PER SEATEL SPEC. 121730. LOCTITE 271 (RED) PROVIDED WITH MOUNTING KIT, P/N 118569

TOLERANCES UNLESS OTHERWISE SPECIFIED	Sea Tel		
X.X = ±.050"	SCALE: 1:4	APPROVED BY:	DRAWN BY: MP
X.XX = ±.020"	DATE: 07-11-95		DRAWING SIZE: D
X.XXX = ±.005"	TITLE: RADOME INSTALLATION ARRANGEMENT		
ANGLES = ±30'	MODEL: 4094/48" RADOME	SHEET: 1 OF 1	DRAWING NUMBER 114120 / REVISION E
3rd ANGLE PROJECTION			

REV	ECO #	DATE	DESCRIPTION	BY
B		6-30-03	Corrected Tx/Rx on U9, Moved A0 to PTA7, Rev A assy	PGB
C		7-1-03	Chg pinout on J3, Release to REV B fab	PGB

NOTES:

1) DIODE ARRAY D1A IS A STUFFING OPTION FOR D12-D19. SEE BOM FOR USE.

2) A/D CONVERTER U2 IS A STUFFING OPTION FOR U4. SEE BOM FOR USE.

HOME SENSOR INTERFACE

IDC3 — AZ REF

RATE SENSOR INTERFACE

J1-13 CL RATE
J1-12 LV RATE
J1-11 AZ RATE
J1-26 AZ REF
J1-10 POL POT
J1-25 AGC

R40 1K, R41 1K, R42 1K, R43 1K, R44 1K, R45 1K

CN1, CN2 — 27pF

D12–D19 — 1N4148

LDS-C32R — D1A

C1, C2, C3 — 1

U2 — LTC1290

CH0	1	18	SCLK
CH1	2	17	DIN
CH2	3	16	DOUT
CH3	4	15	CS-
CH4	5	19	ACLK
CH5	6	20	VCC
CH6	7	14	REF+
CH7	9	13	REF-
COM		12	V-
AGND	11	10	DGND

U4 — TLV2553IDW

AIN0	1	20	VCC
AIN1	2	19	EOC
AIN2	3	18	I/O CLK
AIN3	4	17	DATA IN
AIN4	5	16	DATA OUT
AIN5	6	15	CS-
AIN6	7	14	REF+
AIN7	8	13	REF-
AINB	9	12	AIN10
GND	10	11	AIN9

