Sea Tel TV Antenna Systems
Installation manual

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December 30, 2014 Document. No. 99-141157-A Revision A

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

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Sea Tel is an ISO 9001:2008 registered company. Certificate Number 13690 originally issued March 14, 2011 and was renewed/reissued on March 10, 2014.

R&TTE

CE

The Sea Tel 4009MK3 Maritime Satellite Earth Station complies with the requirements of directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on Radio equipment and Telecommunication Terminal Equipment. A copy of the R&TTE Declaration of Conformity for this equipment is contained in this manual.

Revision History

REV	ECO#	Date	Description	By
A		December 30, 2014	Production Release	MDN

RTT&E Declaration Page

Being Tested

1. Site Survey

There are three objective of the site survey. The first is to find the best place to mount the antenna and the BDE. The second is to identify the length and routing of the cables and any other items or materials that are required to install the system. The third is to identify any other issues that must be resolved before or during the installation.

1.1. Site Selection Aboard The Ship

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

- The antenna has a clear line-of-sight to view as much of the sky (horizon to zenith at all bearings) as is practical.
- X-Band (3cm) Navigational Radars:
    - The ADE should be mounted more than 0.6 meters/2 feet from 2kW (24 km) radars
    - The ADE should be mounted more than 2 meters/8 feet from 10kW (72 km) radars
    - The ADE should be mounted more than 4 meters/12 feet from 160kW (250km) radars
- S-Band (10cm) Navigational Radars:
    - If the ADE is/has C-Band it should be mounted more than 4 meters/12 feet from the S-band Radar.
- The ADE should not be mounted on the same plane as the ship's radar, so that it is not directly in the radar beam path.
- The ADE should be mounted more than 2.5 meters/8 feet from any high power MF/HF antennas (<400W).
- The ADE should be mounted more than 4 meters/12 feet from any high power MF/HF antennas (1000W).
- The ADE should also be mounted more than 4 meters/12 feet from any short range (VHF/UHF) antennae.
- The ADE should be mounted more than 2.5 meters/8 feet away from any L-band satellite antenna.
- The ADE should be mounted more than 3 meters/10 feet away from any magnetic compass installations.
- The ADE should be mounted more than 2.5 meters/8 feet away from any GPS receiver antennae.
- Another consideration for any satellite antenna mounting is multi-path signals (reflection of the satellite signal off of nearby surfaces arriving out of phase with the direct signal from the satellite) to the antenna. This is particularly a problem for the onboard GPS, and/or the GPS based satellite compass.
- The ADE and the BDE should be positioned as close to one another as possible. This is necessary to reduce the losses associated with long cable runs.
- This mounting platform must also be robust enough to withstand the forces exerted by full rated wind load on the radome.
- The mounting location is robust enough that it will not flex or sway in ships motion and be sufficiently well re-enforced to prevent flex and vibration forces from being exerted on the antenna and radome.
- If the radome is to be mounted on a raised pedestal, it ***MUST*** have adequate size, wall thickness and gussets to prevent flexing or swaying in ships motion. In simple terms it must be robust.

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

1.2. Antenna Shadowing (Blockage)

Any substantial structures in the path between the front of the antenna and the satellite it is pointing to will cause significant degradation of the signal. The location of the ADE should be chosen to minimize blockage caused by the structures of the ship. It is desirable to be mounted high enough to minimize the effects of the surrounding structures while not being mounted too high (refer to mounting height information below). Large, solid, structures will cause significant signal loss while wire rope stays, lifelines, small diameter handrails and other accessories may cause little to no noticeable loss.

1.3. Mounting Foundation

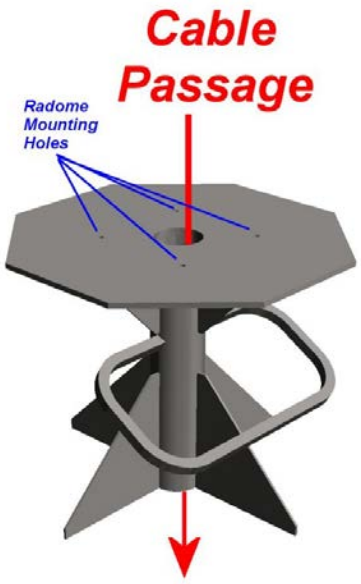
1.3.1. Mounting on Deck or Deckhouse

While mounting the ADE on a mast is a common solution to elevate the ADE far enough above the various obstructions which create signal blockages, sometimes the best mounting position is on a deck or deckhouse top. These installations are inherently stiffer than a mast installation, if for no other reason than the design of the deck/deckhouse structure is prescribed by the ship's classification society. In the deck/deckhouse design rules, the minimum plating and stiffener guidelines are chosen to preclude high local vibration amplitudes.

Most installations onto a deck or deckhouse structure will require a mounting pedestal to raise the ADE above the deck for radome hatch access and to allow the full range of elevation (see ADE mounting considerations above). Some care must be taken to ensure the mounting pedestal is properly aligned with the stiffeners under the deck plating.

1.3.2. ADE Mounting Considerations

Mounting the radome directly on the deck or platform prevents access to the hatch in the base of the radome unless an opening is designed into the mounting surface. If there is no access to the hatch, the only way to service the antenna is to remove the radome top. Two people are required to take the top off of the radome without cracking or losing control of it, but even with two people a gust of wind may cause them to lose control and the radome top may be catastrophically damaged (see repair information in the radome specifications).



If access to the hatch cannot be provided in the mounting surface, provide a short ADE support pedestal to mount the ADE on which is tall enough to allow access into the radome via the hatch.

Ladder rungs must be provided on all mounting stanchions greater than 3-4 feet tall to allow footing for personnel safety when entering the hatch of the radome.

The recommended cable passage in the 50, 60 and 66 inch radomes is through the bottom center of the radome base, down through the ADE support pedestal, through the deck and into the interior of the ship.

1.3.3. Sizing of the support pedestal

The following should be taken into account when choosing the height of a mounting support stand:

1. The height of the pedestal should be kept as short as possible, taking into account recommendations given in other Sea Tel Guidelines.
2. The minimum height of the pedestal above a flat deck or platform to allow access into the radome for maintenance should be 0.6 meters (24 inches).
3. The connection of the ADE mounting plate to the stanchion and the connection of the pedestal to the ship should be properly braced with triangular gussets (see graphic above). Care should be taken to align the pedestal gussets to the ship's stiffeners as much as possible. Doublers or other reinforcing plates should be considered to distribute the forces when under-deck stiffeners are inadequate.
4. The diameter of the pedestal stanchion shall not be smaller than 100 millimeters (4 inches). Where the ADE base diameter exceeds 1.5 meters (60 inches), additional stanchions (quantity greater than 3) should be placed rather than a single large stanchion.
5. Shear and bending should be taken into account in sizing the ADE mounting plate and associated gussets.
6. Shear and bending must be taken into account when sizing the pedestal to ship connection.
7. All welding should be full penetration welds –V-groove welds with additional fillet welds – with throats equivalent to the thickness of the thinnest base material.
8. For an ADE mounted greater than 0.6 meters (24 inches) above the ship's structure, at least one (1)

foot rung should be added. Additional rungs should be added for every 0.3 meter (12 inches) of pedestal height above the ship's structure.

9. For an ADE mounted greater than 3 meters (9 feet) above the ship's structure, a fully enclosing cage should be included in way of the access ladder, starting 2.3 meters (7 feet) above the ship's structure.

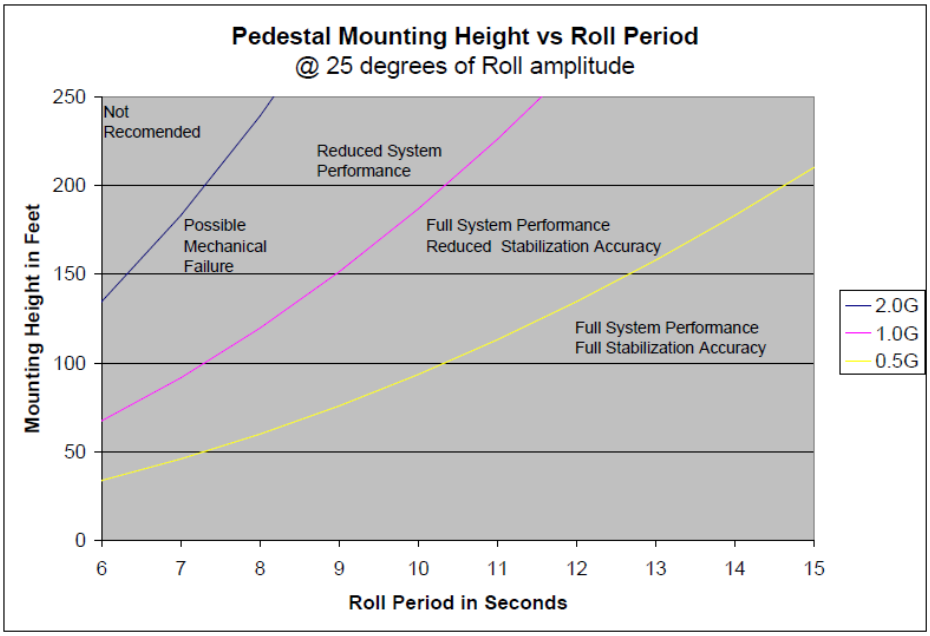
1.4. Mounting Height

The higher up you mount the antenna above the pivot point of the ship the higher the tangential acceleration (g-force) exerted on the antenna will be (see chart below).

When the g-force exerted on the antenna is low, antenna stabilization and overall performance are not affected.

If the g-force exerted on the antenna is high enough (> 1 G), antenna stabilization and overall performance are affected.

If the g-force exerted on the antenna is excessive (1-2 Gs), the antenna does not maintain stabilization and may be physically damaged by the g-force.



1.5. Mast Configurations

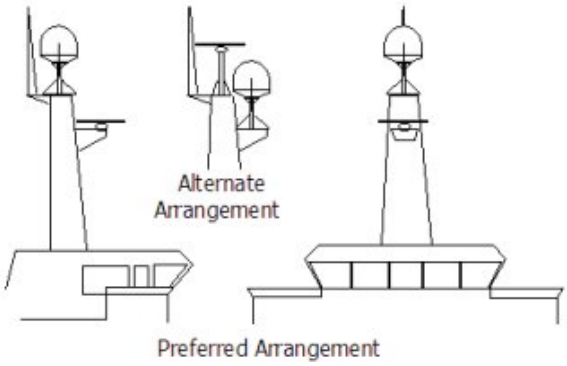
Sea Tel recommends mounting the ADE in a location that has both a clear line-of-sight to the target satellites in all potential azimuth/elevation ranges and sufficient support against vibration excitement. If possible, mounting the ADE pedestal directly to ship deckhouse structures or other box stiffened structures is preferred. However, in many cases, this imposes limits on the antenna system's clear line-of-sight.

Often the solution for providing the full azimuth/elevation range the antenna needs is to mount the ADE on the ship's mast. Unfortunately, masts do not consider equipment masses in design and often have harmonic frequencies of their own.

There are many designs of masts used on ships – masts are nearly as unique in design as the ship is – but the designs often fall into a few categories. These categories can be addressed in terms of typical responses and problems with regards to vibration and mounting of ADE. The most common categories of masts are:

1.5.1. Vertical Masts

Vertical masts are a very ancient and common mast design. In essence, it is the mast derived from the sailing mast and adapted for mounting the ever-increasing array of antennae which ships need to communicate with the world. This drawing of a vertical mast shows the preferred mounting of the ADE center-line above the plane of the radar. Alternatively the ADE is mounted below the plane of the radar signal

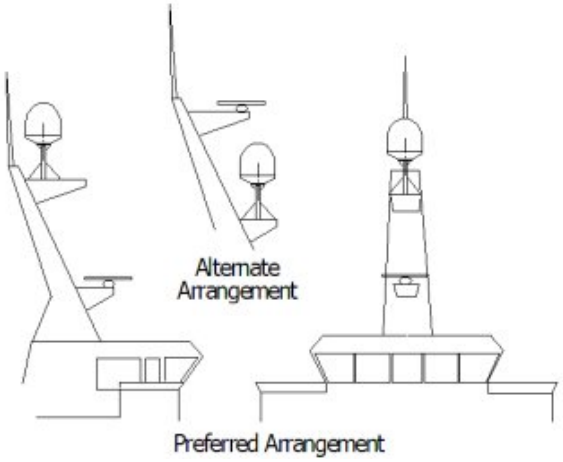


Vertical masts are most commonly found on cargo ships – they are simple, inelegant and functional. They are also fairly stiff against torsional reaction and lateral vibrations, as long as the ADE is mounted on a stiff pedestal near the vertical centerline of the mast. If centerline mounting is impractical or otherwise prohibited, the mast platform the ADE is mounted on should be checked for torsional vibration about the centerline of the mast and the orthogonal centerline of the platform.

If the estimated natural frequency of the mast or platform is less than 35 Hertz, the mast or platform should be stiffened by the addition of deeper gussets under the platform or behind the mast.

1.5.2. Raked Masts

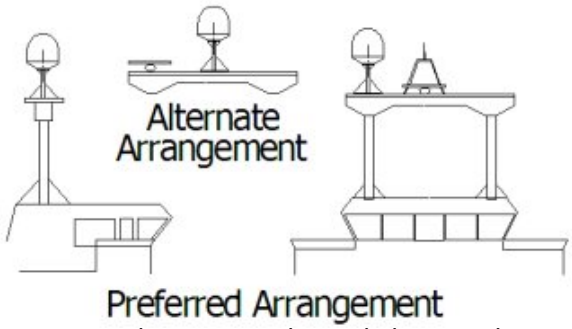
Raked masts are found on vessels where the style or appearance of the entire vessel is important. Again, the inclined mast is a direct descendant from the masts of sailing ships – as ship owners wanted their vessels to look more unique and less utilitarian, they 'raked' the masts aft to make the vessel appear capable of speed. This drawing shows a raked mast, again with the preferred ADE mounting above the radar and alternate with the ADE below the radar.



Raked masts pose special problems in both evaluating the mast for stiffness and mounting of antennae. As can be seen in the drawing, all antennae must be mounted on platforms or other horizontal structures in order to maintain the vertical orientation of the antenna centerline. This implies a secondary member which has a different natural frequency than the raked mast's natural frequency. In order to reduce the mass of these platforms, they tend to be less stiff than the main box structure of the raked mast. Thus, they will have lower natural frequencies than the raked mast itself. Unfortunately, the vibratory forces will act through the stiff structure of the raked mast and excite these lighter platforms, to the detriment of the antenna.

1.5.3. Girder Masts

Girder masts are large platforms atop a pair of columns. Just like girder constructions in buildings, they are relatively stiff athwart ship – in their primary axis – but less stiff longitudinally and torsionally. An example of a girder mast is shown in this drawing, with the preferred ADE mounting outboard and above the radar directly on one of the columns and alternate with the ADE centered on the girder above the plane of the radar.



The greatest weakness of girder masts is in torsion – where the girder beam twists about its vertical centerline axis. As with all mast designs discussed so far, mounting the antenna in line with the vertical support structure will reduce the vibration tendencies. Mounting the antenna directly above the girder columns provides ample support to the antenna pedestal and locates the antenna weight where it will influence the natural frequency of the mast the least.

1.5.4. Truss Mast

Truss masts are a variant on the girder mast concept. Rather than a pair of columns supporting a girder beam, the construction is a framework of tubular members supporting a platform on which the antennae and other equipment are mounted. A typical truss mast is shown in this photograph.

Like a girder mast, truss masts are especially stiff in the athwart ship direction. Unlike a girder mast, the truss can be made to be nearly as stiff in the longitudinal direction. Truss masts are particularly difficult to estimate the natural frequency – since a correct modeling includes both the truss structure of the supports and the plate/diaphragm structure of the platform. In general, the following guidelines apply when determining the adequate support for mounting an antenna on a truss mast:

1. Antenna ADE pedestal gussets should align with platform stiffeners which are at least 200 millimeters in depth and 10 millimeters in thickness.
2. When possible, the antenna ADE pedestal column should align with a vertical truss support.
3. For every 100 kilograms of ADE weight over 250 kilograms, the depth of the platform stiffeners should be increased by 50 millimeters and thickness by 2 millimeters.

Sea Tel does not have a recommended arrangement for a truss mast – the variability of truss mast designs means that each installation needs to be evaluated separately.

1.6. Safe Access to the ADE

Safe access to the ADE should be provided. Provisions of the ship's Safety Management System with regard to men aloft should be reviewed and agreed with all personnel prior to the installation. Installations greater than 3 meters above the deck (or where the access starts at a deck less than 1 meter in width) without cages around the access ladder shall be provided with means to latch a safety harness to a fixed horizontal bar or ring.

The access hatch for the ADE shall be oriented aft, or inboard, when practical. In any case, the orientation of the ADE access hatch shall comply with the SMS guidelines onboard the ship. Nets and other safety rigging under the ADE during servicing should be rigged to catch falling tools, components or fasteners.

1.7. Below Decks Equipment Location

The Antenna Control Unit (LMXP) is a standard 19" rack mount enclosure, therefore, preferred installation is in a standard 19" equipment rack. The ACU mounts from the front of the rack.

The Satellite Receivers, multi-switch and any other associated equipment should be properly mounted for shipboard use.

Plans to allow access to the rear of the ACU, and other equipment, should be considered.

1.8. Cables

During the site survey, walk the path where the cables will be installed. Pay particular attention to how cables will be installed; such as what obstacles they will be routed around, difficulties that will be encountered and the overall length of the cables. The ADE should be installed using good electrical practice. Sea Tel recommends referring to IEC 60092-352 for specific guidance in choosing cables and installing cables onboard a ship. Within these guidelines, Sea Tel will provide some very general information regarding the electrical installation.

In general, all cable shall be protected from chaffing and secured to a cableway. Cable runs on open deck or down a mast shall be in metal conduit suitable for marine use. The conduit shall be blown through with dry air prior to passing cable to ensure all debris has been cleared out of the conduit and again after passing the cable to ensure no trapped moisture exists. The ends of the conduit shall be sealed with cable glands (preferred), mastic or low VOC silicon sealant after the cables have been passed through.

Cables passing through bulkheads or decks shall be routed through approved weather tight glands.

1.8.1. ADE/BDE Coaxial Cables

The first concern with the coaxial cables installed between the ADE & BDE is length. This length between the ADE & BDE is used to determine the loss of the various possible coax, Heliax or fiber-optic cables that might be used. You should always provide the lowest loss cables to provide the strongest signal level into the satellite receivers.

Signal cable shall be continuous from the connection within the ADE radome, through the structure of the ship to the BDE. Splices, adapters or dummy connections will degrade the signal level and are discouraged.

Be careful of sharp bends that kink and damage the cable (refer to the cables bend radius specification). Use a proper tubing bender for Heliax bends.

Penetrations in watertight bulkheads are very expensive, single cable, welded penetrations that must be pressure tested.

Always use good quality connectors that are designed to fit properly on the cables you are using. Poor quality connectors have higher loss, can allow noise into the cable, are easily damaged or fail prematurely.

In as much as is possible, don't lay the coaxes on power cables. Try to have some separation from Inmarsat & GPS cables that are also passing L-band frequencies or radar cables that may inject pulse repetition noise –as error bits - into your cables.

1.8.2. ACU Power Cable/Outlet

The AC power for the ACU and the ADE is not required to be from a UPS but it is recommended.

Power cable shall comply with the provisions of IEC 60092-350 and -351 in so far as practicable.

1.8.3. Gyro Compass Cable

Use good quality shielded cables (twisted pairs, individually foil wrapped, outer foil with braid overall is best). You only need 2-wire for NMEA signal ... always use shielded cable. Be cautious of length and gauge of the run to minimize voltage loss issues.

1.9. Grounding

All metal parts of the ADE shall be grounded to bare metal that is common to the hull of the ship. This is most commonly accomplished by attaching a ground wire/cable from the upper base plate ground point to a ground stud on the mounting pedestal/stanchion/mast near the base of the radome. Preservation of the bare metal contact point should be done to prevent loss of ground due to rust and/or corrosion.

