

APPENDIX 1

PRODUCT SUPPORT MANUAL ACR Y1-03-0180



PRODUCT SUPPORT MANUAL

Y1-03-0180
Rev. T1



ThunderBird S.S.A.S.

Ship Security Alert System
FCC Type Accepted Pending

Model No. RLB-33S

Product No. 2800

Owner _____

Vessel _____

Radio Call Sign _____

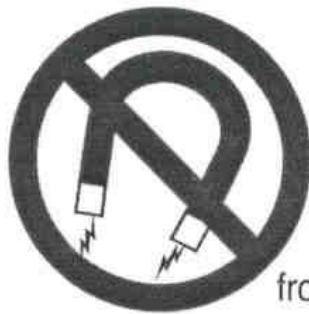
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_____ A **Chelton Group** company _____

***** WARNING *****

**THIS BEACON IS AUTHORIZED FOR USE
ONLY DURING SITUATIONS WHERE THE SECURITY OF YOUR
VESSEL IS UNDER THREAT OR HAS BEEN COMPROMISED AND
POLICE ACTION IS REQUIRED**

**DELIBERATE MISUSE MAY
INCUR A SEVERE PENALTY**



**Magnet
safe distance
1 m (3.3 ft)**

Keep this container
a safe distance away
from all magnetic sources.
A1-20-1083



**Stereo Speaker
safe distance
1 m (3.3 ft)**

Keep this container
a safe distance away
from all stereo speakers.
A1-20-1084

Forward

Congratulations and thank you for purchasing the ACR **ThunderBird 406 MHz Ship Security Alert System. (S.S.A.S.)** The combination of superior design, high quality raw materials and quality controlled manufacturing produce a product that will perform for years to come. The Test Facility at ACR can reproduce some of the harshest environmental conditions known to man. This assures that the products we design and manufacture can stand up to the rigors found in a marine environment. With proper care and maintenance, your S.S.A.S will be in service for years to come.

ACR is proud to be certified to the ISO 9001:2000, the International Standard for Quality.

This manual provides installation, operation and maintenance instructions for the **ThunderBird 406 MHz S.S.A.S.**, hereinafter referred to as the Beacon. This manual also describes the characteristics and details of the Beacon System. The FCC authorizes the use of 406 MHz Radio Beacon by any ship that is also equipped with a VHF Ship Station. This will make the 406 MHz Radio Beacon available for use on most U.S. ships and boats.

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SECTION 1 - REGISTRATION OF 406 MHZ BEACONS

1.1 Registration Importance

It is imperative that the owner of this 406 MHz Beacon registers it with the National Authorities*. All 406 MHz Beacons transmit a Unique Identifier Number (UIN) when activated. This UIN is programmed in the Beacon based on the country in which the Beacon was purchased. Registration provides the security forces with up to date emergency contact information, which will speed up the launch of a rescue operation. The National Authorities use the information to verify if an actual emergency exists. Valuable resources are wasted every year responding to false alarms. For Beacons that are not registered, the National Authorities will not know who you are, what type of vessel you have, your homeport, or who has a copy of your float plan. This will delay the launch of a rescue operation.

* National Authority is the governmental body that is responsible for S.S.A.S Registration Database administration for the country the S.S.A.S is programmed for.

1.2 Where to register

The owner of a 406 MHz Beacon (S.S.A.S) should register it with the National Authority of the vessels flagged state, regardless of where they operate. Each Beacon is programmed with a UIN for the country that the unit is shipped to, and will only be accepted for registration in that country. To verify the country, for which a Beacon is programmed, see the label with the UIN on the side of the unit. Units that do not have a country specified on the UIN label are programmed for the United States. Beacons purchased outside the flagged state of the vessel can be reprogrammed by a properly equipped distributor for registration.

1.3 Registration in the United States

It is the Owner's responsibility to Register 406 MHz Beacons that are programmed for and purchased in the United States. The National Authority that accepts registrations in the United States is the National Oceanic and Atmospheric Administration (NOAA). The owner should complete the enclosed registration form (Do not confuse this with the ACR Electronics Warranty Card) and mail with the pre-addressed; postage paid envelope to:

SARSAT Beacon Registration,
E/SP3, RM 3320, FB-4
NOAA/NESDIS
5200 Auth Rd.
Suitland, MD 20746-4304

Online registration is now available. Please visit - www.beaconregistration.noaa.gov

The information provided on the Registration Form is used only for rescue purposes. The Registration Form should be filled out and mailed immediately. Registration can be expedited by registering online or by faxing the registration form to Fax # (301) 568-8649. Registrations should be faxed in the event the Beacon is to be placed in immediate service and followed up with the mailing of the hard copy form.