NV RAM

U1 — X2444

RAMSEL	1	8	VCC
SK	2	7	STO
SDO	3	6	RCL
SDI	4	5	VSS

LC MOTOR DRIVER

U3 — 4094

IOSEL	1	16	VDD
SDO	2	4	Q1
SDI	3	5	Q2
STR	4	6	Q3
CLK	5	7	Q4
OE	15	14	Q5
		13	Q6
		12	Q7
		11	Q8
		9	QS
VSS	8	10	QS

R1A–R1D 4.7K — J1-18, J1-3, J1-19, J1-4

R2, R4, R5, R6 2.0K — ZTX690B

D2–D5 — 1N4749A

R1E 4.7K — AUX — J2-9
R1F 4.7K — M1 — J2-1
R1G 4.7K — M2 — J2-10
R24 1K — SPARE — J1-8

R8 300, R30 300 — D6 GRN, D11 RED — U7E 4069

R16 680

TILT SENSOR DEMODULATOR

J1-14 CTR

R7 360K, R9 10.0K 1%, R12 10.0K 1%, R11 240K, R14 1.00K 1%, R15 1.00K 1%, R10 200K, R13 100K, R17 200K, R18 100K

C4–C10, C11, C13, C15 — 0.1

C8 — 0.1

U5A MC34074, U5B MC34074, U5C MC34074, U5D MC34074

U6 — 4053

U7A, U7B, U7C, U7D — 4069

J1-29 CL+
J1-44 CL-
J1-15 LV+
J1-30 LV-

F1, F2

A/D

JP1 — JUMPER

U8 — MC34064

C12 0.1, C14 1, R19 10K

R25G 1K

DALBACK

U9 — U22 — 68HC908GP32_44

A1	33	12	PTD0/ SS-
WR-	34	13	PTD1/ MISO
RSEL	35	14	PTD2/ MOSI
SPARE	36	15	PTD3/ SPSCK
AZA	37	18	PTD4/ T1CH0
AZB	38	19	PTD5/ T1CH1
A0	39	20	PTD6/ T2CH0
		21	PTD7/ T2CH1
D0/SDO	22	10	RxD/ PTE1
D1/SK	23	9	TxD/ PTE0
D2/SDI	24	2	PTC0
D3	25	3	PTC1
D4	26	4	PTC2
D5	27	5	PTC3
D6	28	6	PTC4
D7	29	7	PTC5
		8	PTC6

TP1, F1, F2, MISO, MOSI, SK, GPS0, GPS1, Rx, Tx, IOSEL, ADSEL, CONSCAN, PWM, MON1, MON2

R21B 4.7K, R21D 4.7K, R21F 4.7K, R21G 4.7K

R27 1M, Y1 4.0MHZ, C19 15pF, C20 15pF

PROGRAMMING INTERFACE

C16 0.1

U10 (U22) — DS8921

R20 300

D7, D8, D9 — 1N4148

PTA0, VCC, IRQ-

RS 422

RX+, RX-, TX+, TX- — J2-7, J2-5, J2-13, J2-6

VAA — J2-8, J2-15

GND — J2-12, J2-14

PERIPHERAL I/O

R26 4.7K

JP2–JP5

CONSCAN — J2-2
PWM — J2-3
MON1 — J2-11
MON2 — J2-4

JP6 — J1-10

GPS INTERFACE

J5 — IDC5 — GPS0, GPS1

J2 — DB-15P

RECEIVER INTERFACE

J1-9 AZA
J1-24 AZB
J1-23 SPARE

R21H 4.7K, R21A 4.7K, R21E 4.7K, R21C 4.7K, R22 100K, R24 100K, R23 1K

C17 470pF, C18 470pF

U11A, U11B, U11C, U11D — 14077

J4 — IDC8 — AGC, SEL, SDO, SK, SDI, SPARE

IRQ LOGIC

MOTOR DRIVER INTERFACE

J6 — IDC15 — D3, D4, D2/SDI, D5, D1/SK, D6, D0/SDO, WR-, A1, A0, D7, DALBACK

POWER SUPPLY

TP2, TP3, TP4

U12 — LM7812C/TO220

U13 — LM7805C/TO220

R28 300, D10 GRN

C21 100, C22 470, C23 1, C25 0.1, C24 0.1

VAA +28V, VBB +12V, VCC +5V, VDD, VSS

J1 — DB-44S

J1-3, J1-4, J1-8, J1-9, J1-10, J1-11, J1-12, J1-13, J1-14, J1-15, J1-18, J1-19, J1-44, J1-30, J1-29, J1-26, J1-25, J1-24, J1-23

REFERENCE DOCUMENTS:

121270 PCB FAB, PCU, 3-AXIS
121271 PCB ASSY, PCU, 3-AXIS

SCALE:	APPROVED BY:	DRAWN BY:	NICO
DATE: 03/11/03		DWG SIZE:	Custom
TITLE: PCB SCHEMATICS. 3-AXIS PCU			
MODEL: 4003 / 2702	SHEET 1 OF 1	DRAWING NUMBER	121172
		REV	C

REV	ECO#	DATE	DESCRIPTION	BY
B	3717	10-7-02	ADDED LM7805 (U6) & J1-8; RELABLED JP8, JP9 & JP10	MSP
C	3808	1-28-03	ADDED 3X CAP NETWORKS; CHANGED J1.13 TO D/A LOOP BACK DOUBLED-UP J1.8 ON +24V SUPPLY	MSP
D	4094	8/11/03	U7 ADDED	DD
D1		8/26/03	U7 PIN ASSIGNMENTS REASSIGNED.	DD