Grounding by exposing bare metal under all mounting bolts of the under-side of the radome base prior to final tightening does NOT provide adequate grounding of the ADE.

Grounding should be ensured throughout the entire mounting to the hull. While it is presumed the deckhouse is permanently bonded and grounded to the hull, in cases where the deckhouse and hull are of different materials a check of an independent ground bonding strap should be made. Masts should be confirmed to be grounded to the deckhouse or hull.

2. Installation

Your antenna pedestal comes completely assembled in its radome. This section contains instructions for unpacking, final assembling and installing of the equipment. It is highly recommended that trained technicians install the system.

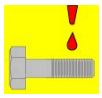
The installation instructions for your system are below.

2.1. Unpacking and Inspection

Exercise caution when unpacking the equipment.

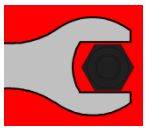
1. Unpack the crates. Carefully inspect the radome surface for evidence of shipping damage.
2. Unpack all the boxes.
3. Inspect everything to assure that all materials have been received and are in good condition.

2.2. Assembly Notes and Warnings



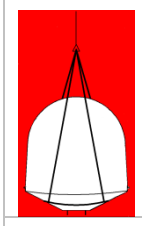
***NOTE**: All nuts and bolts should be assembled using the appropriate Loctite thread-locker product number for the thread size of the hardware.*

Loctite #	Description
222	Low strength for small fasteners.
242	Medium strength
638	High strength for motor shafts & sprockets.
2760	Permanent strength for up to 1" diameter fasteners.
290	Wicking, High strength for fasteners which are already assembled.

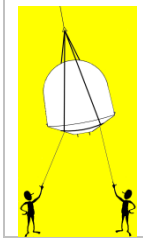


***WARNING**: Assure that all nut and bolt assemblies are tightened according to the tightening torque values listed below:*

SAE Bolt Size	Inch Pounds	Metric Bolt Size	Kg-cm
1/4-20	75	M6	75.3
5/I6-18	132	M8	150
3/8-16	236	M10	270
1/2-13	517	M12	430



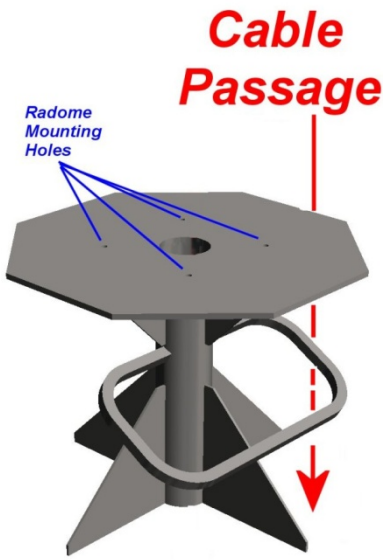
***WARNING**: Hoisting with other than a webbed four-part sling may result in catastrophic crushing of the radome. Refer to the specifications and drawings for the fully assembled weight of your model antenna/radome and assure that equipment used to lift/hoist this system is rated accordingly.*



***CAUTION**: The antenna/radome assembly is very light for its size and is subject to large swaying motions if hoisted under windy conditions. Always ensure that tag lines, attached to the radome base frame, are attended while hoisting the antenna assembly to its assigned location aboard ship.*

2.3. Installing the ADE

The antenna pedestal is shipped completely assembled in its radome. Please refer to the entire Site Survey chapter of this manual.



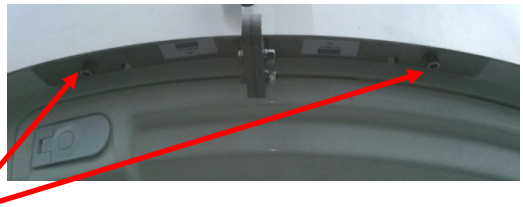
Base Hatch Access - Mounting the radome directly on the deck/ platform prevents access to the hatch in the base of the radome unless an opening is designed into the mounting surface to allow such entry. If there is no access to the hatch the only way to service the antenna is to remove the radome top. Two people are required to take the top off of the radome without cracking or losing control of it, but even with two people a gust of wind may cause them to lose control and the radome top may be catastrophically damaged (see repair information in the radome specifications) or lost.

If access to the hatch cannot be provided in the mounting surface, provide a short ADE mounting stanchion to mount the ADE on which is tall enough to allow access into the radome via the hatch.

Ladder rungs must be provided on all mounting stanchions greater than 3-4 feet tall to allow footing for personnel safety when entering the hatch of the radome.

Cable Passage - When strain relief glands are being used the recommended cable passage will be in/out the starboard side of the base of the radome approximately 12 inches from the center of the radome base, down along the side if the pedestal, through the deck and into the interior of the ship.

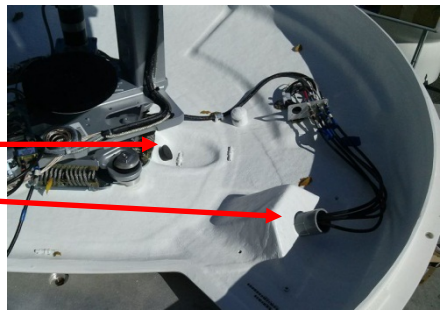
2.3.1. Prepare the 1.2M Radome Assembly

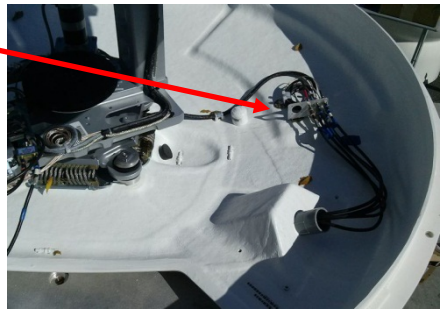
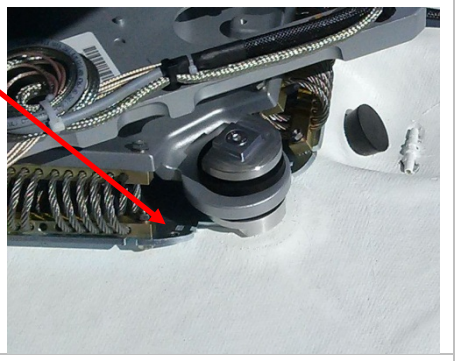
1. Remove the side walls of the radome crate. 2. Lift the pallet using a forklift and/or jacks. 3. From the underside of the pallet, remove the four shipping bolts which attach the ADE to its' pallet. Discard this shipping hardware.	
4. Holding the lifting bracket in place, remove two original bolts from the correct locations for where bolts will be installed in the bracket. Keep the original perimeter bolt hardware to be reinstalled after the ADE has been installed. 5. Install two bolts (provided in the radome installation kit) through the bracket into the radome top to mount one of the brackets. 6. Repeat step 4 & 5 to mount the other three lifting brackets in equally spaced locations around the perimeter of the radome flange.	
7. Attach properly load rated four part web lifting sling (or four individual straps) to the brackets using shackles. 8. Attach a suitable length tagline to one of the eyebolts.	

9. After the ADE is hoisted into place the lifting eyes are to be removed and replaced with the original stainless hardware that was removed in step 4.	

2.3.2. Installing the 1.2M Radome Assembly

The antenna pedestal is shipped completely assembled in its radome.

1. Hoist the antenna assembly off the shipping pallet, by means of a suitably sized crane or derrick, to allow access to bottom of radome assembly. 2. Open the hatch by pressing the round release button in the latches and gently push the hatch up into the radome. Place the hatch door (gel coat surface up) inside the radome on the far side of the antenna pedestal. 3. Inspect the pedestal assembly and reflector for signs of shipping damage.	
4. Peel the paper off of the mounting pad (provided in the radome installation kit) to expose the sticky side of the pad, align it to the mounting holes and press it in place on the underside of the radome base.	
5. Using Loctite 271, install the four mounting studs (provided in radome mounting kit) into the radome base. 6. Man the tag line and have the crane continue lifting the ADE up and hover above the mounting site on the ship.	
7. Carefully route the ground strap/cable (see Grounding info below) and 5 power & IF coax cables through the cable passage in the bottom center OR the offset cable entry (as desired). Center Cable Entry Side Cable Entry **NOTE: Suitable strain relief should be provided below the mounting surface to prevent the cables from being kinked where the cables exit the bottom of the radome.**	

8. Allow enough service loop to terminate these cables to the connector bracket respectively: **Refer to the System Block Diagram for cable connection information.** 9. Connect the Antenna Control coax to the **Red** connector. 10. Connect the Low Band Vertical/RHCP coax to the **Blue** connector. 11. Connect the Low Band Horizontal/LHCP coax to the **White** connector. 12. Connect the High Band Vertical/RHCP coax to the **Green** connector. 13. Connect the High Band Horizontal/LHCP coax to the **Black** connector.	
14. Attach hull ground strap/cable to the threaded hole in the lower base plate.	
15. Lower radome assembly into the mounting holes, positioned with the BOW reference of the radome as close to parallel with centerline of the ship as possible (any variation from actual alignment can be electrically calibrated if needed). 16. Using Loctite 271, install the four fender washers and hex nuts (provided in the radome installation kit), from the underside of the mounting surface, to affix the radome to the mounting surface. Tighten to torque spec.	
17. Adjust the cables through the desired cable entry and apply "Duct Seal" (or Silocon Sealant) to to make the cable entry point splash-proof.	
18. Remove the tag lines. 19. Remove the lifting sling. 20. Remove the four lifting brackets and re-install the original perimeter bolt hardware. 21. Close the radome hatch.	

2.4. Installing the Below Decks Equipment.

2.4.1. General Cautions & Warnings

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

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

2.5. IF Coax Cable Connections

Refer to the System Block Diagram. Connections are described using the color designation as show on the System Block Diagram.

2.5.1. Red Coax

This coax provides +24 VDC power to the antenna and it also carries the Ethernet Over Coax (EOC) antenna control signals between the antenna and the LMXP. Connect this coax to J2 Antenna connection on the rear panel of the LMXP (this step is duplicated below).

2.5.2. Blue Coax

This coax carries the Low Band Vertical/RHCP signals from the antenna to the below decks Multiswitch, or other distribution equipment. Connect this coax to the Low Band Vertical, or RHCP port, on your Multiswitch, or other distribution equipment.

2.5.3. White Coax

This coax carries the Low Band Horizontal/LHCP signals from the antenna to the below decks Multiswitch, or other distribution equipment. Connect this coax to the Low Band Horizontal, or LHCP, port on your Multiswitch, or other distribution equipment.

2.5.4. Green Coax

This coax carries the High Band Vertical/RHCP signals from the antenna to the below decks Multiswitch, or other distribution equipment. Connect this coax to the High Band Vertical, or RHCP, port on your Multiswitch, or other distribution equipment.

2.5.5. Black Coax

This coax carries the High Band Horizontal/LHCP signals from the antenna to the below decks Multiswitch, or other distribution equipment. Connect this coax to the High Band Horizontal, or LHCP, port on your Multiswitch, or other distribution equipment.

2.6. Connecting the Below Decks Equipment

Connect this equipment as shown in the System Block Diagram. Install the equipment in a standard 19 inch equipment rack or other suitable location. Optional slide rails are available.

2.6.1. Connecting the BDE AC Power Cables

Connect the AC Power cables that supply power to the Below Decks Equipment (LMXP, Satellite Receivers, and all other equipment) to an outlet strip fed from a suitably rated breaker or UPS.

2.6.2. Media Xchange Point™ (LMXP) Connections

LMXP Front Panel

LMXP Rear Panel

2.6.2.1. Ships AC Mains

Connect the power cord from the rear panel of the LMXP to AC voltage power source (UPS power recommended).

2.6.2.2. J2 Antenna

Connect the **Red** antenna control coax cable to this connector on the rear panel of the LMXP.

2.6.2.3. J4 A/B & J4 A/B – Ethernet 2 Port 10/100 switch

Ethernet connections to computer or LAN devices as desired.

2.6.2.4. J5 SFP Fiber Interface

SFP Gigabit Ethernet connection.

2.6.2.5. J6 Mini-USB Computer M&C Connection

Mini-USB Antenna M&C connection, if desired.

2.6.2.6. J7 M&C Host

Not connected - -Future development.

2.6.2.7. J8 Console

Antenna M&C Serial connections.

2.6.2.8. J9 AUX

Computer RJ-45 Serial M&C connections.

2.6.2.1. J10 NMEA 0183 Gyro Compass

NMEA 0183 I/O connections. Wiring is:

Pin 1	+12 VDC
Pin 2	RX+
Pin 3	RX-
Pin 4	TX+
Pin 5	TX-
Pin 6	GND

2.6.3. Other BDE connections

Connect your other Below Decks Equipment (ie, satellite receivers, Multiswitch, other audio/video equipments and computer equipment) to complete your configuration.

2.7. Final Checks

2.7.1. Visual/Electrical inspection

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

2.7.2. Electrical - Double check wiring connections

Double check all your connections to assure that it is safe to energize the equipment.

2.8. Setup – Media Xchange Point™ (LMXP)

Now that you have installed the hardware, you will need to setup, calibrate and commission the antenna.

At the very least, you will need to set up the antenna system for:

- Connect & configure a ships computer for accessing the LMXP. Refer to the "Configuring a Computer for the LMXP" chapter for more information.
- Set up / configure all satellites that the system might use as the ship travels. Refer to the "Dealer Login Pages - LMXP" chapter for more information.
- Set up Blockage zone(s) as needed. Refer to the "Dealer Login Pages - LMXP" chapter for more information.
- Acquire the desired satellite. Refer to the "Dealer Login Pages - LMXP" chapter for more information.
- Optimize targeting (Auto or manual trim). Refer to the "Dealer Login Pages - LMXP" chapter for more information.
- Conduct other commissioning/testing of matrix switch, satellite receivers and TV distribution equipment.
- It is strongly recommended that you download, and save, the system INI file (contains all of the system parameters). Save this file in a convenient location.

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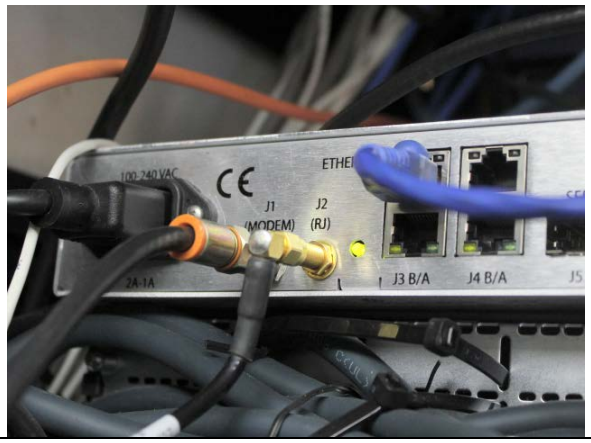
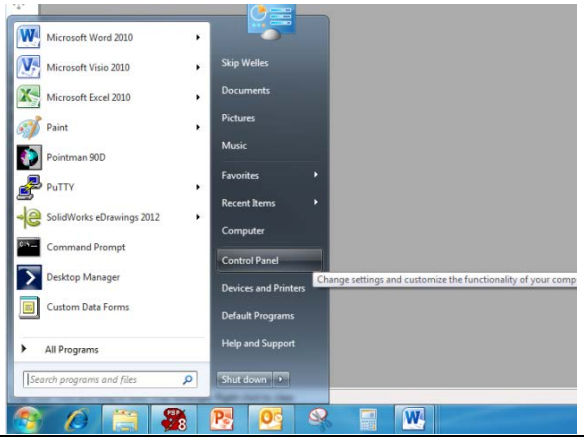
3. Configuring a Computer for the LMXP

The first thing you need to do is to configure your computer so that it will display the MXP screens. Follow these instructions to accomplish that.

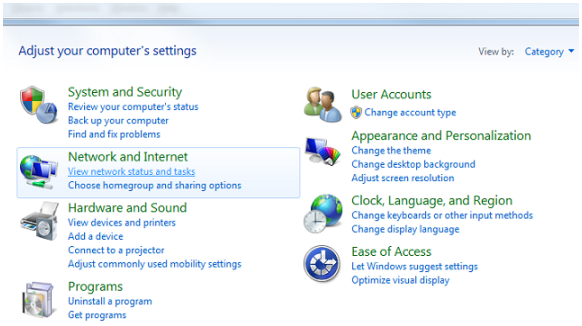
1. Connect a LAN cable to the back of your computer. If you are connecting into a LAN, instead of a single computer, you will need to provide a connection from your LAN router/hub/switch to the LMXP.	
2. Connect the other end of the LAN cable to the back of the LMXP.	
3. Power on the LMXP.	

4. From your computer desktop, click the Control Panel button.

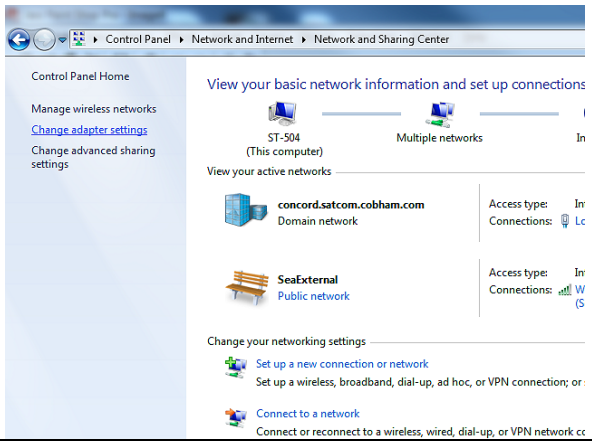
NOTE: The following displayed screen captures are form Window 7 OS, your screens may differ; refer to your PC manual for changing network adapter settings.



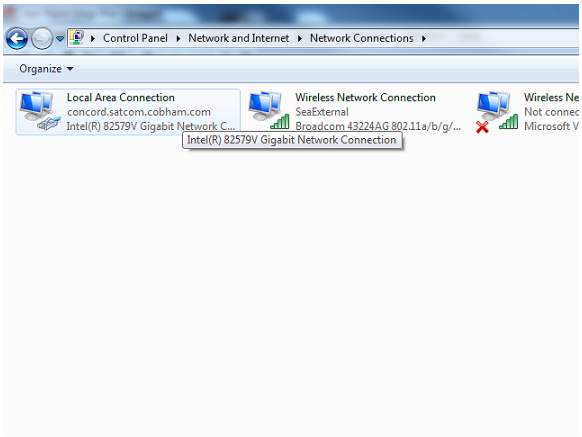
5. Click on “View network status and tasks”.

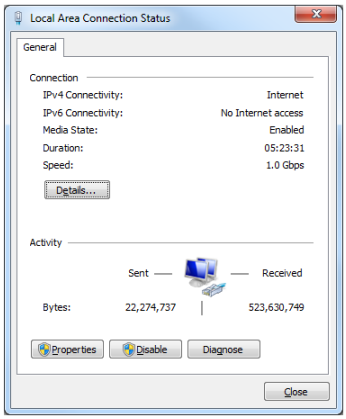
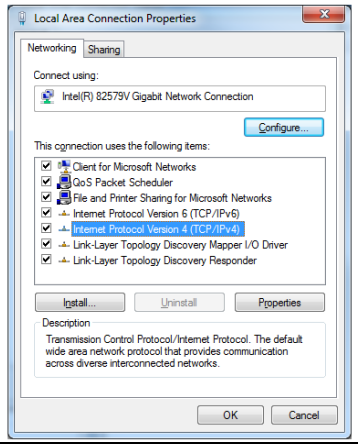
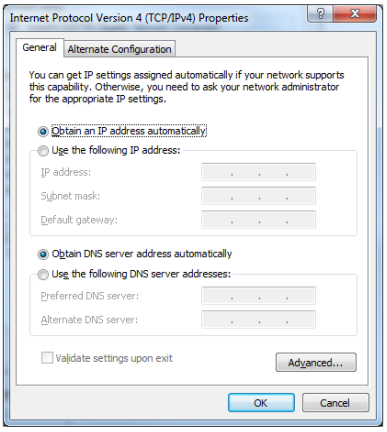


6. Click “Change adapter settings”.



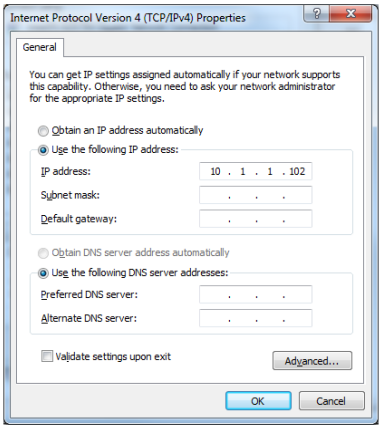
7. Click on “Local Area Connection.”