All registration forms will be entered in the 406 MHz Beacon Registration Database within 48 hours of receipt. A confirmation letter, a copy of the actual registration and a proof-of-registration decal will be mailed to you within two weeks. When you receive these documents, please check the information carefully and affix the decal to your beacon in the area marked “Beacon Decal here”. If you do not receive confirmation back from NOAA, Please call toll free 1-888-212-7283 for assistance.

1.3.1 Commercial Vessels in the United States

In the United States, commercial vessels that are required to have a Radio Station License are required to modify that license when an S.S.A.S is added to the vessel. Please use the enclosed FCC FORM 506 to modify your Radio Station License. For information on whether you need a Radio Station License, call toll free 1-888-CALLFCC (225-5322)

1.4 Registration Outside of the United States

In countries other than the United States, the sales agent should assist in filling out the forms and sending to that country’s National Authority at the time of purchase. To verify that the unit is properly programmed for that country, view the UIN label on the side of the unit. In the event that the Beacon is not programmed for the country it has been purchased in, the sales agent, (if properly equipped) can reprogram the unit for that country.

1.5 Change of ownership or contact information

It is the owner’s responsibility to advise the National Authority of any change in the information on the registration form. If the current owner of the Beacon is transferring the Beacon to a new owner, the current owner is required to inform the National Authority by Letter, Fax or telephone, of the name and address of the new owner. The new owner of the Beacon is required to provide the National Authority with all of the information requested on the Registration form. This obligation transfers to all subsequent owners. In the United States registration forms are available from NOAA. Call 1 (888) 212-7283 or visit www.beaconregistration.noaa.gov

1.6 Commercial Vessels World Wide

406 MHz Beacons that are carried on commercial vessels world wide, should be registered with the country where the vessel is flagged regardless of where the vessel operates. When a commercial vessel acquires a 406 MHz Beacon from outside of its home country; the Beacon should be reprogrammed for the home country and registered there.

SECTION 2 - FALSE ALARMS

2.1 Prevention of false alarms.

An ACR 406 MHz S.S.A.S can be activated by two different methods.

1. With the beacon switch in the ready position and depressing one of the buttons of the remote activation points, or
2. With the beacon switch in the ready position and shorting the two wire leads from the beacon.

There are a few precautions that should be taken to prevent false alarms.

Do not transport Beacon within 1 meter (3.3ft) of a magnetic source.

Do not mount Beacon within 1 meter (3.3ft) of a magnetic source.

Do not mount remote switches where they can be confused with another switch.

Do not mount beacon where it can get wet.

Do not clean beacon with any liquid.

2.2 Reporting of false alarms

Should there be, for any reason, an inadvertent activation or false alarm, it must be reported to the National Authority of your vessels flagged state. The information that should be reported includes the S.S.A.S Unique Identifier Number (UIN), Date, Time, duration and cause of activation, as well as location of beacon at the time of activation.

2.2.1 To report false alarms in the United States contact any of the following:

Atlantic Ocean / Gulf of Mexico
USCG Atlantic Area Command Center
Tel: (757) 398-6390

Pacific Ocean Area \ USCG Atlantic Area Command Center
Tel: (510) 437-3700
From Any Location

USCG HQ Command Center
Tel (800) 323-7233

2.2.2 To report false alarms worldwide contact your national authority.

SECTION 3 - INSTALLATION

3.1 Beacon Installation

3.1.1 General Information

The **ThunderBird S.S.A.S.** is shipped attached to its mounting bracket. Typically, the beacon must be removed from the mounting bracket during installation. The beacon can be removed from the mounting bracket as follows:

- First disconnect the 2-Pin waterproof connector on the left side of the beacon.
- Unbuckle the strap holding the beacon to the bracket.

The **ThunderBird S.S.A.S.** is intended to covertly transmit a security alert notifying competent authorities that the security of the vessel is under threat or has been compromised. A key component of the system is its covert nature, which should be maintained as much as possible to protect the beacon from malicious tampering.

The **ThunderBird S.S.A.S.** is shipped in the “OFF” position. During the installation procedure, leave the beacon in the “OFF” position to prevent false alarms.