J2
16 +5V
3 HALL 1A
4 HALL 1B
5 HALL 1C
17 GND
CN1
27pF

J1
15 PIN IDC
9 WR-
10 A1
11 A0
7 D0
5 D1
3 D2
1 D3
2 D4
4 D5
6 D6
12 D7

U1 MAX505
LDAC- WR- A1 A0 D0 D1 D2 D3 D4 D5 D6 D7
VOUTA VOUTB VOUTC VOUTD
C25 0.1

U5 4099
A0 A1 A2 WD RST Q0 Q1 Q2 Q3 Q4 Q5 Q6 Q7
C22 0.1

J2
20 +5V
7 HALL 2A
8 HALL 2B
9 HALL 2C
21 GND
CN2
27pF

J1
8 VBB
14 VBB
15 GND
U6 LM7805 VI VO
C24 470
C23 100
R1 4.7K
R2 4.7K
VDD +5V
VBB +24V
VHH +2.5V

J2
24 +5V
11 HALL 3A
12 HALL 3B
13 HALL 3C
25 GND
CN3
27pF

13 DALBACK U7-3

RP1 10 4.7K (7) (8) (9)
R3 51K
C1 0.1
C2 0.22
C3 0.22
C4 0.22
C5 0.22
C6 0.1
R6 0.1 5W 2512

U2 A3936SED
TACH HBIAS HA+ HA- HB+ HB- HC+ HC- SLEEP- DIR EXTMODE BRAKE SR ENABLE OSC BLANK PFD1 PFD2 REF
VCP CP1 CP2 OUTA OUTB OUTC VREG SENSE
JP10 JP8 JP9

CL MOTOR
J2
MOTOR 1A 2
MOTOR 1B 14
MOTOR 1C 15
25 PIN D-SUB

U7 4051
X0 X1 X2 X3 X4 X5 X6 X7 INH A B C VEE VSS
U1-19 A0
U1-18 A1
U1-17 A2
DALBACK J1-13

RP1 10 4.7K (4) (5) (6)
R4 51K
C7 0.1
C8 0.22
C9 0.22
C10 0.22
C11 0.22
C12 0.1
R7 0.1 5W 2512

U3 A3936SED
TACH HBIAS HA+ HA- HB+ HB- HC+ HC- SLEEP- DIR EXTMODE BRAKE SR ENABLE OSC BLANK PFD1 PFD2 REF
VCP CP1 CP2 OUTA OUTB OUTC VREG SENSE
JP10 JP8 JP9

EL MOTOR
J2
MOTOR 2A 6
MOTOR 2B 18
MOTOR 2C 19

RP1 10 4.7K (1) (2) (3)
R5 51K
C13 0.1
C14 0.22
C15 0.22
C16 0.22
C17 0.22
C18 0.1
R8 0.1 5W 2512

U4 A3936SED
TACH HBIAS HA+ HA- HB+ HB- HC+ HC- SLEEP- DIR EXTMODE BRAKE SR ENABLE OSC BLANK PFD1 PFD2 REF
VCP CP1 CP2 OUTA OUTB OUTC VREG SENSE
JP10 JP8 JP9

AZ MOTOR
J2
MOTOR 3A 10
MOTOR 3B 22
MOTOR 3C 23

NOTE:
J2 IS AN RF FILTERED CONNECTOR WITH A NOMINAL CAPACITANCE OF 1000 pf.

REFERENCE DRAWINGS:
120849 PCB FABRICATION, MOTOR DRIVER, 3 BLDC
120850 PCB ASSEMBLY, MOTOR DRIVER, 3 BLDC
120852 PCB TESTING, MOTOR DRIVER, 3 BLDC