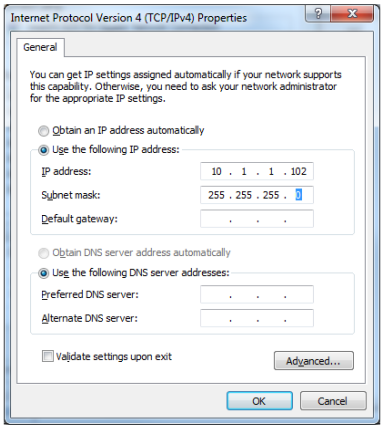
8. Click on “Properties”.	
9. Double-Click on “Internet Protocol Version 4 (IPv4)”.	
10. Click on “Use the following IP address:	

11. In the IP Address boxes, enter “10.1.1.102” (This is for the IP address of your computer).

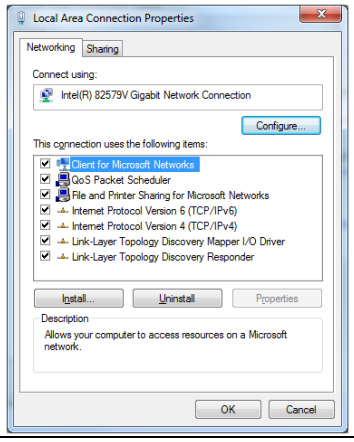
NOTE: You could use 101, 102, 103, etc. as long as it is not the same as the address of the LMXP, which is “**10.1.1.100**” (default).



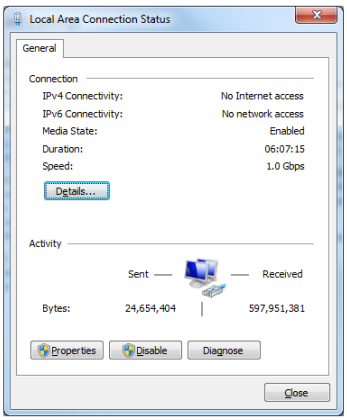
12. On the second line, enter Subnet Mask of “255.255.255.0”.
13. Then click the “OK” button.



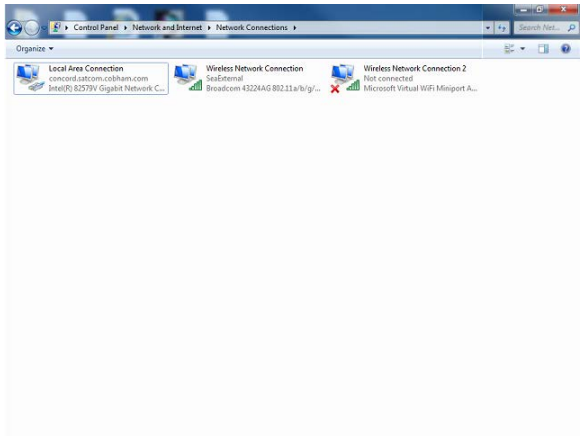
14. Back at the Local Area Connection Properties screen, click the “OK” button.



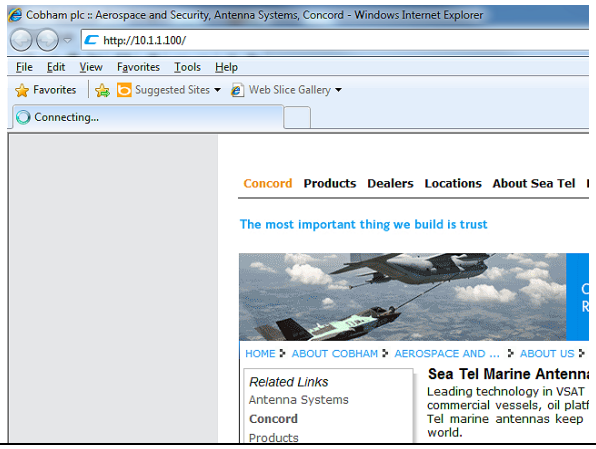
15. Click the “Close” button.



16. Close the Control Panel.

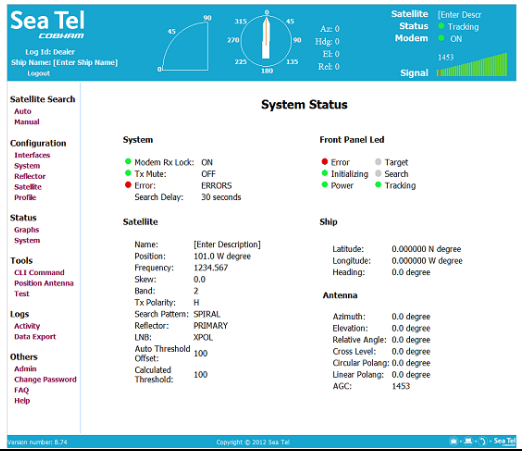


17. Open your browser, and enter the URL: "10.1.1.100".



18. At the log in screen enter the user name (Dealer, SysAdmin, or User). Contact Sea Tel Service for the password.

19. After you log in you will see the System Status screen



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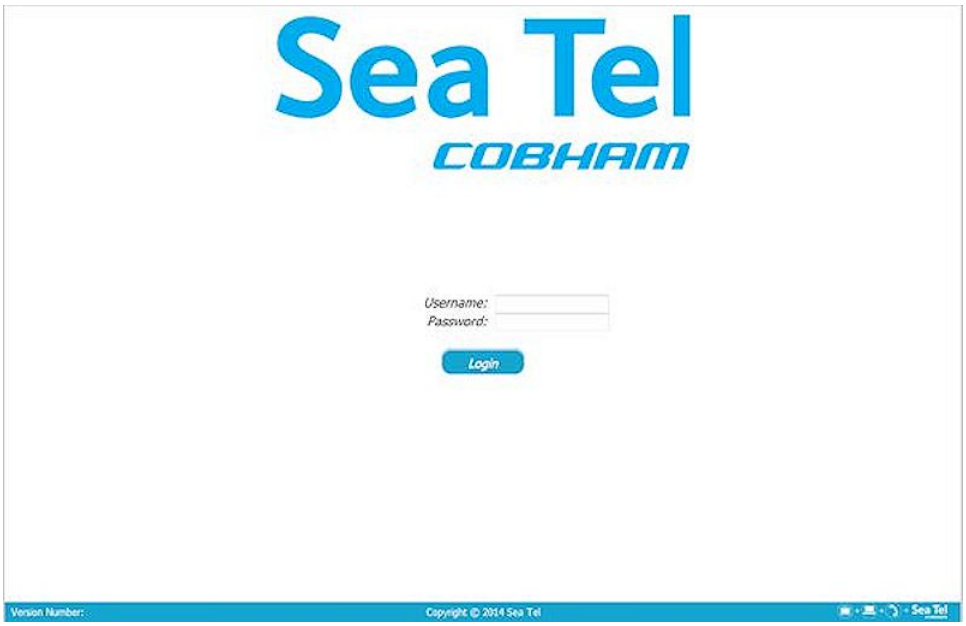
4. Dealer Login Pages – LMXP

4.1. Login Page

Log in to the LMXP from the computer. If the computer has not been set up for you by the dealer, refer to the installation manual for instructions. When you access the LMXP you will first see the login screen:

Enter the **Username** and **Password**. Both of these are case sensitive.



4.2. Layout of the GUI Pages

4.2.1. Top Banner (All Pages)

The banner across the top of every page is the same. It contains much of the information you would want about the system at a glance.

Sea Tel / Cobham – Our logo is presented in the Upper Left corner of the banner. The logo also doubles as a link to the Cobham Satcom site. But mostly it provides branding.

Login information is in the left middle – Login Level is displayed followed by LOGOUT. Click on LOGOUT to log out of the GUI.

Ship Name is displayed on the left bottom. Ship Name is entered on the System Configuration page.

Ship & Compass rose graphic is displayed middle left of the banner. This graphic is comprised of multiple image components. There are several selections one can make here in order to customize the look and function of this graphic.

The outer ring is a compass rose representing compass points, and indicating the heading of the ship. The compass follows the heading reading coming from the ships gyro compass or the fixed heading entered on the Navigation section of the **Configuration** – **Interfaces** page. The numeric heading value is displayed with more accuracy in the small box near the stern of the ship image.

The style of the compass rose graphic can be changed by clicking on the compass and then toggle it using "Shift" + "C" on the keyboard.

1. The default is the English 'N', 'S', 'E', and 'W' representing North, South, East and West directions.
2. The second set is pertinent to French or Spanish speakers with 'N', 'S', 'E', and 'O' representing Nord, Sud, Est, and Ouest (in French).
3. The third set displays the traditional Chinese ordinal directions.
4. The fourth set displays the Cyrillic ordinal directions.
5. The fifth set displays the universal circular degrees. Here 0 or 360 degrees represents North, 90 degrees represents East, 180 degrees represents South and 270 degrees represents West.
6. The sixth set displays the radian view of the angular direction. In this set 0 or 2*pi represents North.

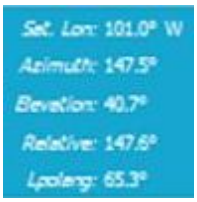
The ship image within the compass rose can also be changed. To change the 'ship' click on the compass graphic and then select 'Shift' + 'Q' " on the keyboard to change to the next available ship image.

7. The default image is a shaped needle typically found in a magnetic compass needle where the red part of the needle would be pointing due north. In this configuration the needle rotates around while the outer compass rose directions remain static.
8. The second image is of a standard sailboat silhouette. In this profile the compass rose rotates and the sailboat silhouette remains static.
9. The third image is a large ship silhouette. Much like the sailboat the large ship remains static while the compass rose rotates around it.
10. The fourth image is intended to be a catamaran silhouette. Again, the ship remains static while the compass rose rotates around it.

The Red Arrow indicates the position of the antenna, both relative to the bow of the ship and to the true azimuth pointing angle.

The final compass element is the representation of blockage zones. Blockage zones are represented on the compass as a transparent red wedge overlaying the entire blockage section on the compass (using the start and end positions entered on the **Configuration** – **System** page. The drawing of the blockage zones can be turned off by clicking on the compass and pressing "Shift" + "B".

The Pointing Information graphic is displayed in the middle right of the banner. This graphic is comprised of a list of values.



Sat Lon – is the satellite longitude of the current satellite.

Azimuth - is the true azimuth pointing angle of the antenna.

Elevation - is the elevation pointing angle of the antenna.

Relative - is the azimuth pointing angle of the antenna, relative to the bow of the ship.

Polang - is the polarization angle of the feed.

The LED / Status / Signal graphic is displayed in the far right of the banner. This graphic is comprised of Tracking (ON/OFF) on the top,

Satellite Lock or other status messages will be displayed in the center area.

If there are Errors, you can click on the "View" to see which errors are present in the system.

Signal - The bottom contains signal level information, displayed as a digital value of AGC and as a relative bar graph. Along the bar graph is an arrow marker, with a digital value, representing the current

Threshold value. When the signal level is greater than the Threshold value, the segments of the bar graph will be green and when signal is lower than Threshold they will be red.

4.2.2. Left Side Bar

Tracking ON/OFF radio buttons are on the top of the sidebar. Tracking can be turned ON, or OFF, by clicking on the button.

Each of the main menu selection tabs below the Tracking ON/OFF, have a small arrow on the left that will expand, or collapse the choices contained within it. The choices are listed here and are described in detail in the paragraphs below.

Satellite Search
- **Auto**

Configuration
- **Interfaces**
- **System**
- **Reflector**
- **Satellite**
- **Profile**

Status
- **System**

Tools
- **Command Line Interface**
- **Position Antenna**

Logs
- **Activity**

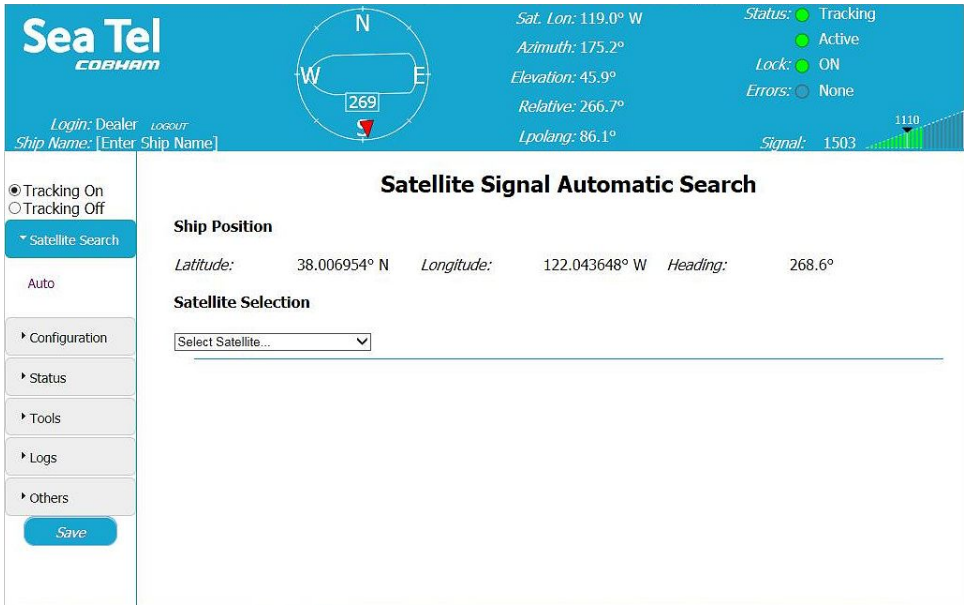
Others
- **Admin**
- **Help**

SAVE

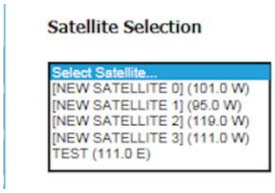
SAVE is on the bottom of the sidebar where it is available on every page of the menu system. You can save the changes you have made on each page, as you go, or after all changes have been made on all pages (SAVE saves ALL parameters).

4.3. Satellite Search – Auto

For normal operation, it is expected that the Satellite Signal Automatic Search page will serve as the primary tool used to command the system to locate and track a desired satellite.



The ships location information is displayed across the top of the page under Ship Position. A dropdown list of "Favorite Satellites" that have been entered, and saved, into this system is below the ships location information under Satellite Selection.



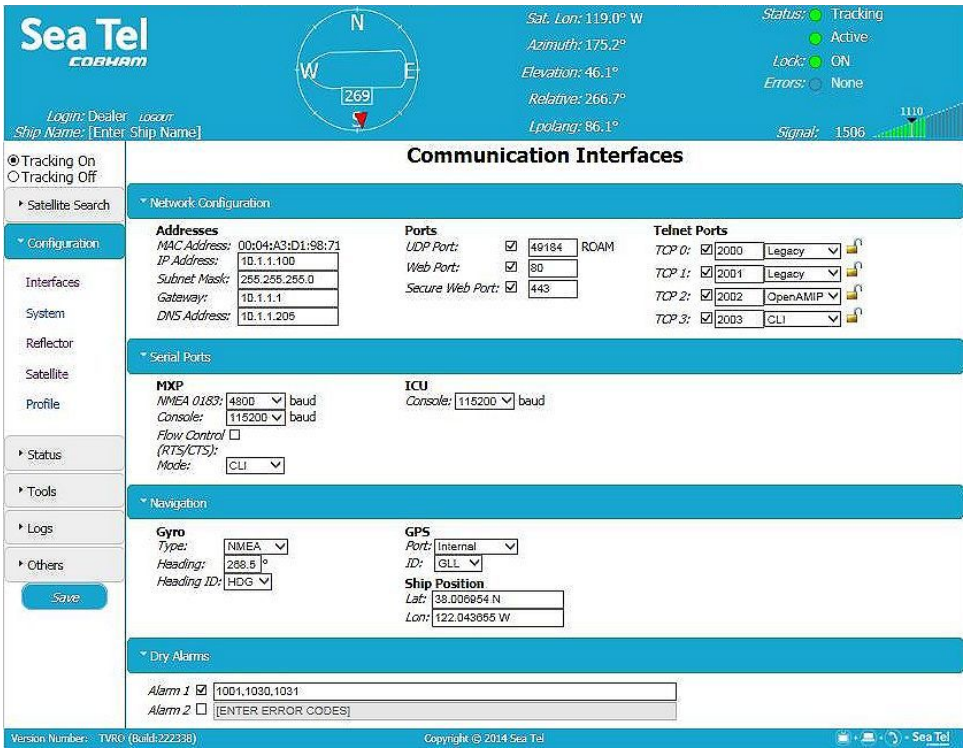
This dropdown list is used by the operator to select a satellite that they want to use. If power to the system is cycled, the antenna will retarget the last satellite that was selected.

You should enter all of the satellites that the user would be able to use with this antenna and the supporting below decks receivers and other distribution equipment (refer to **Configuration** – **Satellite** page). Once set up, the satellites will appear here in this simple list for the operator to select.

4.4. Configuration – Communication Interfaces

The Communication Interfaces page provides the ability for the dealer to define system settings to ensure the LMXP's ability to properly communicate with all Above Decks and/or Below Decks Equipment, whether supplied by Cobham SATCOM or not, as a part of normal operation or system maintenance.

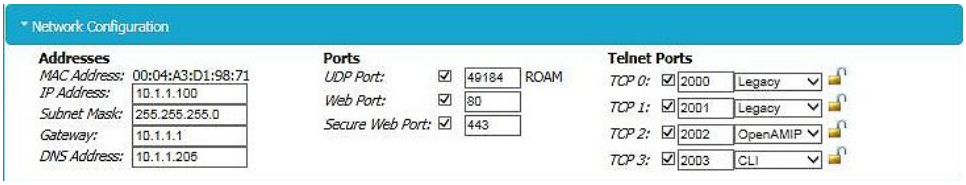
The Communication Interface page is divided into 4 sub-sections, each of which is described below.



4.4.1. Network Configuration

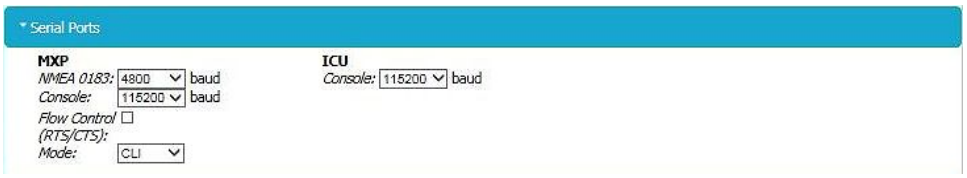
Network configuration is contained in this portion of the page. Defines the systems Ethernet based communication settings.

Addresses, Ports and Telnet – This information is typically left "as is" for a system which will only be accessed infrequently from a single computer. If the system will be connected to a LAN to allow access from multiple computers, then the addresses will need to be changed to be appropriate for the addresses in use in the existing network. NOTE: Changes made to this section require a system reboot to take effect.



4.4.2. Serial Ports

Used to define the systems serial based communication settings. These are normally left at factory default and should only be changed if necessary.



1. MXP NMEA 0183 - Set the Baud Rate speed of the NMEA Gyro Compass input connected to the rear panel of the LMXP. Although the standard baud rate for NMEA 0183 is 4800, your device may be different. Factory Default is 4800.
2. Console - If you will have a device connected to the Console port on the rear panel of the LMXP, set the speed for the port to the appropriate baud rate for your device. Factory Default is 115200.
3. Flow Control - Set flow control ON (box checked), or OFF (Box left Un-Checked), as appropriate for the input device. Factory Default is OFF (Unchecked).
4. Mode - Sets the CLI interface mode of either CLI or Legacy. Factory Default is CLI.
5. ICU Console - There is NO need to change the baud rate of the ICU Console port, leave it at factory default. Factory Default is 115200.

4.4.3. Navigation

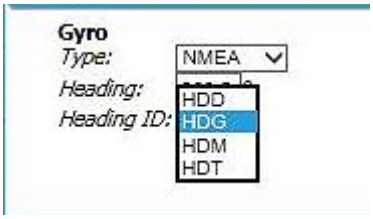
1. Gyro - Select the type of Gyro Compass input that the system will use for heading of the ship. An NMEA 0183 Heading input is highly recommended for faster acquisition times of targeted satellites.

Choose 'No Gyro' from the dropdown list if you have no gyro compass input. You will next have to enter the current ships heading. You must also turn ON Satellite Reference Mode (Miscellaneous section of the **Configuration** – **System** page).

Choose 'Fixed' from the dropdown list if you have no gyro compass input and the ship remains at a fixed heading (like an oil platform). You will next have to enter the current ships heading. It is recommended that you turn ON Satellite Reference Mode for this selection (Miscellaneous section of the **Configuration** – **System** page).

Choose 'NMEA' from the dropdown list if you have an NMEA 0183 Ships Gyro Compass input connected to the rear panel of the LMXP. You will not need to enter the current ships heading, as it will be automatically read from the ships gyro compass.

2. Gyro - Select the type of NMEA0183 Gyro Compass data that is provided by your ships gyro compass.



Choose 'HDD' from the dropdown list if your gyro compass outputs Heading Digital data.

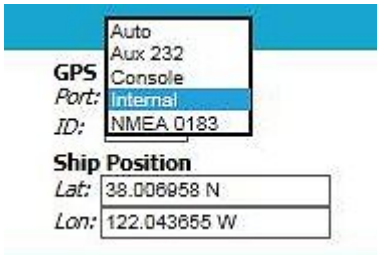
Choose 'HDG' from the dropdown list if your gyro compass outputs Heading Deviation & Variation data.

Choose 'HDM' from the dropdown list if your gyro compass outputs Magnetic Heading data.

Choose 'HDT' from the dropdown list if your gyro compass outputs True Heading data. This is the **PREFERRED** heading input.

3. GPS - There is a GPS mounted on the antenna (Internal) that provides automatic Latitude & Longitude input to the system. This ships position information is used for targeting any satellite you wish to use. Because a GPS is provided in the system, no external device is required, and these settings should be left at factory default (**Port=Internal and ID=GLL**).

Should the Internal GPS fail, an external device must be connected or periodic manual Latitude & Longitude entry (in the LAT & LON fields) will be required to reacquire the satellite signal if it is lost. Manual entry is only required to a tenth of a degree.



LAT entry format is ##.# followed by N or S for North or South (ie 38.0 N).

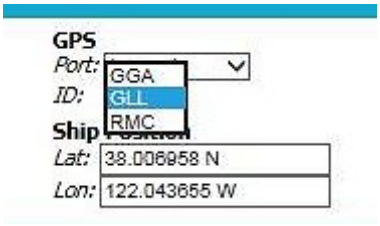
LAT entry format is ###.# followed by E or W for East or West (ie 122.0 W).

If an external device is connected for use;

Set the Port to the correct selection for the device and the electrical connection on the rear panel of the LMXP.

Then select the correct sentence type from the ID dropdown list.

4. The GPS ID string is selected to match the NMEA 0183 string provided by the GPS which is selected (factory default for the "**Internal**" GPS is **GLL**).

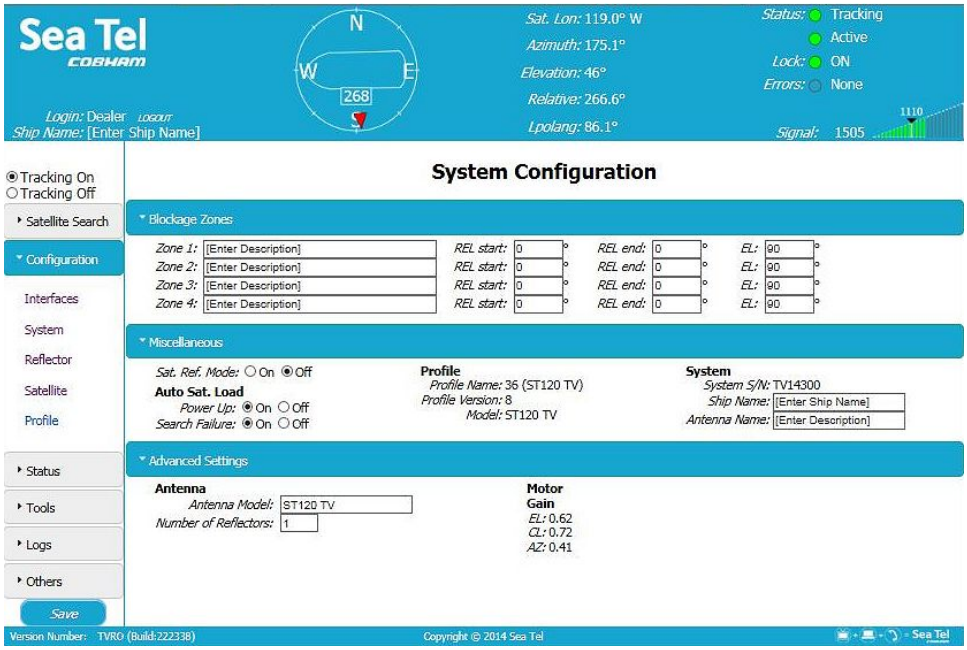


4.4.4. Dry Alarms

This section allows you to define what Error, Informational, or Warning Codes, (if any) will trigger one of two dry alarm contact sets accessed via the rear panel of the LMXP. Refer to the IMA Command Line Interface document for list of these supported messages and correlated code number.

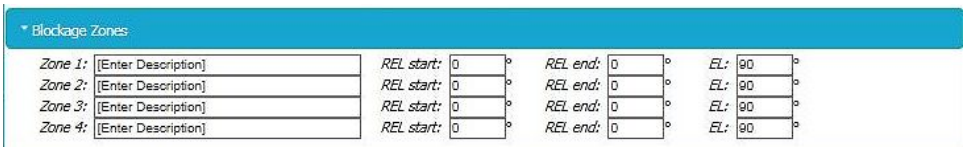
When configured, and electrically connected, the dry alarm contacts can be used to provide (programmable) alarm output to other equipment/systems. Switched outputs have ability to use 4.7K ohm pull up or pull down resistors and can provide Current sink of 0.5 amps max. Contacts are **Normally Open** for No Alarm state and are **Closed/Shorted** when the programmed alarm state exists.

4.5. Configuration – System



4.5.1. Blockage Zones

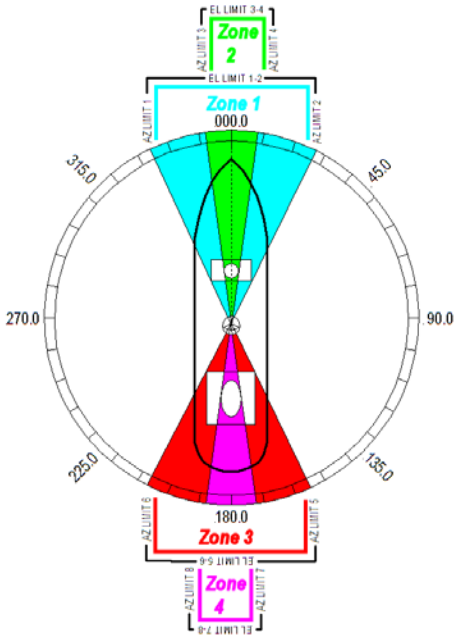
Blockage Zones: Names and defines known regions where line of site will be blocked.



The LMXP can be programmed with relative azimuth sectors (zones) where blockage exists. Your LMXP software allows you to set up to four zones.

When you create these *ZONES*, several things happen when the antenna is within any one of the zones:

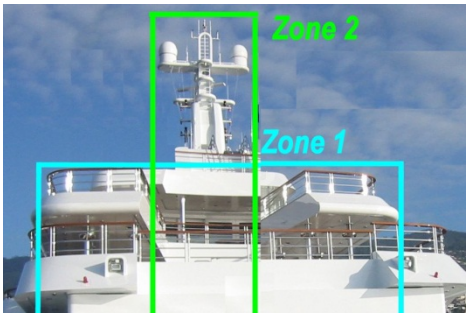
1. Tracking continues as long as the AGC value is greater than the Threshold value. When the AGC value drops below Threshold, the antenna will simply hold its' pointing angles (this keeps the systems angular positions pointed where the satellite is at).
2. While still within the blockage zone, if AGC rises above Threshold, tracking will resume. This would happen if the blockage zone start & end positions are wider than the actual structure that is causing the blockage.
3. When exiting the blockage zone, if AGC has NOT risen above Threshold, a search pattern will be automatically be initiated. This could happen if the blockage zone start & end positions are narrower than the actual structure that is causing the blockage or that the antenna is no longer pointed



where the satellite should be (i.e. faulty gyro compass input caused the antenna to be mispointed). When search limit is reached, the system will re-target the satellite, wait search delay and then search again. This cycle will continue until the satellite is re-acquired and tracking can resume.

To program zones into the LMXP:

1. Enter a readily identifiable name for the zone (i.e. Mast, Deck House or Stack).
2. Moving to the right, enter the relative bearing of the starting point of this blockage zone (the more counter-clockwise bearing).
3. Then enter the relative bearing of the stop point of this blockage zone (the more clockwise of the two bearings).
4. Enter in the Elevation angle of the TOP of the blockages zone. This value is equal to the calculated angle from beam center of the reflector to the upper most portion of the structure being defined.



A transparent red wedge overlaying each blockage section on the compass in the top banner will be displayed when this display is turned ON (see top banner info).

4.5.2. Miscellaneous

This section is used to define system behavior.

Sat Reference Mode - Satellite reference mode is used when there is NO gyro compass connected to the LMXP, or when the gyro compass input is intermittent or unreliable. Therefore, if you have good gyro compass input to the LMXP, this setting should be OFF.

When ON the system will decouple the gyro compass from the azimuth stabilization loop 2 ½ minutes after an AZ target command has been issued.

Auto Sat Load: Defines the condition states when the system will automatically target the last satellite loaded.

Power Up - This setting should always be ON.

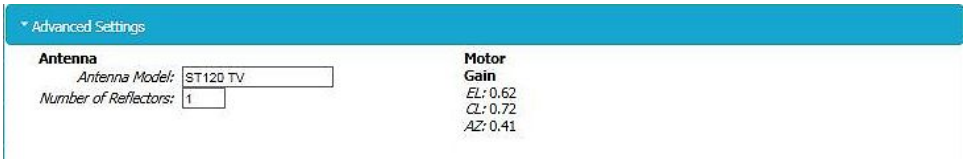
Search Fail - This setting should always be ON.

Profile - This is a displayed model that Profile is currently set to. To change the profile, refer to the **Configuration** – **Profile** page.

System - The Serial Number of the system is displayed here. Ship Name and Antenna Name are entry fields where the name of the ship and/or the name of the antenna can be entered if desired. Example: Ship Name: **Old Glory** Antenna Name: **Portside TVRO Antenna**

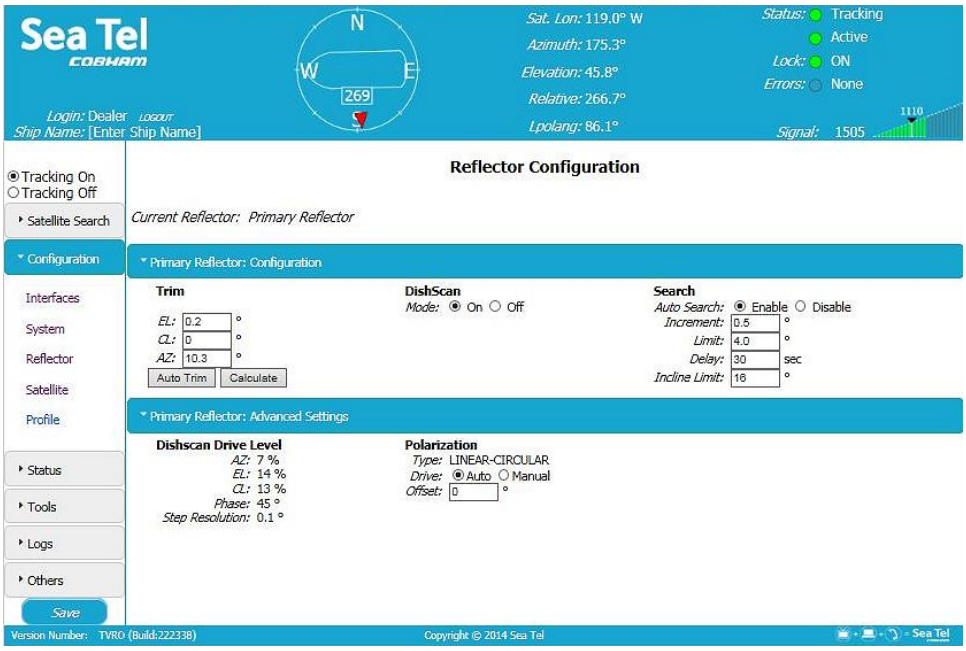
4.5.3. Advanced Settings

Advanced Settings: Antenna read only display of settings related to antenna model, drive and configuration.



4.6. Configuration – Reflector

The Reflector Configuration page provides the ability for the user to read and/or define some of the system settings related to targeting, searching, or tracking.



4.6.1. Primary Reflector Configuration

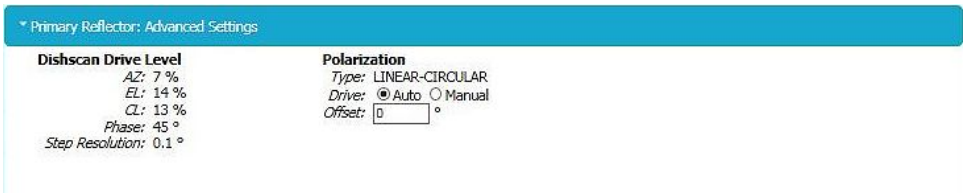
Trim: Define, either manually or automatically, the required Azimuth, Cross-Level and/or Elevation trim settings as well as the automatic calculation of the Auto Threshold Offset.

DishScan: Toggle the state of systems tracking mode.

NOTE: Mode should be set to OFF *only for specific testing purposes* required to do so and **must remain ON for normal operation**.

Auto Search - This setting should always be set to Enable. Increment, Limit, Delay and Incline Limit should all be left at the factory default values.

4.6.2. Primary Reflector Advanced Settings

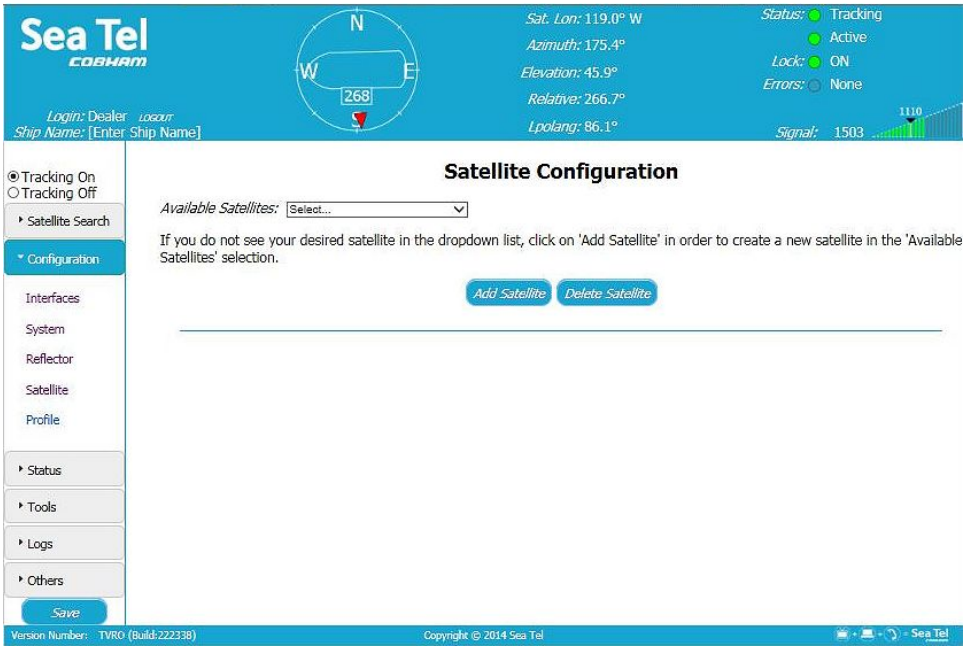


DishScan Drive Level - These displayed values are set by your antenna Profile selection.

Polarization - The "**Type**" parameter is set by LNB selection. "**Drive**" should only be set to Manual for diagnostic purposes and should be set to **Auto** for normal operation. "**Offset**" is used to calibrate the LINEAR polarization of your LINEAR feed. This should only be adjusted by a qualified technician.

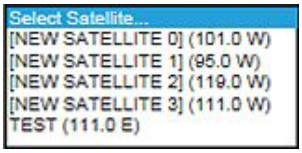
4.7. Configuration – Satellite

The Satellite Configuration page provides the ability for the user to create and or edit a satellite preset.



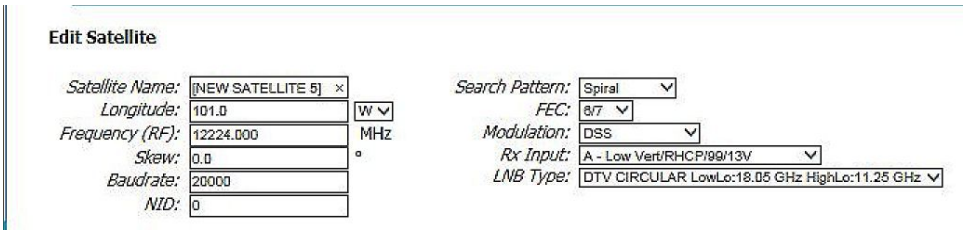
4.7.1. Satellite Selection:

Use the drop down list of pre-saved "favorite" satellites to select one of the satellites so that you can edit its' settings. Once selected, the settings for that satellite will appear below, and can be edited.



4.7.2. Add Satellite

Click on the Add Satellite button to add a new satellite to the favorites list. An Edit Satellite settings database record will appear below. Edit the settings for the new satellite and when completed click SAVE on the left sidebar.



4.7.2.1. Satellite Name:

Click in this field and type in the name you wish to use for this satellite.

4.7.2.2. Longitude:

Click in this field and type in the longitude position of this satellite.

4.7.2.3. E/W:

Use the dropdown to select the East or West longitude position of the satellite.

4.7.2.4. RF Frequency:

Enter the RF frequency of the signal you want the tracking receiver to use to track this satellite. This frequency is entered in MHz, so a tracking frequency of **12.224** (twelve point two-two-four) GHz would be entered as 12224 MHz.

4.7.2.5. Skew:

This setting is used to enter a known skew for ***this*** satellite. If the satellite is not skewed, this setting should be zero. Entered in degrees & tenths of degrees.

4.7.2.6. Baud Rate:

Enter the baud, or symbol rate of the signal you will be tracking.

4.7.2.7. NID:

Enter the decimal format Network ID (NID) of the signal you will be tracking. If the listed NID value is provided in HEX format, it will have to be converted to DECIMAL for entry.

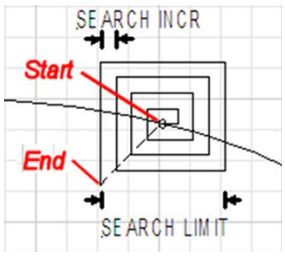
4.7.2.8. Search Pattern:

From the dropdown list, select the type of search pattern you want the antenna to perform when searching for this satellite.