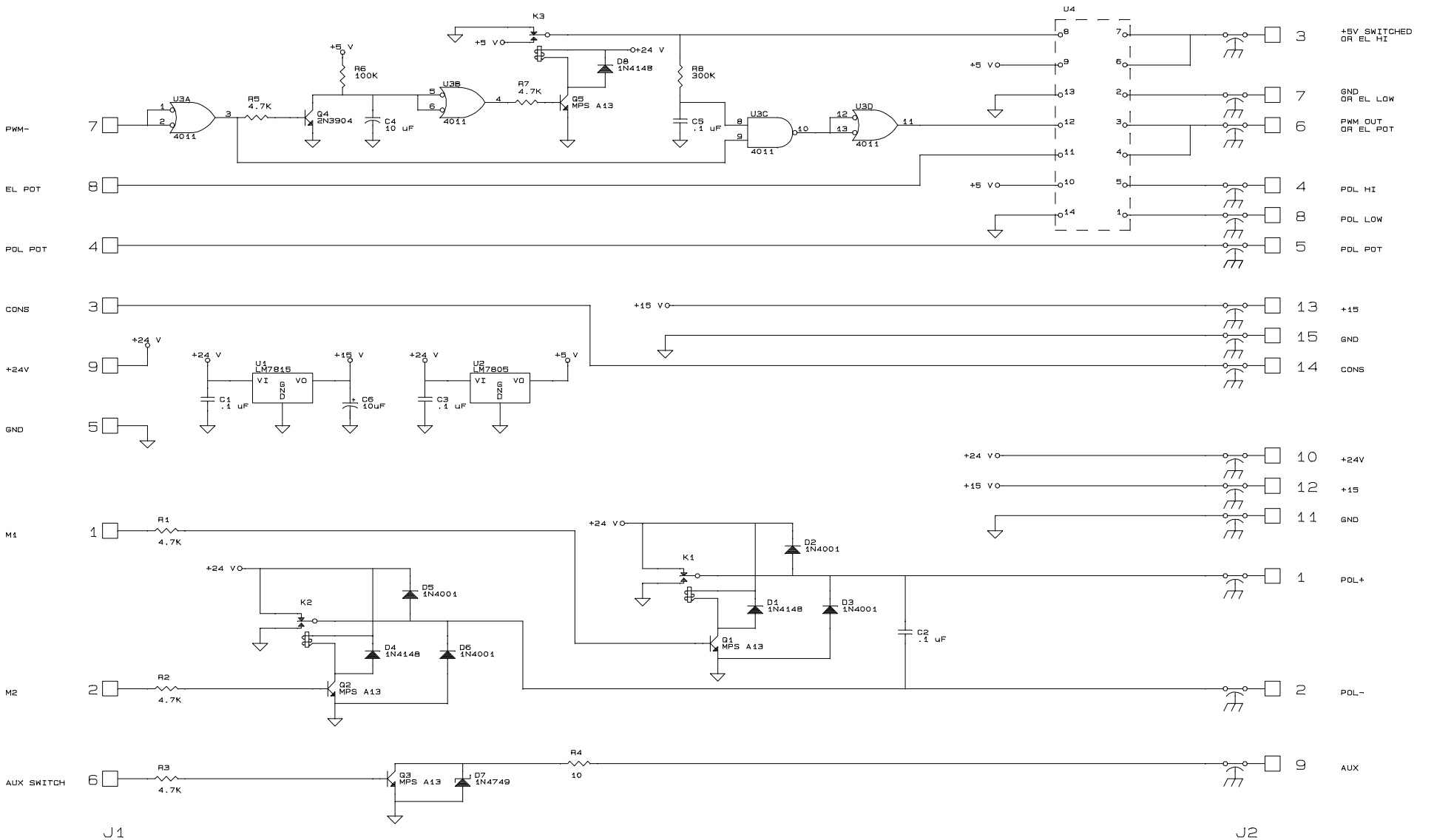
Sea Tel, Inc.
CONCORD, CA

SCALE:	APPROVED BY:	DRAWN BY: NJ	
DATE: 07-12-02		DWG SIZE: D	

PCB SCHEMATIC, MOTOR DRIVER, 3 BLDC

MODEL:	SHEET 1 OF 1	DRAWING NUMBER	REV
		120851	D1

REV	DATE	DESCRIPTION	BY
0	12/1/97	INITIAL RELEASE	KSL
A	1/14/98	ADDED PWM AND 5V REG.	KSL
B	1/21/98	R8 WS 100K.	MAB
C	5/13/98	C6 ADD'D.	MAB



REFERENCE DRAWINGS:

116279 SHIELDED POL. AUX. RELAY PCB FAB.
116281 SHIELDED POL. AUX. RELAY PCB ASS'Y

Sea Tel, Inc.
CONCORD, CA

SCALE: NONE	APPROVED BY:	DRAWN BY KSL
DATE: 12-1-97		REVISED

SHIELDED POLANG AUX. RELAY
PCB SCHEMATIC

SHEET 1 OF 1

DRAWING NUMBER
116280-C

REV	ECO#	DATE	DESCRIPTION	BY
A	1929	4-12-99	J3 "LBAND" WS J2 "DC-LBAND; J3 & J1 REV.	MAB
B	1965	4-20-99	3 CH. -200 SPLITTER REFERENCE ADD'D.	MAB
B1		7-30-02	CHG J3 TO J2 ON -200 SPLITTER	PGB
C	4049	7-21-03	MAKE 485 RX STANDARD CONNECTION. C10 WS 120pF, P/N 117606 ADD'D TO REF. DWGS	PGB

NOTES:

1.

COMPONENT VALUES FOR MODEM VERSIONS -1, -2, -3, -4				
ASSEMBLY	117606-1 116781-1 117163-1	117606-2 116781-2 117163-2	117606-3 116781-3 117163-3	117606-4 116781-4 117163-4
APPLICATION	PEDESTAL	BASE	PEDESTAL	BASE
XMT FREQ'S	1100KHz	1500KHz	1900KHz	700KHz
RCV FREQ'S	1500KHz	1100KHz	700KHz	1900KHz
C10	180pF (150+27)	140pF (120+22)	100pF	330pF (270+47)
C19	270pF	270pF	470pF	270pF
C24	330pF	180pF (150+27)	100pF	1000pF
C25	180pF (150+27)	330pF	1000pF	100pF
L1	82uH	39uH	22uH	180uH
L2	22uH	56uH	100uH	15uH
R16	13K	18K	24K	8.2K
R29	8.2K	8.2K	4.7K	8.2K
R30	390ohm	1.5K	1K	240ohm

J1 ROTARY JOINT — L6 .047uH — L8 1.5uH — C33 22pF — J3 LBAND

3 CHANNEL SPLITTER SCHEMATIC REFERENCE

J2 DC-200 — L5 .032uH — C33 22pF — L8 1.5uH — L6 .047uH — J1 ROTARY JOINT — C31 10pF — C32 10pF — L7 .032uH — J3 L-BAND — L9 1.5uH -1 ONLY — +15V

4 CHANNEL SPLITTER

J2 DC-3GHz — L6 .047uH — L8 1.5uH — J1 ROTARY JOINT

3 CHANNEL -200 SPLITTER

RECEIVER

TRANSMITTER

RS-422 Tx

RS-422/485 RX

POWER SUPPLY

J4 DE-9P

1	Tx+
2	Tx−
6	+24V
9	+24V
7	+15V
5	GND
4	GND
3	Rx−
8	Rx+

ORIGINAL RS-422/232 ONLY WIRING

REFERENCE DRAWINGS:

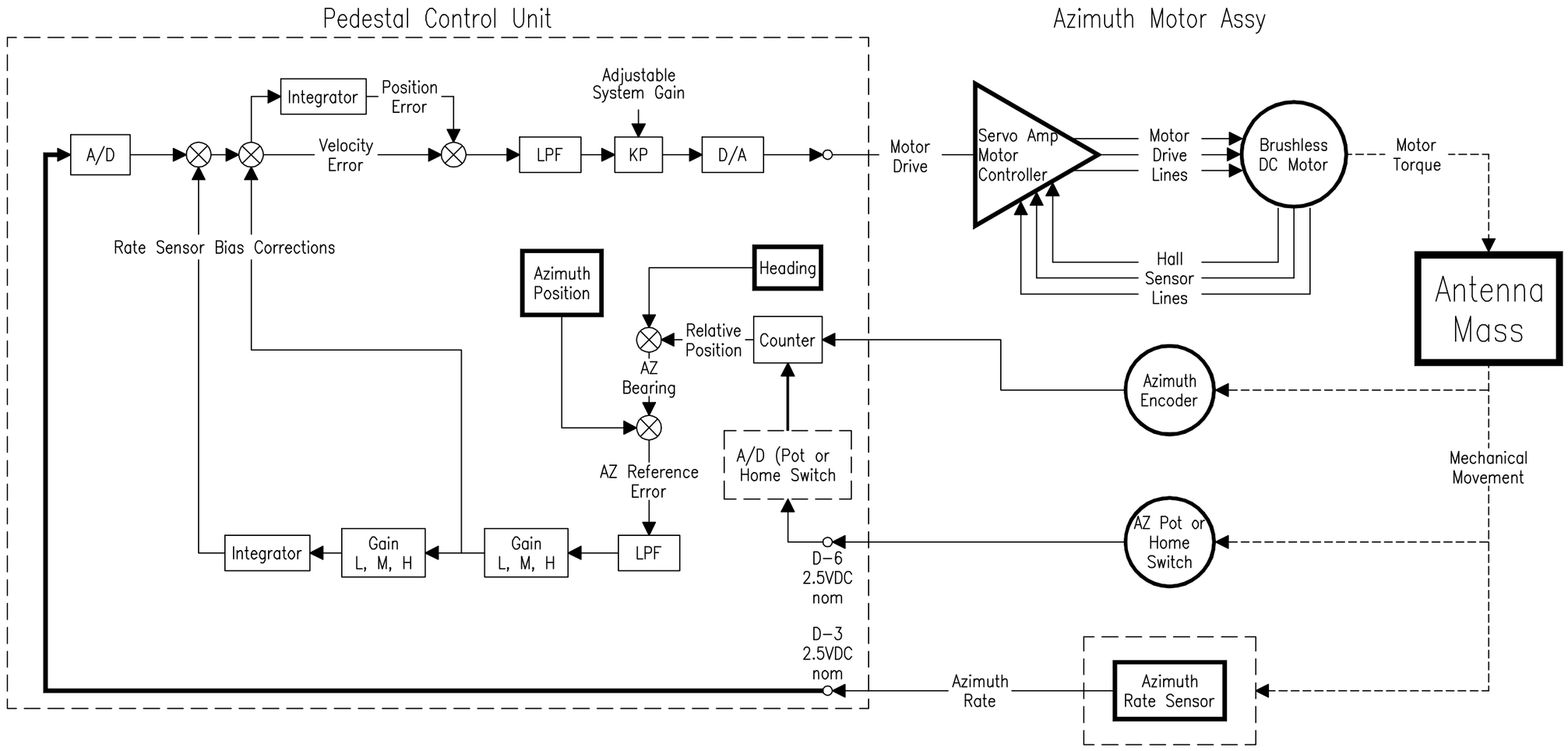
116781 4 CHANNEL RF MODEM PCB ASSEMBLY
117163 3 CHANNEL RF MODEM PCB ASSEMBLY
117606 3 CHANNEL-200 RF MODEM ASSEMBLY