4.7.2.8.1. Default "Spiral" (Box) Search Pattern

The factory default search pattern in the LMXP is a "Spiral" pattern.

When a search begins;



The antenna will then search up in azimuth one Search Increment, search up one Search Increment in elevation, search down two Search Increments in azimuth, search down two Search Increments in elevation, etc until Search Limit is reached. When the end of the search pattern is reached, the MXP will retarget the antenna to the calculated Azimuth and Elevation position of the desired satellite (start point).

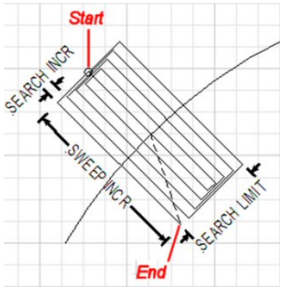
If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the MXP will terminate search and go into Tracking mode. If the desired signal is not found the MXP will wait SEARCH DELAY seconds and then begin the search

pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

4.7.2.8.2. Inclined Orbit Search Pattern

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

When a search begins;



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

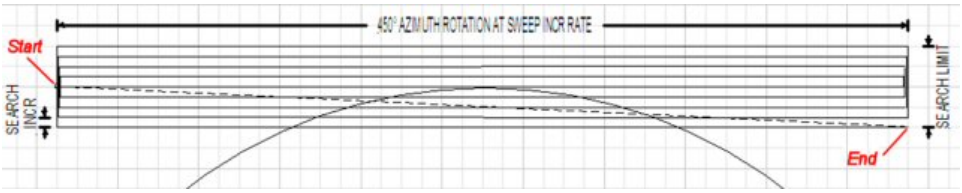
If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the MXP will terminate search and go into Tracking mode. If the desired signal is not found the MXP will wait SEARCH DELAY, then target the antenna to start point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

4.7.2.8.3. Sky Search Pattern

A Sky Search pattern does a hemispheric pattern. It behavior is different if you have a gyro compass input or not::

No Gyro - If you do not have gyro compass set the gyro type to "no gyro". When in this mode, Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW 450 degrees, steps elevation up and then drives azimuth CCW 450 degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW 450 degrees. Because of this large search area, acquiring the satellite will take longer than if you have valid heading input. If the end of the search pattern is reached, the MXP will retarget the antenna back to the start point shown in the graphic below.

With Gyro - If you have gyro compass set the gyro type to the appropriate selection. When in this mode, Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW **360** degrees, steps elevation up and then drives azimuth CCW **360** degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW **360** degrees. Because of this large search area, acquiring the satellite will take less time because you have valid heading input. If the end of the search pattern is reached, the MXP will retarget the antenna back to the start point shown in the graphic below.

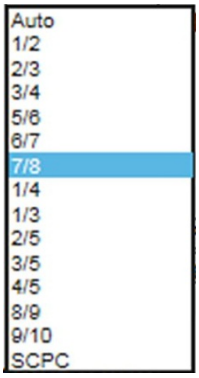


If the desired signal is found (AND network lock is achieved) at any position within the search pattern, the LMXP will terminate search and go into Tracking mode.

If the desired signal is not found within the search pattern the LMXP will wait SEARCH DELAY seconds and then begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

4.7.2.9. FEC:

From the dropdown list, select the **F**orward **E**rror **C**orrection rate of the desired tracking signal.

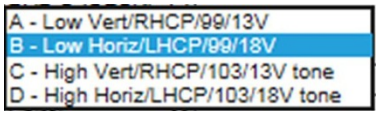


4.7.2.10. Modulation:

From the dropdown list, select the type of modulation that the desired tracking signal uses.

4.7.2.11. RX Input:

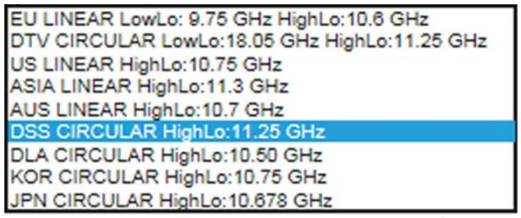
This setting is used to select the Band & polarity of the LNB output which is routed to the tracking receiver. This MUST be the band and polarity which contains the desired tracking frequency/signal.



EXAMPLE: If the signal you wish to track is LHCP (or Horizontal) at 12.224 GHz (high band), you would select "D –High Horiz/LHCP/103/18Vtone" from the dropdown.

4.7.2.12. *LNB Type:*

The TVRO LNB is capable of operating in a variety of modes and frequency bands. This setting selects the Local Oscillator frequency (therefore the RF frequency band), linear or circular polarization and whether the LNB will output dual or quad IF outputs.



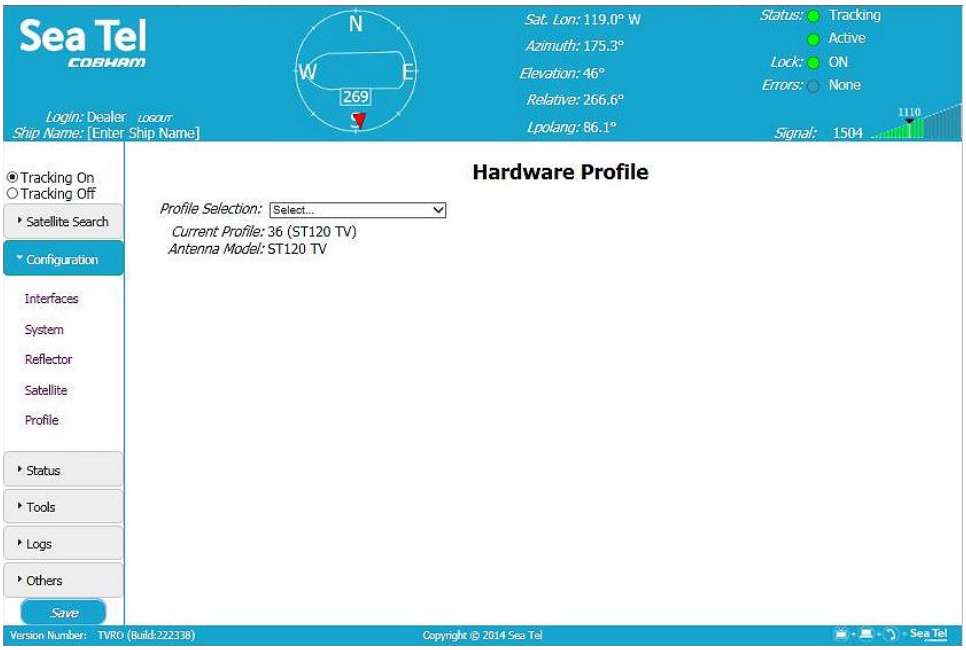
This selection sets the LNB into the listed modes (each emulating an individual LNB for the cited satellite/service) This MUST be set correctly for the desired satellite/service.

SAVE: When editing of all of these settings has been completed, click SAVE on the left sidebar to save this satellite to the "favorites" satellite database. Up to 40 favorite satellites may be saved.

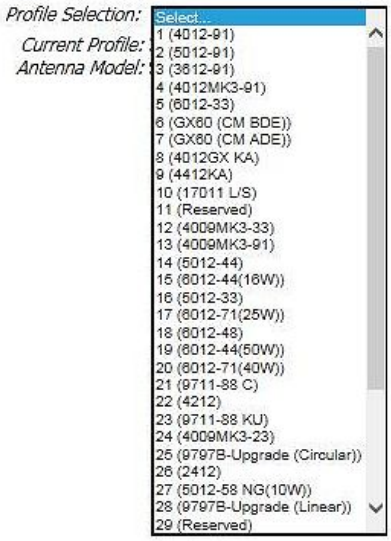
4.7.3. Delete Satellite

Click Delete Satellite if you want to delete the satellite which is currently displayed for editing.

4.8. Configuration – Hardware Profile



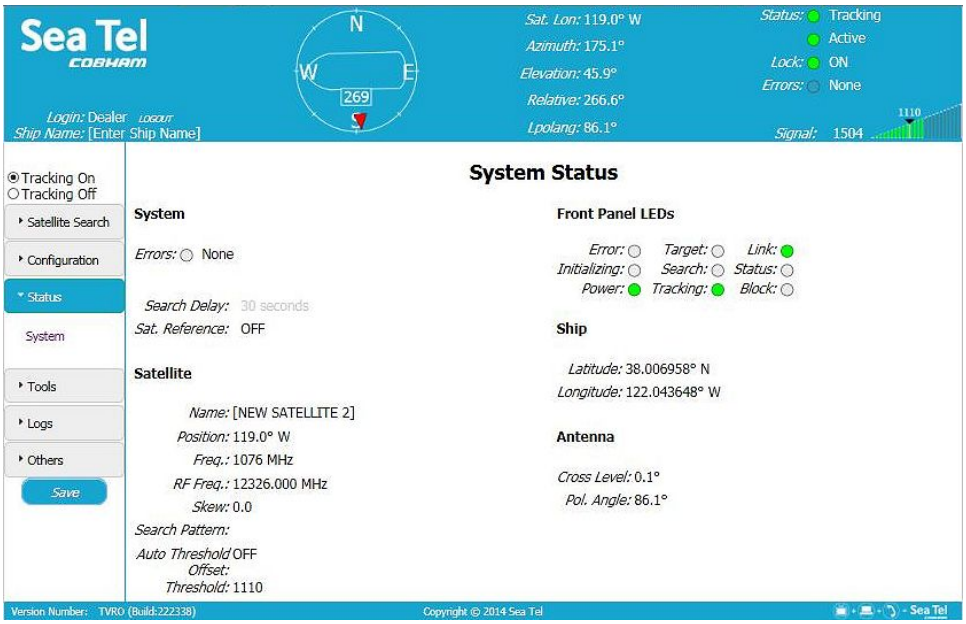
The Hardware Profile page provides the ability to select the Profile of the system from a simple dropdown list. This selection sets many of the other settings to values which are appropriate for this antenna system.



Hardware Profile: Use the Profile Selection drop down menu to select the model of antenna that the TICU/LMXP shall be configured to. Selection of one of these profiles causes an automatic configuration of all of the model specific parameter settings.

NOTE: If changed, the system will require a soft reboot for the new settings to take affect.

4.9. Status – System



The System Status page presents the user with all relevant system information on a single page, including but not limited to Satellite Configuration, Geo Location and, if present Error reporting information.

NOTE: If the Error LED is illuminated solid red, mouse click "**ERRORS**" text in red to redirect to the reported system errors page.

Satellite: Provides the user with a read only display of the target satellite settings currently being utilized by the system.

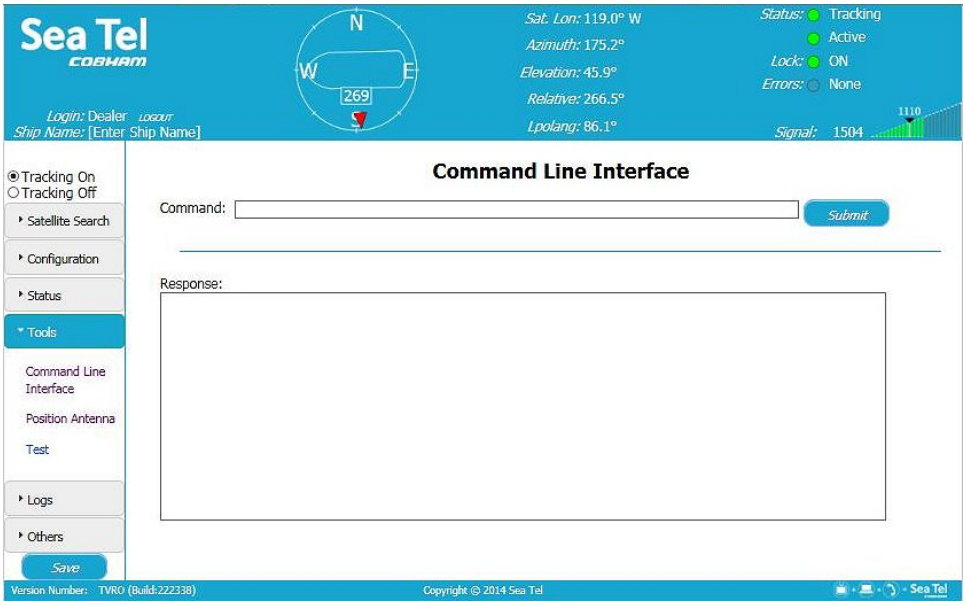
Front Panel LEDs: Provides the user with a mirror image of the diagnostic LED's located on the front panel of the LMXP.

Ship: Provides the user with a read only display of the systems current GEO location information as provided by the integrated GPS.

Antenna: Provides the user with a read only display of the systems Cross Level and Polarization angles.

4.10. Tools – Command Line Interface (CLI)

The CLI (**C**ommand **L**ine **I**nterface) Command page presents the user with the ability to issue Monitor and Control commands to the system as a part of advanced maintenance of the system.



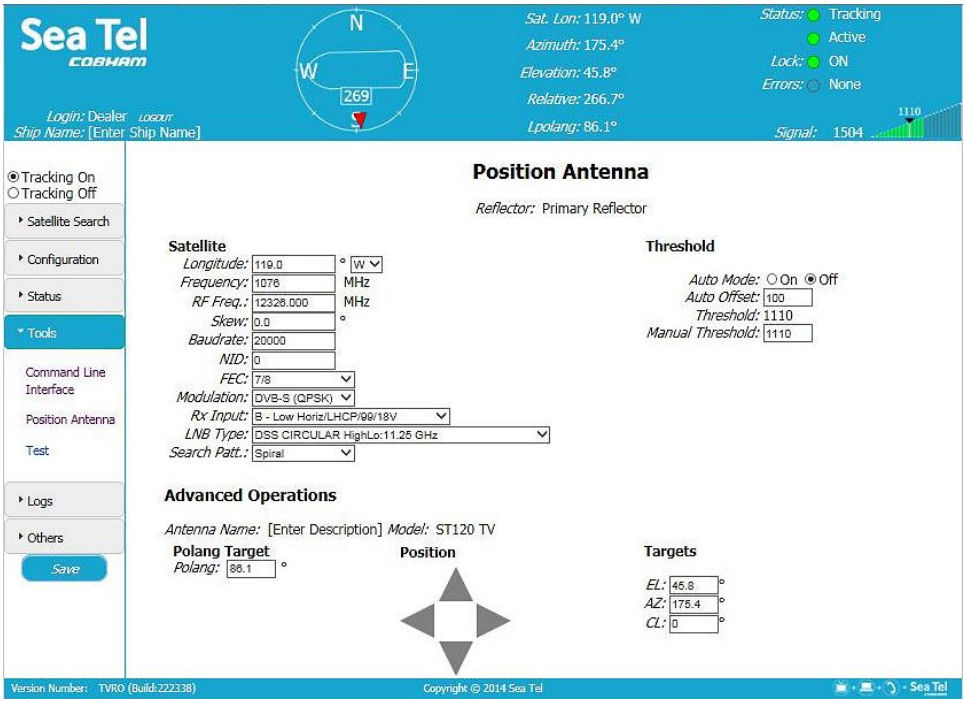
Command: Type in an appropriate command from the IMA CLI Protocol Specification document 135163 into the entry field window and press Submit to invoke. It is critical to ensure that the proper command and syntax be used while submitting a desired command else risk the unwanted configuration of the system, leaving it in a non-operational state.

Response: This window will display the applicable response to the submitted query entered in to the Command window above.

NOTE: The response window allows for user to select all (Ctrl + A) in order to copy and paste to another document such as notepad.

4.11. Tools – Position Antenna

The Position Antenna page provides the ability for the user to edit the current target satellite parameter settings as well as manual control of the systems angular positions and operational states.



4.11.1. Satellite -

This section is used to display, or set up, the satellite information required for the antenna to be able to acquire the chosen satellite.

4.11.1.1. Longitude:

Click in this field and type in the longitude position of this satellite.

4.11.1.2. E/W:

Use the dropdown to select the East or West longitude position of the satellite.

4.11.1.3. Frequency (IF):

Enter the IF frequency of the signal you want the tracking receiver to use to track this satellite. This frequency is entered in whole MHz,

Entry in this field will automatically calculate the **RF Frequency** field based on the LO of the LNB Type currently selected.

4.11.1.4. RF Frequency:

Enter the RF frequency of the signal you want the tracking receiver to use to track this satellite. This frequency is entered in MHz, so a tracking frequency of **12.224** (twelve point two-two-four) GHz would be entered as 12224 MHz.

Entry in this field will automatically calculate the **Frequency** field based on the LO of the LNB Type currently selected.

4.11.1.5. Skew:

This setting is used to enter a known skew for ***this*** satellite. If the satellite is not skewed, this setting should be zero. Entered in degrees & tenths of degrees.

4.11.1.6. Baud Rate:

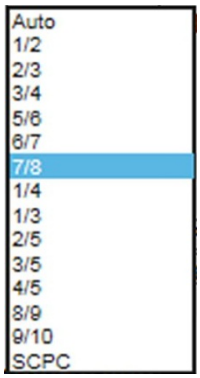
Enter the baud, or symbol rate of the signal you will be tracking.

4.11.1.7. NID:

Enter the decimal format Network ID (NID) of the signal you will be tracking. If the listed NID value is provided in HEX format, it will have to be converted to DECIMAL for entry.

4.11.1.8. FEC:

From the dropdown list, select the **F**orward **E**rror **C**orrection rate of the desired tracking signal.

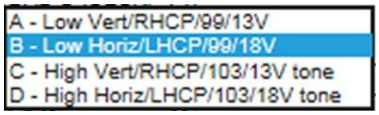


4.11.1.9. Modulation:

From the dropdown list, select the type of modulation that the desired tracking signal uses.

4.11.1.10. RX Input:

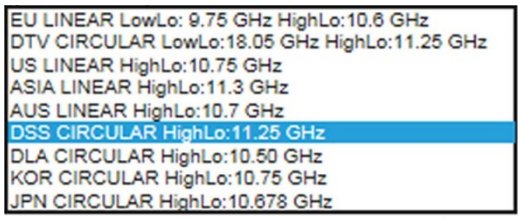
This setting is used to select the Band & polarity of the LNB output which is routed to the tracking receiver. This MUST be the band and polarity which contains the desired tracking frequency/signal.



EXAMPLE: If the signal you wish to track is LHCP (or Horizontal) at 12.224 GHz (high band), you would select "D –High Horiz/LHCP/103/18Vtone" from the dropdown.

4.11.1.11. *LNB Type:*

The TVRO LNB is capable of operating in a variety of modes and frequency bands. This setting selects the Local Oscillator frequency (therefore the RF frequency band), linear or circular polarization and whether the LNB will output dual or quad IF outputs.



This selection sets the LNB into the listed modes (each emulating an individual LNB for the cited satellite/service). This MUST be set correctly for the desired satellite/service.

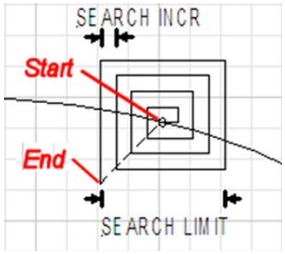
4.11.1.12. Search Pattern:

From the dropdown list, select the type of search pattern you want the antenna to perform when searching for this satellite.

4.11.1.12.1. Default "Spiral" (Box) Search Pattern

The factory default search pattern in the LMXP is a "Spiral" pattern.

When a search begins;



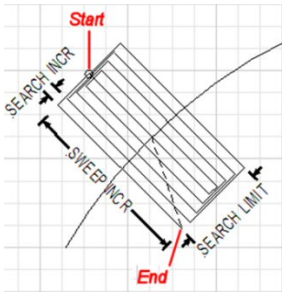
The antenna will then search up in azimuth one Search Increment, search up one Search Increment in elevation, search down two Search Increments in azimuth, search down two Search Increments in elevation, etc until Search Limit is reached. When the end of the search pattern is reached, the MXP will retarget the antenna to the calculated Azimuth and Elevation position of the desired satellite (start point).

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

4.11.1.12.2. Inclined Orbit Search Pattern

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

When a search begins;



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

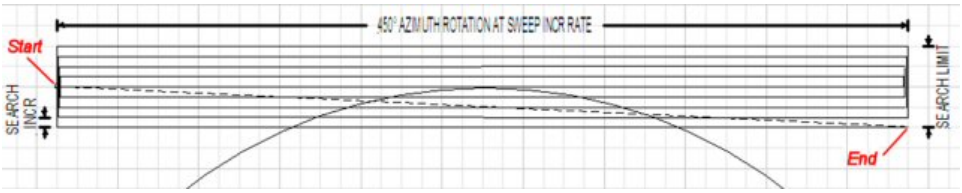
If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the MXP will terminate search and go into Tracking mode. If the desired signal is not found the MXP will wait SEARCH DELAY, then target the antenna to start point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

4.11.1.12.3. Sky Search Pattern

A Sky Search pattern does a hemispheric pattern. It behavior is different if you have a gyro compass input or not::

No Gyro - If you do not have gyro compass set the gyro type to "no gyro". When in this mode, Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW 450 degrees, steps elevation up and then drives azimuth CCW 450 degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW 450 degrees. Because of this large search area, acquiring the satellite will take longer than if you have valid heading input. If the end of the search pattern is reached, the MXP will retarget the antenna back to the start point shown in the graphic below.

With Gyro - If you have gyro compass set the gyro type to the appropriate selection. When in this mode, Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW **360** degrees, steps elevation up and then drives azimuth CCW **360** degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW **360** degrees. Because of this large search area, acquiring the satellite will take less time because you have valid heading input. If the end of the search pattern is reached, the MXP will retarget the antenna back to the start point shown in the graphic below.



If the desired signal is found (AND network lock is achieved) at any position within the search pattern, the LMXP will terminate search and go into Tracking mode.

If the desired signal is not found within the search pattern the LMXP will wait SEARCH DELAY seconds and then begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

SAVE: When editing of all of these settings has been completed, click SAVE on the left sidebar to save this satellite to the "favorites" satellite database. Up to 40 favorite satellites may be saved.

4.11.2. Threshold

This is used for setting the Threshold parameters.

4.11.2.1. Auto Mode

View, or set, threshold Auto Mode. For normal operation it should always be set to **ON**.

4.11.2.2. Auto Offset

View, or set, threshold Auto Offset, Typically it is left at factory default. If you wish to optimize it, record the peak "ON Satellite" AGC value displayed in the Signal bar graph of the banner. Turn Tracking OFF and use the UP arrow on the Position graphic below to move the antenna OFF satellite and read the "OFF Satellite" AGC value. Subtract the OFF Satellite AGC from the peak ON Satellite AGC to find out the difference in signal ON/OFF satellite. Divide the difference value in half and enter that value in the Auto Offset field. Use the DOWN arrow to return to ON satellite and turn Tracking back ON.

4.11.2.3. Threshold

View the current threshold value in the Threshold field.

4.11.2.4. Manual Threshold

View, or set, a Manual Threshold value in that field. Manually setting threshold is NOT recommended because the system cannot automatically adjust the Threshold value as atmospheric changes occur.

4.11.3. Advanced Operations

4.11.3.1. Antenna Name

View, or enter an Antenna Name (ie Port Antenna) if desired.

4.11.3.2. Model

Display of the model based on the Profile setting of the system.

4.11.3.3. Polang Target

View, or set, Polang Target. View the current polarization target value for the current satellite. The only reason to target a polarization is for testing feed polarity drive.

4.11.3.4. Position Graphic

Use the UP/DOWN/LEFT/RIGHT arrows to manually move the dish. Each click on an arrow will move the dish 0.3 degrees. This would most commonly used for four quadrant tracking test or checking ON/OFF satellite signal levels. For larger AZ or EL movement, use the Targets field.

4.11.3.5. Targets

For larger antenna movements, use the AZ & EL targets fields.

4.12. Tools – Test

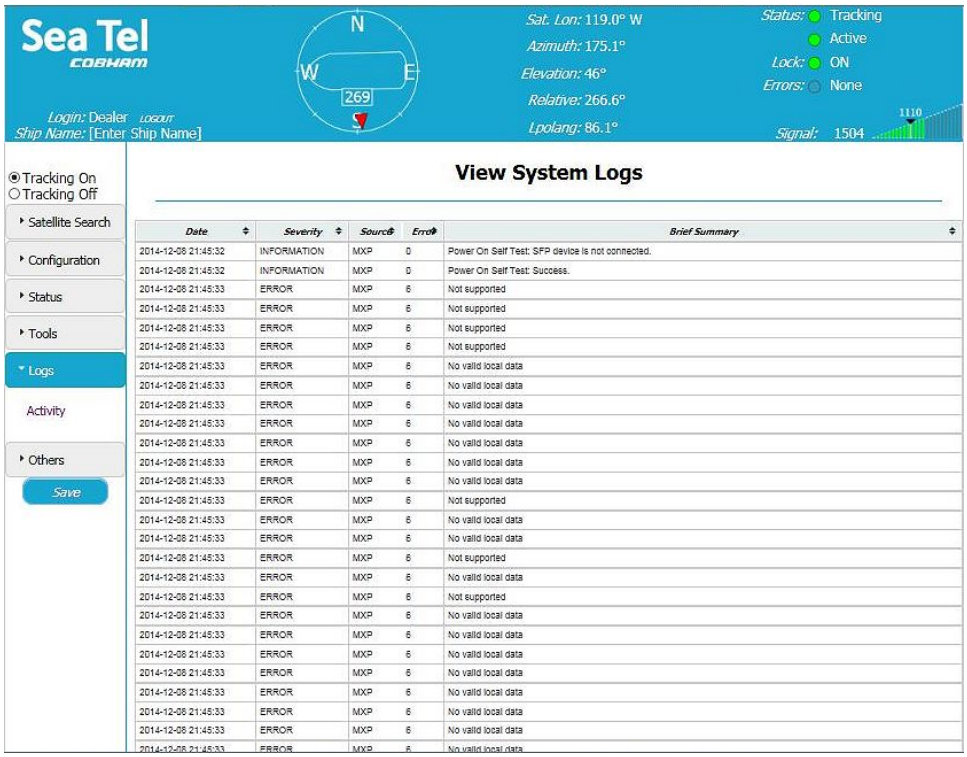
The Tools Test page is under development.

4.13. Logs

4.13.1. Activity

The Activity Log page provides the means to view, filter, sort and/or export all reported system activity reported either that day or for up to the last 7 operational days.

Activity Log:



4.14. Others - Admin

4.14.1. Firmware

The Firmware Upgrade page provides the means to perform a system firmware upgrade. It is recommended that you download the systems INI file (System Configuration text file) prior to performing an update. A firmware update in this IMA based system is set up as a Monolithic Architecture, meaning that all modules both above and below decks are updated at one time. The nature of the upload also verifies the file integrity within the system prior to actual update and should there be any discrepancies, the upload process cancels and will revert to the last known good configuration and build version. In addition, should you interconnect a spare TICU or LMXP with the system as a part of a retrofit or repair procedure, the system will automatically update to the latest version upon power up. This is an automatic feature that does not require any user intervention.

1. Click Browse to locate the software file on your computer.
2. Click Upload File.

4.14.2. System Configuration

The System Configuration Files page provides the means to download or upload the systems INI file. This file type contains all configurable system parameters, including but not limited to any preset satellites that may have been configured.

Upload - This is used to upload a previously saved INI file.

1. Click Browse to locate the configuration file (INI file) which was previously saved on your computer.
2. Click the Upload File button to load it into your system.

Download - This is used to download a previously saved INI file.

1. Click the Download Config button to download a **complete INI file** and save it to your computer. This should be done after you have made changes to any of the system parameters or added favorite satellites.
2. Click the Download Config button to download an MXP-Only INI file and save it to your computer. This should only be done be done after you have made changes to any of the system parameters or added favorite satellites.

4.14.3. Reboot

The Reboot page provides the means to perform a simultaneous reboot of the LMXP and TICU subsystems of the antenna. This does not issue any reboot command to any other BDE components integrated with the LMXP.

Reboot:

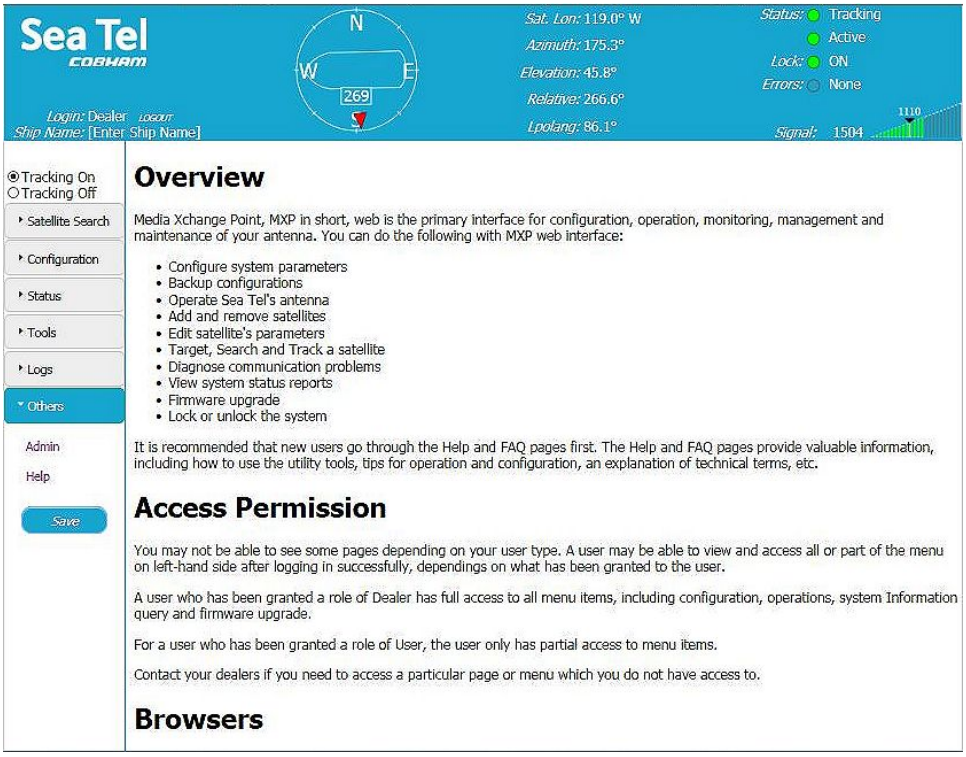
Click on Reboot All link to issue reboot command to the LMXP & TICU (this is recommended).

NOTE: You will need to re-login into the system once reboot and start up sequence has completed.

4.15. Others – Help

The Help page provides some general knowledge items in regards to the LMXP's operational capabilities and restrictions.

HELP: The Help page is separated into 6 major groups; Overview, Access Permission, Browsers, Configuration Tips, Operation Tips, and Tech Contact. Scroll down the page use slider at right hand side of screen or use your keyboards Page up/down keys.



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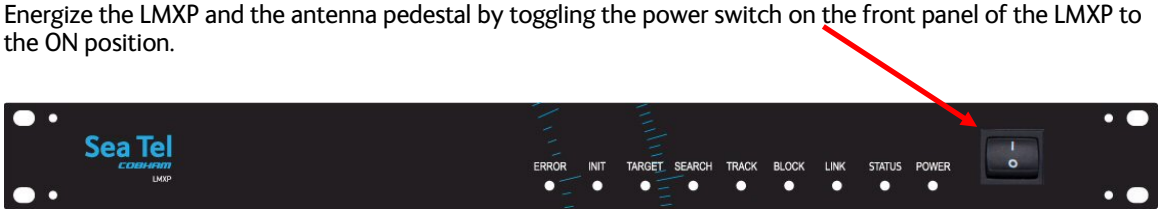
5. Quick Start Operation

If your system has been set up correctly, and if the ship has not moved since the system was used last, the system should automatically acquire the satellite from a cold (power-up) start. Once the satellite has been acquired, the modem then should achieve lock and you should be able to use the system.

5.1. Turn Power ON

To apply power to the antenna system:

1. Energize the LMXP and the antenna pedestal by toggling the power switch on the front panel of the LMXP to the ON position.



2. Energize all other below decks receivers, distribution and audio/video equipment.
3. The antenna system will power up, go through its initialization process and then automatically target the last satellite that had been previously acquired.

5.2. If satellite signal is found AND network lock is achieved:

1. Tracking will take over (front panel Tracking LED will be ON) and automatically peak the antenna position for highest receive signal level from the satellite.
2. When the system has signal above threshold AND modem has network lock the antenna will continue to track the satellite.
3. Satellite Name (if entered), Tracking indicator, Modem Lock indicator and signal level (number value and bar graph) will be displayed in the header of the LMXP GUI pages.

Upon completion of the above, the system will continue to operate automatically, indefinitely until:

- AC power to the system is interrupted OR
- The satellite signal is blocked OR
- The ship sails into an area of insufficient satellite signal strength/level.

5.3. If no signal is found:

If the system does NOT automatically find the satellite from a cold start, log into the LMXP and follow the steps below:

1. The Tracking LED, on the front panel of the LMXP, will flash for a short period of time (Search Delay) followed by the Search LED coming ON.
2. The antenna will automatically be driven in a search pattern, attempting to relocate the desired satellite. The bar graph on the upper right will display red bars while the signal value is less than the threshold value (red bar in the bar graph).
3. Not finding a signal greater than Threshold, the bar graph will stay red and the antenna will reach the end of the prescribed search pattern.
4. The antenna will retarget and then the cycle (steps 1-3) until the satellite is found, or the operator intervenes.
5. Log into the LMXP GUI.
6. Access the Configuration - Communication Interfaces page.
7. Find the Latitude, Longitude and Heading displayed values. If they are correct skip to step 10.
8. If the Latitude & Longitude values are not correct, enter the ships Latitude & Longitude position in those fields.
9. If the Heading value is not correct, enter the correct value in the Heading field.
10. Select the Satellite Search – Auto page.

11. Verify that the correct satellite is selected. If it is correct skip to step 14.
12. If the selected satellite is not the desired satellite, click the dropdown list and select the satellite you wish to use.
13. Click Save.

If the desired satellite is still not found:

14. Check for blockage (this is the MOST common cause of not being able to acquire the desired satellite).
15. Check cable connections to assure that a cable has not been disconnected.

If you verify that the antenna is not blocked and all of the connections are good but the system still does NOT automatically find the satellite, contact your dealer.

5.4. To Target a different satellite

1. Log into the LMXP GUI.
1. To target a different satellite go to the Satellite Search - Auto page and select the desired satellite from the drop down list.
2. When you make that selection you will see the temporary message:
   Acquiring Satellite Signal...Please Wait
3. Shortly after that you will see the temporary message:
   Satellite Signal Found.
   Lock: ON

5.5. Basic Description of the Front Panel Status LEDs

The basic description of the front panel LED states are:

ERROR -

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

OFF indicates that no errors have occurred

INIT (Initializing) -

ON

- (Solid Green) indicates that the Antenna is initializing. Initialization of the antenna will take approximately two minutes.
- (Flashing Amber) indicates that a software update in progress, the system (ADE-BDE) is synchronizing or in service/out of service testing is in progress.

TARGET -

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

SEARCH (Searching) -

ON (Solid Green) indicates that the LMXP is actively searching for your satellite signal.

OFF indicates that SEARCH is OFF.

TRACK (Tracking) -

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

Blinking indicates that the LMXP is in search delay or that the system is analyzing a satellite signal.
OFF indicates that Tracking is OFF.

BLOCK -

ON (Solid Red) indicates that the antenna is within a defined blockage zone (therefore you should not have satellite signal until the antenna is no longer within the blockage zone).

OFF indicates that the antenna is not within a defined blockage zone). If no blockage zones have been entered, the antenna could be blocked causing loss of signal.

LINK - (Green LED)

ON (Solid Green) indicates that the LMXP has good communications with the antenna (therefore good antenna control). This is normal state for system operation.

ON (Solid Red) indicates LOSS of communications with the antenna (therefore, loss of antenna control). Check the coax connections on the LMXP and in the base of the radome.

STATUS - (Green LED)

ON (Solid Red) indicates that the signal is below threshold (satellite signal is low or lost).

OFF indicates that status is normal.

POWER - (Green LED)

OFF indicates that LMXP Power switch is OFF (No power to the LMXP or the antenna).

ON (Flashing Green) indicates that the LMXP is booting up.

ON (Solid Green) indicates that the LMXP boot sequence is complete and the system power is ON (normal).

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6. DRAWINGS

6.1. Sea Tel TV Model Specific Drawings

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BOM Explosion Report

Item Number: 140113-601

Description: SYSTEM, SEA TEL 100 TV

Item Revision: A.01 ECO-00009606

Date as of: 11/24/2014 02:50:58 PM PST

Find Num	Qty	Number	Rev	Description / Title	BOM Notes
1	1	141120-1	A.06 ECO-00009343	BASE SPINDLE & TURNTABLE ASSY, TVRO, 1.2M	
2	1	140931-2	A ECO-00008547	ANTENNA ASSY, WWKU, 1.0M	
3	1	141686-1	A.03 MCO-00013080	RADOME ASSY, GA INSTALL, 100 TV, NCS WHITE	
4	1	140372-2	A.01 ECO-00009161	LMXP, TVRO	
8	1	140130	A ECO-00008547	CUSTOMER DOC PACKET, TVRO, 1M	
9	1	124747-1	C ECO-00008543	DECAL KIT, SEATEL, 50/60 IN DOMES	
10	1	121711	B ECO-00008543	BALANCE WEIGHT KIT, BASIC, MEDIUM SYSTEMS	
14	1	121655-14	M ECO-00008543	LABELS INSTALLATION, GX60	
15	1	140197-1	03 ECO-00009447	HARNESS ASSY, UPPER, TVRO, KIT	
16	1	129527-30	B ECO-00008544	HARNESS ASSY, MOTOR EXTENSION, 30 IN	
18	1	129527-72	B ECO-00008544	HARNESS ASSY, MOTOR TO ELEVATION, 72 IN	
20	1	138847-96	A ECO-00008547	CABLE ASSY,INTERFACE,DE15P- DE15S,7 S/UTP,96 IN	
51	1	114589-358	MCO-00012113	SCREW, HEX HD M6X90	
53	1	119973-112	MCO-00012113	SCREW, SOCKET HD, M3 X 8, SS.	
55	3	119973-108	MCO-00012113	SCREW. SOCKET HD, M4 X 8, SS.	
58	4	119973-216	MCO-00012113	SCREW, SOCKET HD, M10 X 40, SS.	
62	1	114580-210	MCO-00012113	WASHER, FLAT, M3, SS.	
64	3	114580-230	MCO-00012113	WASHER, FLAT, M4, SS.	