Sea Tel, Inc.
CONCORD, CA

SCALE:	APPROVED BY:	DRAWN BY MAB
DATE: 11-9-98		REVISED

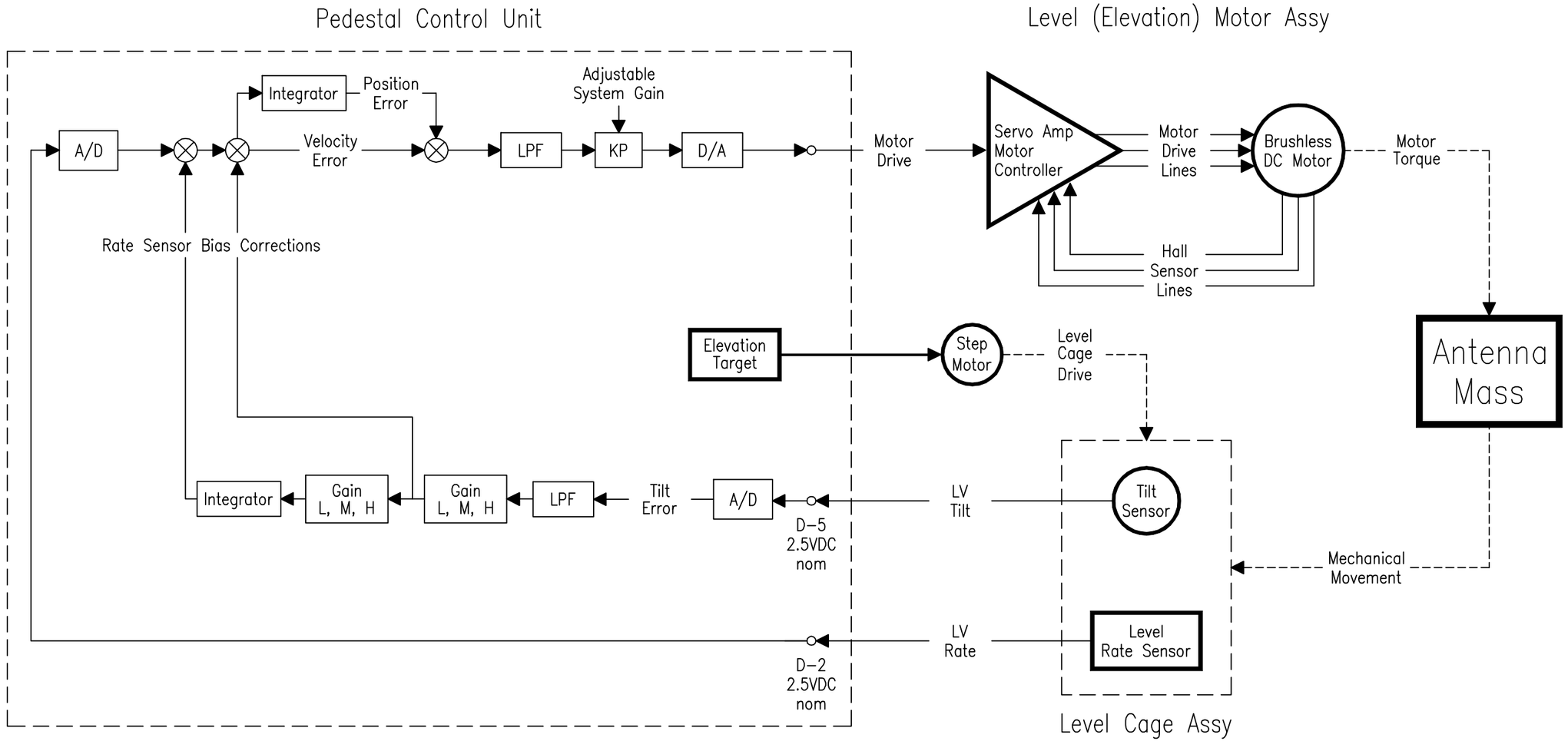
4 CHANNEL RF MODEM PCB SCHEMATIC

SHEET 1 OF 1 — DRAWING NUMBER 117149-C



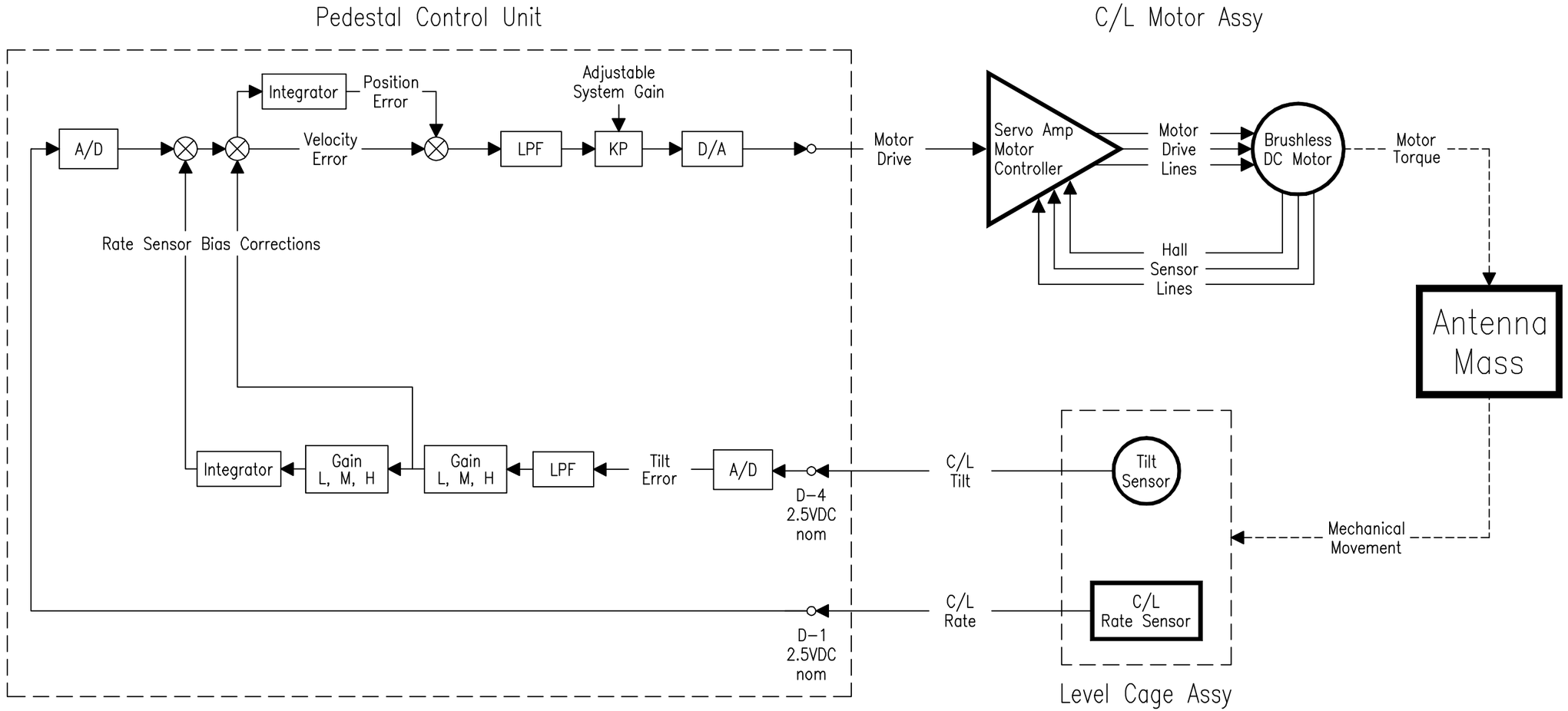
Azimuth Loop – Models xx96 and xx97

TOLERANCES UNLESS OTHERWISE SPECIFIED	Sea Tel, inc.		
X.X = ± .050"	SCALE: NONE	APPROVED BY:	DRAWN BY: MAB
X.XX = ± .020"	DATE: 11JUN98		REVISED:
X.XXX = ± .005"	CONTROL LOOP DIAGRAM		
ANGLES = ± 30'	AZIMUTH LOOP	SHT. 1 OF 3	SIZE B / DRAWING NUMBER 116287-0
3rd ANGLE PROJECTION			



Level Loop – Models xx96 and xx97

TOLERANCES	Sea Tel, inc.		
UNLESS OTHERWISE SPECIFIED			
X.X = ± .050"	SCALE: NONE	APPROVED BY:	DRAWN BY: MAB
X.XX = ± .020"	DATE: 11JUN98		REVISED:
X.XXX = ± .005"	CONTROL LOOP DIAGRAM		
ANGLES = ± 30'			
3rd ANGLE PROJECTION	LEVEL LOOP	SHT. 2	SIZE B / DRAWING NUMBER 116287-0



Cross-Level Loop – Models xx96 and xx97

TOLERANCES				
UNLESS OTHERWISE SPECIFIED				
X.X = ± .050"	Sea Tel, inc.			
X.XX = ± .020"	SCALE: NONE	APPROVED:	DRAWN BY: MAB	
X.XXX = ± .005"	DATE: 11JUN98		REVISED:	
ANGLES = ± 30'	CONTROL LOOP DIAGRAM			
3rd ANGLE PROJECTION	CROSS LEVEL LOOP	SHT. 3	SIZE B	DRAWING NUMBER 116287-0