Created By: Mike Needham

Create Time: 12/30/2014 10:46:47 AM PST

BOM Explosion Report

Item Number: 140113-601

Description: SYSTEM, SEA TEL 100 TV

Item Revision: A.01 ECO-00009606

Date as of: 11/24/2014 02:50:58 PM PST

Find Num	Qty	Number	Rev	Description / Title	BOM Notes
66	1	114580-250	MCO-00012113	WASHER, FLAT, M6, SS.	
68	4	114580-285	MCO-00012113	WASHER, FLAT, M10, SMALL PATTERN, SS.	
70	2	123082-1921	MCO-00012113	SPACER, 1/4 X .50 OD X 1.50, NYLON	
72	1	111679-3	MCO-00012114	CABLE CLAMP, NYLON, .25 DIA, #8 MTG HOLE	
74	2	111679-5	MCO-00012114	CABLE CLAMP, NYLON, .375 DIA, #8 MTG HOLE	
76	2	52-207088-000	MCO-00013407	INSULATED P-CLAMP 5/8 IN	
		140113-601	A.01 ECO-00009606	SYSTEM, SEA TEL 100 TV	

Created By: Mike Needham

Create Time: 12/30/2014 10:46:47 AM PST

BOM Explosion Report

Item Number: 141000-601

Description: SYSTEM, SEA TEL 120 TV

Item Revision: A.04 ECO-00009991

Date as of: 12/30/2014 08:52:56 AM PST

Find Num	Qty	Number	Rev	Description / Title	BOM Notes
0	1	97-144896-A	DRAFTA DCO-00009951	ASSEMBLY DRAWING, NGTV SYSTEM	
1	1	141120-1	A.07 ECO-00009991	BASE SPINDLE & TURNTABLE ASSY, TVRO, 1.2M	
2	1	140931-1	B ECO-00009941	ANTENNA ASSY, WWKU, 1.2M	
3	1	141688-1	A.02 MCO-00013081	RADOME ASSY, GA INSTALL, 1.64 M, TVRO, NCS WHITE	
4	1	140372-2	A.03 ECO-00009763	LMXP, TVRO	
8	1	140130	A ECO-00008547	CUSTOMER DOC PACKET, TVRO, 1M	
9	1	124766-1	B ECO-00008543	DECAL KIT, 66-81 IN RADOME, SEA TEL	
10	1	121711	B.01 ECO-00009762	BALANCE WEIGHT KIT, BASIC, MEDIUM SYSTEMS	
14	1	121655-14	M ECO-00008543	LABELS INSTALLATION, GX60	
15	1	140197-1	03 MCO-00012891	HARNESS ASSY, UPPER, TVRO, KIT	
16	1	129527-30	B ECO-00008544	HARNESS ASSY, MOTOR EXTENSION, 30 IN	
18	1	129527-72	B ECO-00008544	HARNESS ASSY, MOTOR TO ELEVATION, 72 IN	
20	1	138847-96	A ECO-00008547	CABLE ASSY,INTERFACE,DE15P- DE15S,7 S/UTP,96 IN	
22	4	139805-1	A ECO-00008547	BASE STOP TOP, DIA 60, T&T	
24	4	141257-1	01 MCO-00012614	BASE STOP BOTTOM, DIA 60	

Created By: Mike Needham

Create Time: 12/30/2014 10:46:47 AM PST

BOM Explosion Report

Item Number: 141000-601

Description: SYSTEM, SEA TEL 120 TV

Item Revision: A.04 ECO-00009991

Date as of: 12/30/2014 08:52:56 AM PST

Find Num	Qty	Number	Rev	Description / Title	BOM Notes
26	4	141258-1	01 MCO-00012614	BASE STOP STUD, DIA 10 X 87MM	
28	8	139810-1	A ECO-00008547	RUBBER PAD, BASE STOP, DIA 60 - SHORE A 60, T&T	
46	4	126657-282	MCO-00012113	SCREW, FLAT HD, SKT DRV, M8 X 16, SS	
51	1	114589-358	MCO-00012113	SCREW, HEX HD M6X90	
53	1	119973-112	MCO-00012113	SCREW, SOCKET HD, M3 X 8, SS.	
55	3	119973-108	MCO-00012113	SCREW. SOCKET HD, M4 X 8, SS.	
58	4	119973-216	MCO-00012113	SCREW, SOCKET HD, M10 X 40, SS.	
62	1	114580-210	MCO-00012113	WASHER, FLAT, M3, SS.	
64	3	114580-230	MCO-00012113	WASHER, FLAT, M4, SS.	
66	1	114580-250	MCO-00012113	WASHER, FLAT, M6, SS.	
68	4	114580-285	MCO-00012113	WASHER, FLAT, M10, SMALL PATTERN, SS.	
70	1	123082-1921	MCO-00012113	SPACER, 1/4 X .50 OD X 1.50, NYLON	
72	1	111679-3	MCO-00012114	CABLE CLAMP, NYLON, .25 DIA, #8 MTG HOLE	
74	2	111679-5	MCO-00012114	CABLE CLAMP, NYLON, .375 DIA, #8 MTG HOLE	
76	2	52-207088-000	MCO-00013407	INSULATED P-CLAMP 5/8 IN	
		141000-601	A.04 ECO-00009991	SYSTEM, SEA TEL 120 TV	

Created By: Mike Needham

Create Time: 12/30/2014 10:46:47 AM PST

BOM Explosion Report

Item Number: 141409-1

Description: SYSTEM BLOCK DIAGRAM, SEA TEL 80/100/120 WWKU

Item Revision: A.02 ECO-00008540

Date as of: 09/20/2014 11:49:16 AM PDT

Find Num	Qty	Number	Rev	Description / Title	BOM Notes
2	1	140931-1	Introductory	ANTENNA ASSY, WWKU, 1.2M	
2	1	140931-2	Introductory	ANTENNA ASSY, WWKU, 1.0M	
2	1	140931-3	Introductory	ANTENNA ASSY, WWKU, 0.8M	
3	1	140116-2	Introductory	LNB, WWKU, TVRO	
4	1	140752-1	Introductory	ENCLOSURE ASSY, TICU	
5	1	139012-1	Introductory	MOTION PLATFORM ASSY, REMOTE	
6	1	133040-3	Introductory	MOTOR,BLDC,SIZE 23,DOUBLE STACK,W/BRAKE, W/ENCODER	
7	2	125644-1	Introductory	MOTOR, SIZE 23, BLDC W/ BRAKE, 15 PIN	
8	1	131381-1	Introductory	GPS ANTENNA, SERIAL, 118 IN	
20	1	129527-72	Introductory	HARNESS ASSY, MOTOR TO ELEVATION, 72 IN	
21	1	129527-30	Introductory	HARNESS ASSY, MOTOR EXTENSION, 30 IN	
23	1	138847-96	Introductory	CABLE ASSY,INTERFACE,DE15P- DE15S,7 S/UTP,96 IN	
24	1	140984-156	Introductory	HARNESS ASSY, REFLECTOR W/ENCODER,156 IN, TVRO	
25	1	140987-138	Introductory	CABLE ASSY, M12 TO DE-9, 5 WIRE, 138 IN	
26	1	117164-10BLK	Introductory	CABLE ASSY, RG-179, F TO F, 10 IN, BLK	
27	1	127963-138BLK	Introductory	CABLE ASSY, RG-179, F TO F(RA), 138 IN, BLK	
27	1	127963-138BLU	Introductory	CABLE ASSY, RG-179, F TO F(RA), 138 IN, BLU	
27	1	127963-138GRN	Introductory	CABLE ASSY, RG-179, F TO F(RA), 138 IN, GRN	
27	1	127963-138WHT	Introductory	CABLE ASSY, RG-179, F TO F(RA), 138 IN, WHT	
28	1	122372-0120	Introductory	CABLE ASSY, RG-179, F(M)-F(M), BLK, 120 IN	
28	1	122372-5120	Introductory	CABLE ASSY, RG-179, F(M)-F(M), GRN, 120 IN	

Created By: Mike Needham

Create Time: 12/30/2014 10:46:47 AM PST

BOM Explosion Report

Item Number: 141409-1

Description: SYSTEM BLOCK DIAGRAM, SEA TEL 80/100/120 WWKU

Item Revision: A.02 ECO-00008540

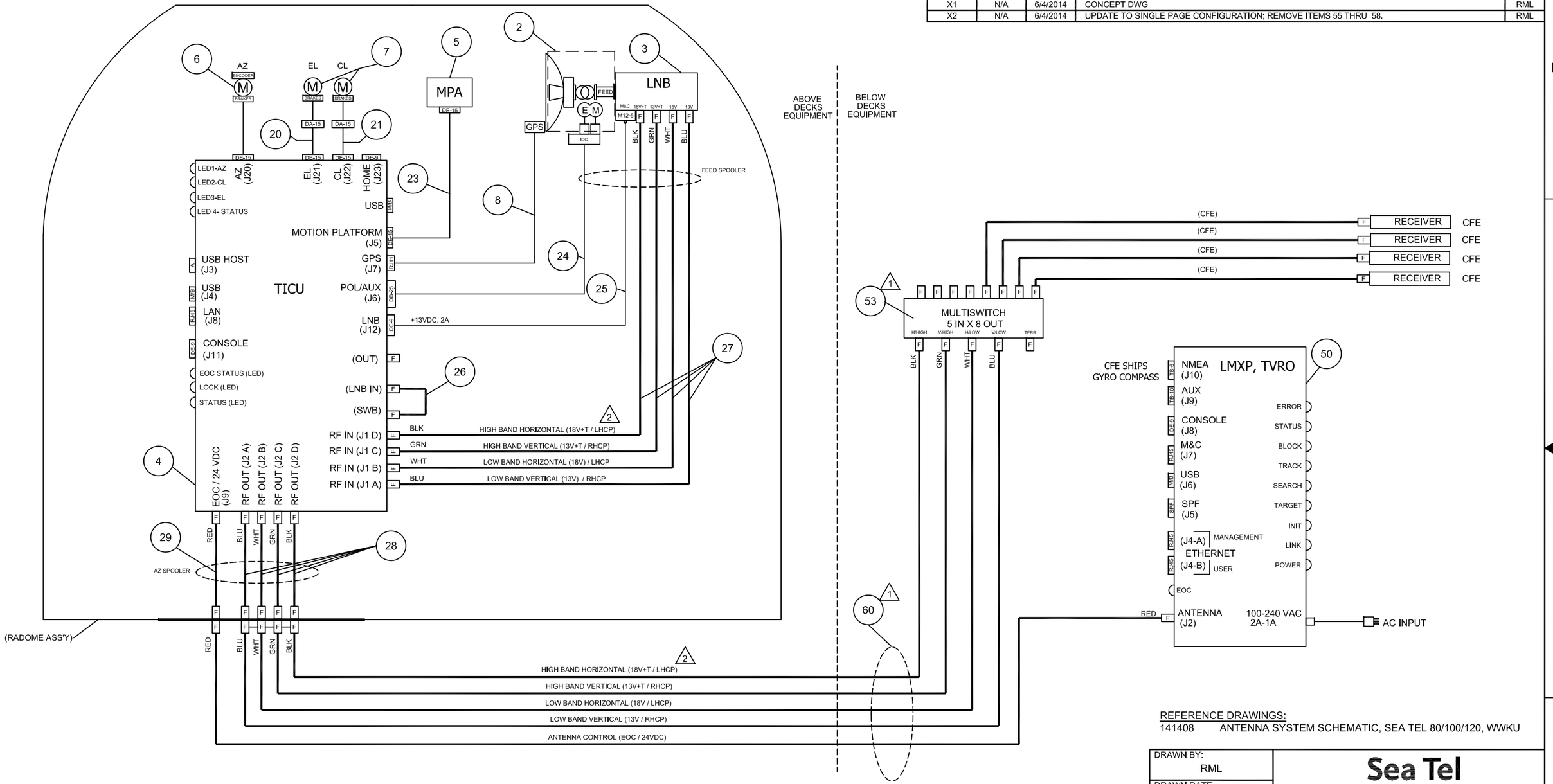
Date as of: 09/20/2014 11:49:16 AM PDT

Find Num	Qty	Number	Rev	Description / Title	BOM Notes
28	1	122372-6120	Introductory	CABLE ASSY, RG-179, F(M)-F(M), BLU, 120 IN	
28	1	122372-9120	Introductory	CABLE ASSY, RG-179, F(M)-F(M), WHT, 120 IN	
29	1	141671-120RED	Introductory	CABLE ASSY, RG-59, F(M)-F(M), 120 IN, RED, HI FLEX	
50	1	140372-2	Introductory	LMXP, TVRO	
53	1	120422-2	Introductory	MULTISWITCH, DUO-SAT, 5 IN X 8 OUT	
60	1	133980-4	Introductory	CABLE KIT, ST, QUAD, RG6, 50FT	
60	1	133980-6	Introductory	CABLE KIT, ST, QUAD, RG11, 150FT	
		141409-1	A.02 ECO-00008540	SYSTEM BLOCK DIAGRAM, SEA TEL 80/100/120 WWKU	

Created By: Mike Needham

Create Time: 12/30/2014 10:46:47 AM PST

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
X1	N/A	6/4/2014	CONCEPT DWG	RML
X2	N/A	6/4/2014	UPDATE TO SINGLE PAGE CONFIGURATION; REMOVE ITEMS 55 THRU 58.	RML



REFERENCE DRAWINGS:
141408 ANTENNA SYSTEM SCHEMATIC, SEA TEL 80/100/120, WWKU

NOTES: UNLESS OTHERWISE SPECIFIED

1. OPTIONAL ITEM - NOT PART OF SYSTEM
2. VOLTAGE/TONE SHOWN FOR REFERENCE ONLY

DRAWN BY:	RML
DRAWN DATE:	6/4/14
APPROVED BY:	
APPROVED DATE:	

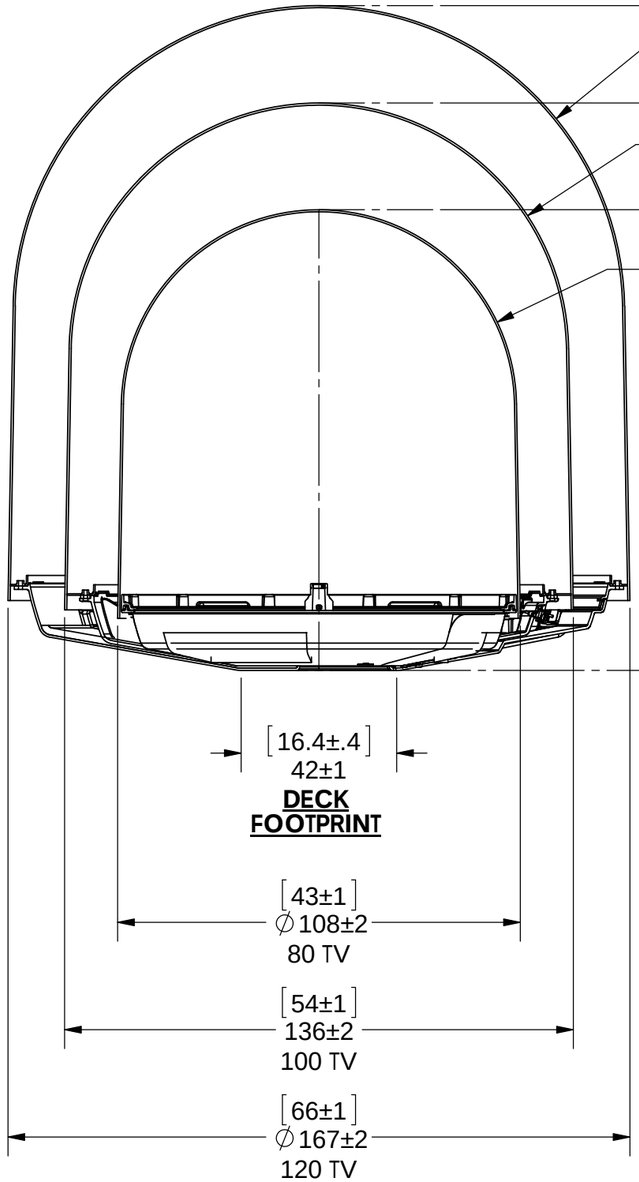
Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

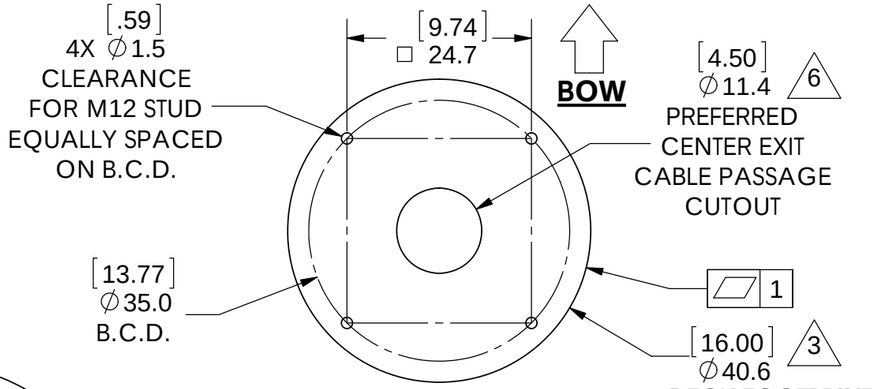
TITLE:
SYSTEM BLOCK DIAGRAM
SEA TEL 80/100/120 WWKU

SIZE	SCALE:	DRAWING NUMBER	REV
B	NONE	141409	X2

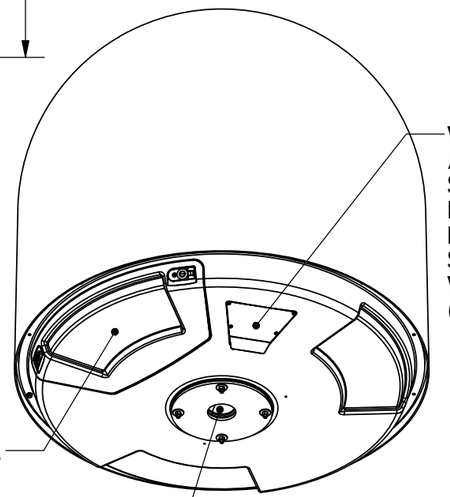
FIRST USED: SEATEL 80/100/120 WWKU | SHEET NUMBER 1 OF 1

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	11-04-14	INITIAL RELEASE.	AMN





MOUNTING SURFACE PATTERN



TYPICAL ARRANGEMENT

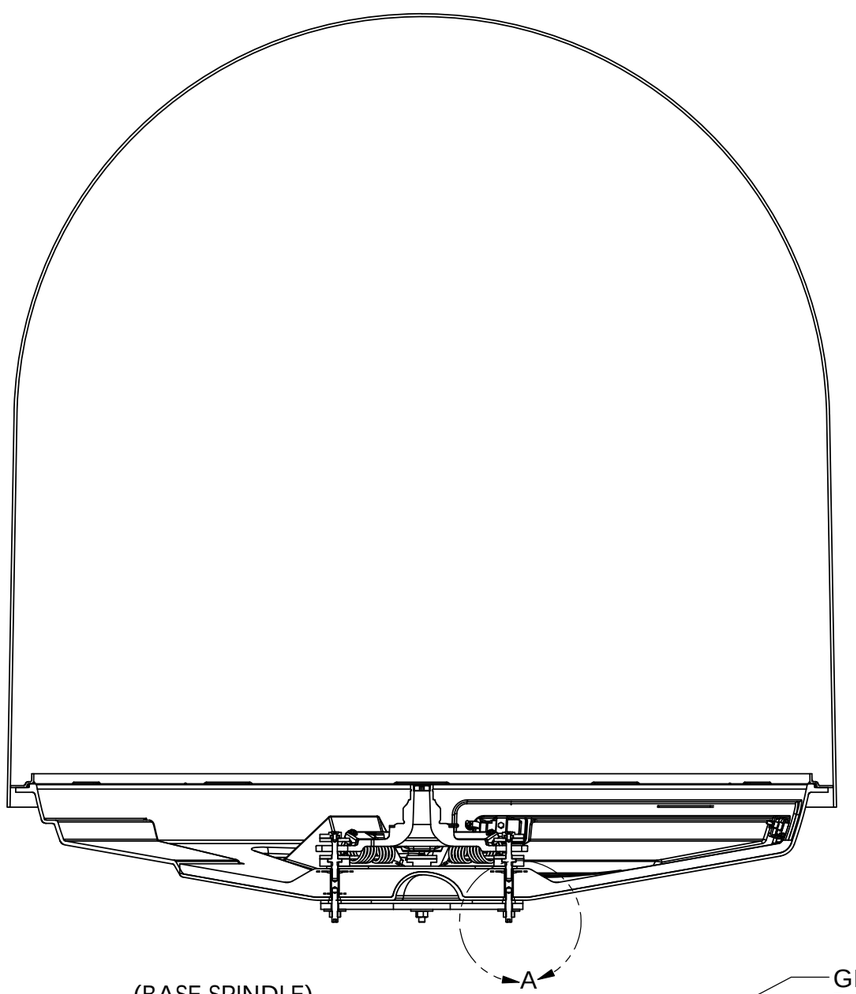
FACTORY SETTINGS/TRIM
ASSUME SYSTEM INSTALL
WITH HATCH DIRECTLY AFT.

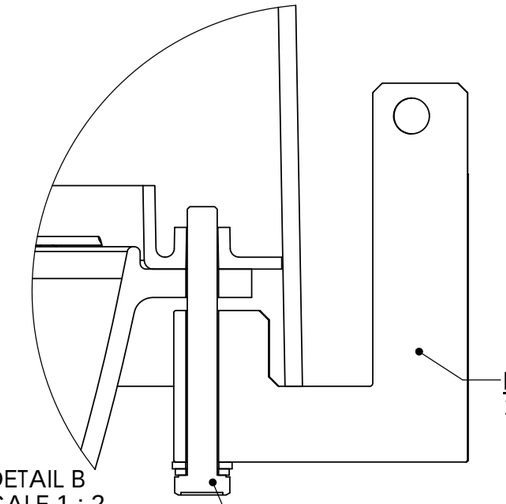
NOTES: UNLESS OTHERWISE SPECIFIED

1. INDICATED ITEMS ARE PART OF PROVIDED MOUNTING KIT.
2. APPLY ADHESIVE PER SEA TEL SPEC. 121730. LOCTITE 271 (RED) PROVIDED WITH MOUNTING KIT.
3. MINIMUM DIAMETER OF MAST/MOUNTING PLATE EQUALS RADOME BASE FOOTPRINT.
4. APPLY INSTALLATION GUIDELINES PER DOC. NO. 130040.
5. DIMENSIONS ARE GIVEN IN CENTIMETERS, [INCHES IN PARENTHESE], TOLERANCE +/- 0.5MM.
6. NO SHARP EDGES PERMITTED, ON CABLE PASSAGE CUTOUT, (TO PROTECT CABLE).
7. IF RADOME IS INSTALLED EMPTY, GENERAL ASSEMBLY BOTTOM PLATE MUST BE INSTALLED.

REFERENCE DRAWINGS
62-139001 - RADOME TOP FOR 0.8M SYSTEM
62-139068 - RADOME BOTTOM FOR 0.8M SYSTEM
140090 - RADOME ASSY FOR 1.0M SYSTEM
140705 - RADOME ASSY FOR 1.2M SYSTEM

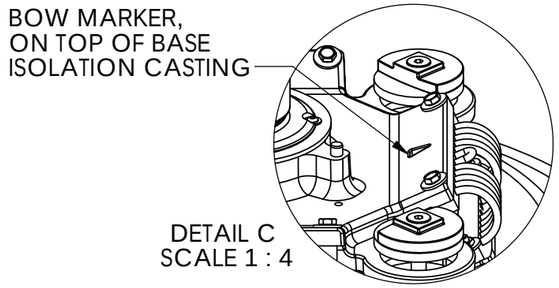
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN CENTIMETERS. X = ±.150, X.X = ±0.05, X.XX = ±0.015, ANGLES: ±.5°	DESIGNER/ENGINEER: AMN	DRAWN BY: AMN	Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986
	WEIGHT: SEE DRAWING	DRAWN DATE: 10-24-14	
INSPECTION DIMENSIONS NOTED BY (X.X) SHALL HAVE FEATURE SIZE DIMENSIONS AND ASSOCIATED GD&T TOLERANCES INSPECTED	MATERIAL: RoHS COMPLIANT	APPROVED BY:	TITLE: INSTALLATION ARRANGEMENT, SEA TEL TV
INTERPRET TOLERANCING PER ASME Y14.5 - 2009	FINISH: N/A	APPROVED DATE:	
	SURFACE ROUGHNESS:	SIZE B / SCALE: 1:16	DRAWING NUMBER 97-143895 / REV A
	3rd ANGLE PROJECTION	FIRST USED: KA TVRO	SHEET NUMBER 1 OF 5





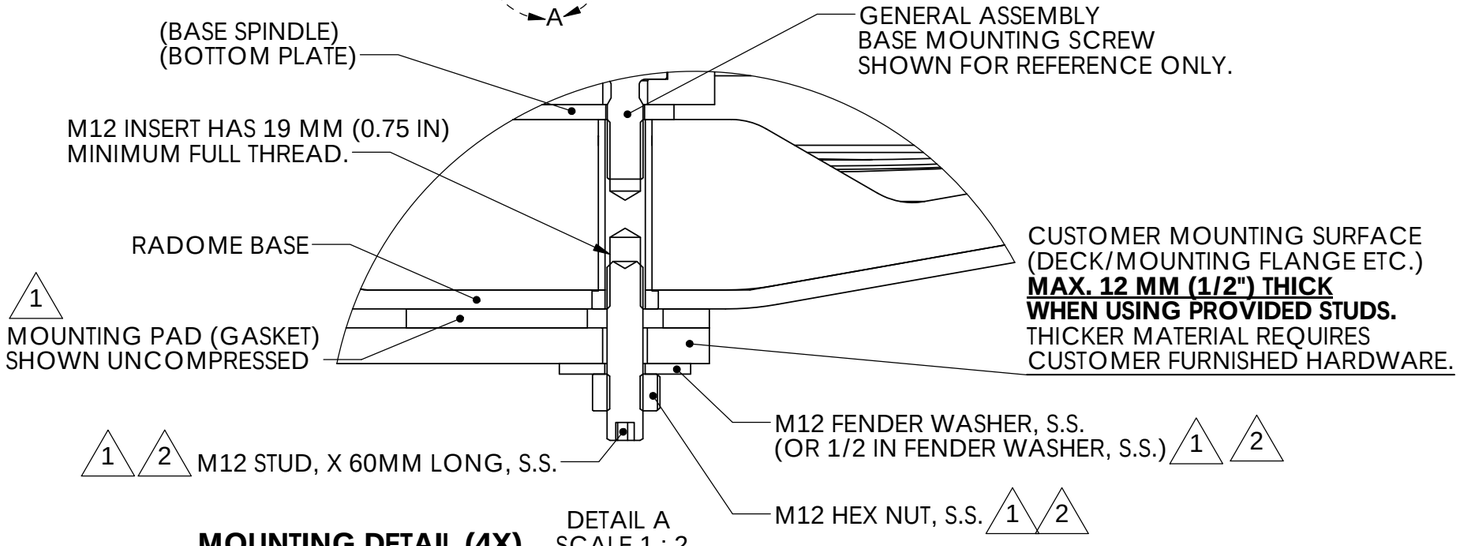
DETAIL B
SCALE 1 : 2

LIFTING DETAIL (4X)



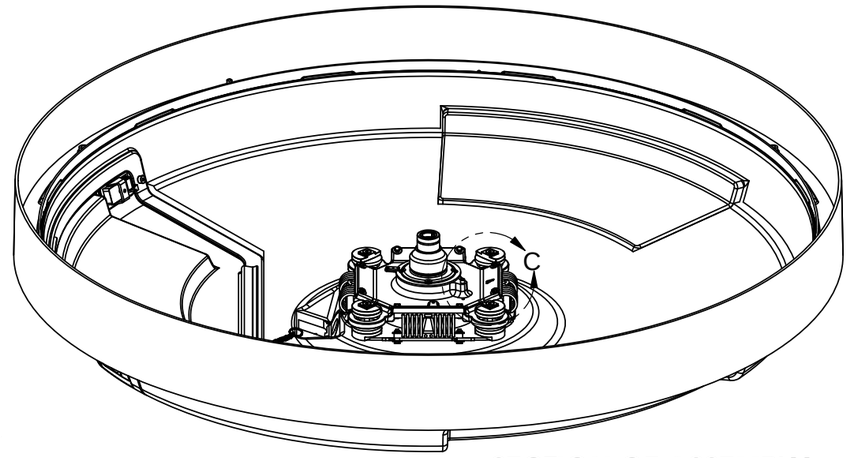
DETAIL C
SCALE 1 : 4

BOW MARKER DETAIL
(LOCATED OPPOSITE HATCH)



MOUNTING DETAIL (4X)

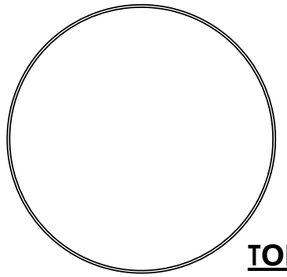
DETAIL A
SCALE 1 : 2



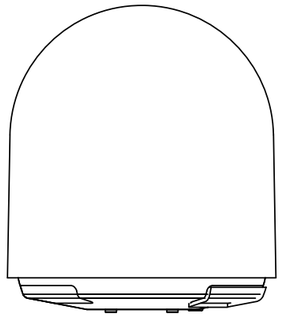
SECTION OF ASSEMBLY
SHOWN FOR REFERENCE ONLY.

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:12	97-143895	A
		SHEET NUMBER 2 OF 5	

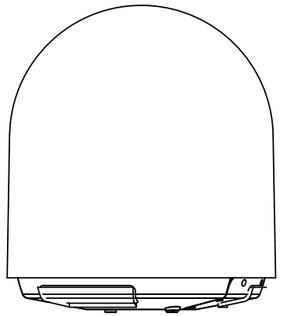
80 TV



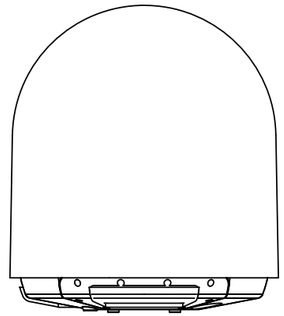
TOP VIEW



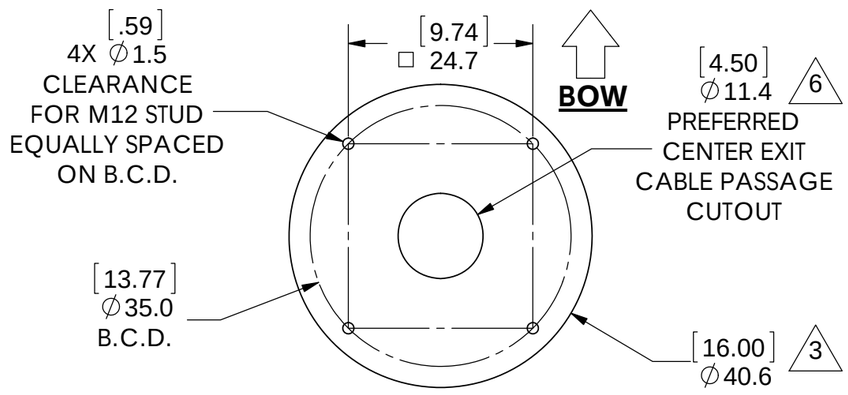
FRONT VIEW



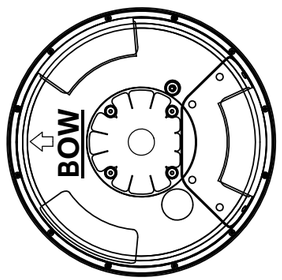
SIDE VIEW



REAR VIEW



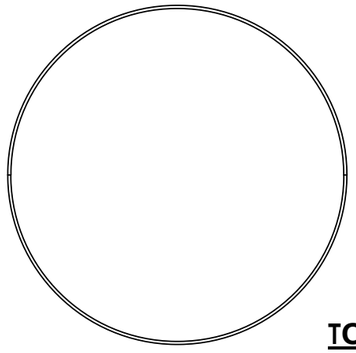
MOUNTING SURFACE PATTERN (SCALE 1:8)



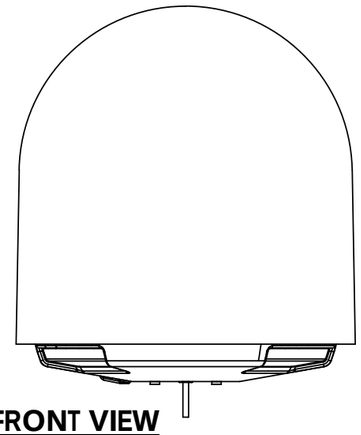
BOTTOM VIEW

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:24	97-143895	A
		SHEET NUMBER 3 OF 5	

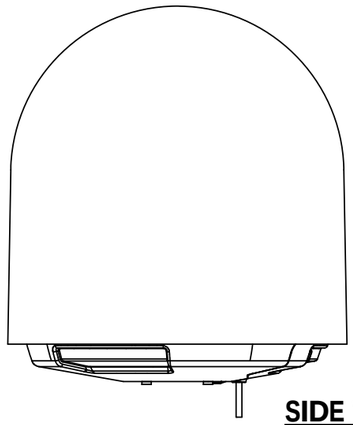
100 TV



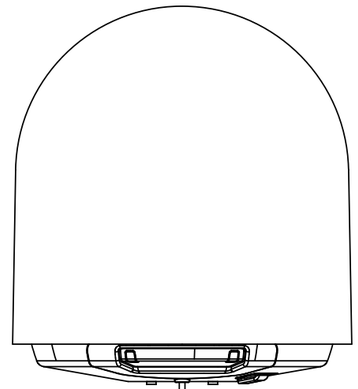
TOP VIEW



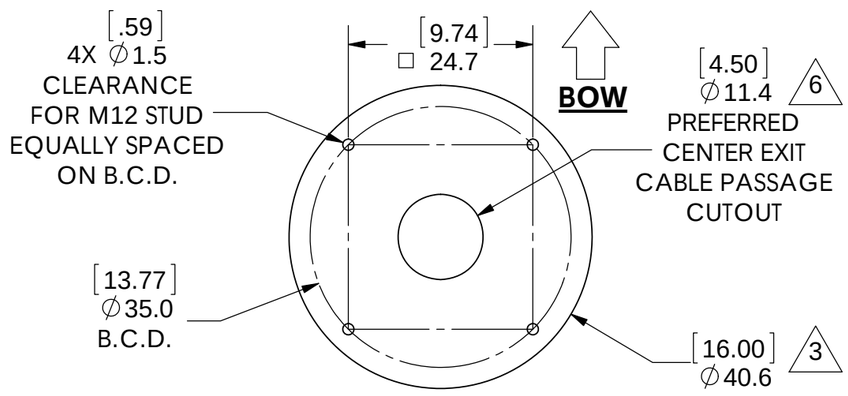
FRONT VIEW



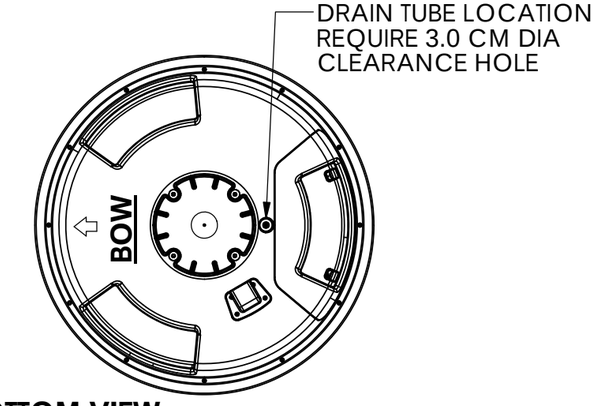
SIDE VIEW



REAR VIEW



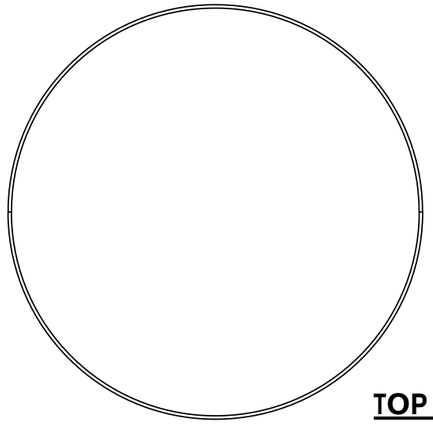
MOUNTING SURFACE PATTERN (SCALE 1:8)



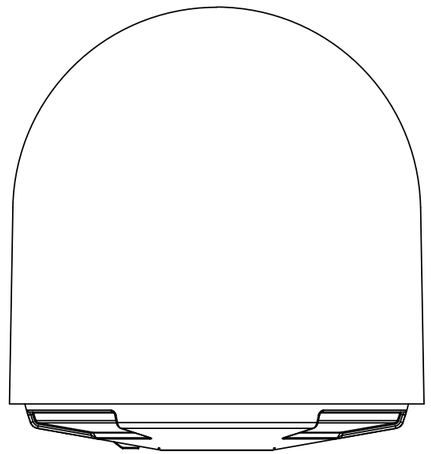
BOTTOM VIEW

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:24	97-143895	A
		SHEET NUMBER 4 OF 5	

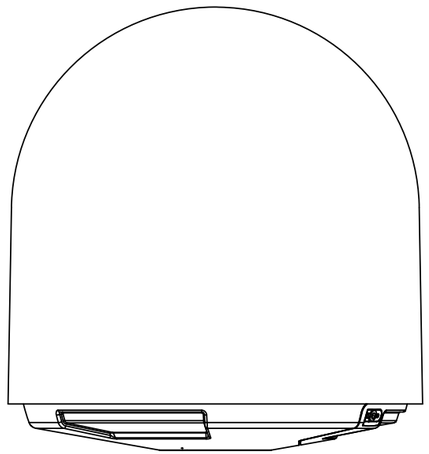
120 TV



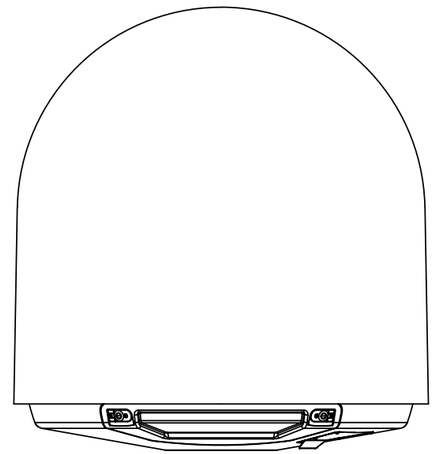
TOP VIEW



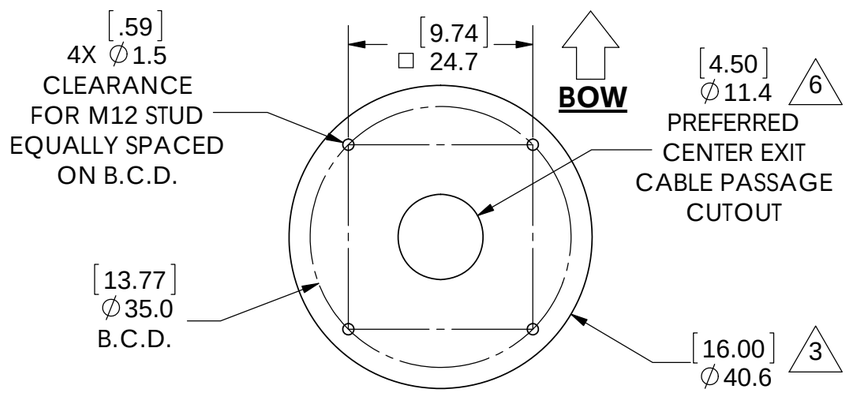
FRONT VIEW



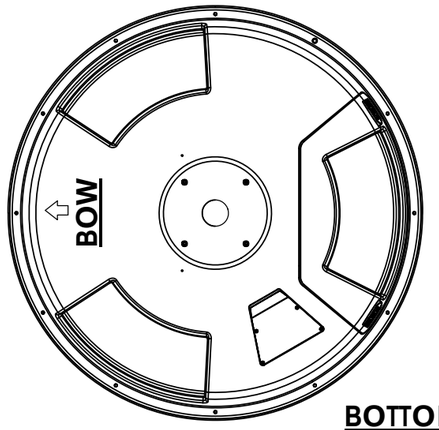
SIDE VIEW



REAR VIEW



MOUNTING SURFACE PATTERN (SCALE 1:8)



BOTTOM VIEW

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:24	97-143895	A
		SHEET NUMBER 5 OF 5	