3.1.2 Mounting Location

The location selected must be sufficiently rigid to support the weight of the total installation and at the same time consider vibration, exposure to surrounding hazards, such as equipment movement, doors being opened, personnel traffic, etc.

Also to be considered in selecting a location for installation is the harmful effect that certain corrosive vapors might have on the beacon. Under no circumstances should a location be selected for installation where the beacon would be jeopardized by any foreign articles being temporarily or permanently positioned during “at sea” or “in port” activities.

Do not mount or store the beacon within 1 meter (3.3 ft) of strong magnetic (such as loud speakers) or electrical (such as radar or high power radio transmitter) fields. The beacon should not be mounted closer than 1 meter (3.3 ft) to a navigation compass.

In order to maintain the required covert operation, the **ThunderBird S.S.A.S.** mounting location should be hidden from the view of most personnel and all passengers and guests. Suitable locations include inside an equipment closet or cabinet, under the navigation bridge and inside a closed equipment rack.

The bracket can be mounted in any orientation; however, the beacon controls and system connections were designed for vertical installation. When selecting a mounting location the following should be carefully considered:

- Routing of switch wires/cables. (Connects to top of mounting bracket.)
- Routing of RG-8U coaxial antenna cable. (Connects to top of beacon.)
- Routing of GPS interface cable. (Connects to top left part of beacon.)
- Accessibility to beacon control switch. (Top right part of beacon.)
- Visibility of Test and Xmit LED's. (Top left part of beacon.)

3.1.3 Bracket Mounting

For flat surface mounting, three Stainless Steel Pan head fasteners are included. Alternatively, size (3/16) bolts can be used. (*Not Supplied*)

For Rail mounting, one Stainless Steel Hose clamp (*Not Supplied*) is required. The size of the hose clamps depends on the diameter of the rail. The rail can be horizontal or vertical. It is recommended that the mounting point should be near a cross section on rails to prevent the bracket from spinning. Position the V rail adapter between the rail and bracket. Hose clamp should be fed through slots in bracket and around the rail. Tighten clamp securely.

3.1.4 Installing the Beacon in the Bracket

The mounting bracket is keyed to prevent the beacon from being installed backwards. Install the **ThunderBird S.S.A.S.** with the front label facing out. The strap should be tightened to secure the beacon snugly in the bracket. Connect the 2-Pin waterproof connector on the left side of the beacon.

3.1.5 Connecting the Beacon to a GPS Receiver via the Optical Interface (IR Transmitter)

Your Beacon comes with a NMEA GPS Optical Interface cable (transmitter plug with lead wires) that should be connected to the ship's GPS system. The IR transmitter plug attaches to your Beacon, via the keyed blue bezel on the top left of the beacon. The cable can be routed through the hole in the upper left corner of bracket. The lead wires attach to the ship's GPS system via the NMEA 0183 connector from your GPS receiver. The black lead wire with white stripes should be connected to the positive transmitter pin (Data Out). The black wire should be connected to the negative pin (Ground).

NOTE: The baud rate output for your GPS receiver NMEA 0183 should be 4800 bps. Consult your GPS manufacturer for correct installation.

3.2 Activation Switch Installation

3.2.1 General Information

S.S.A.S. beacons are required to have at least two remote activation points, one of which is on the navigation bridge. Two switches are supplied with the **ThunderBird S.S.A.S.** Contact the factory if additional switches are required.

The switches are required to be protected from inadvertent activation and activate only with two independent mechanical actions. These requirements are satisfied by the spring-loaded switch guard attached to the switch when shipped. The switches must be installed with the guard in place.

3.2.2 Switch Location

The switches are designed to be installed through a hole in a panel and require approximately 1" by 1" clearance on both the front and the back. The recommended panel thickness is 0.039" to 0.106".

There are some additional factors that should be considered when selecting the switch locations. A primary consideration is installing the switches per RTCM requirements: one on the navigation bridge and one elsewhere. The switches should also be installed in location that will not draw unnecessary attention to it, yet be easy to access. The switches should not be installed in a location where they might be confused with another switch. Lastly, the wiring routing may also be considered.

3.2.3 Recommended Wire/Cable

ACR recommends using stranded, tinned wire between 16 to 22 AWG to connect between the remote activation switches and the beacon mounting bracket. Stranded wire is recommended to better withstand the effects of vibration. Tinned wire is more resistant to corrosion. The recommended wire gauge is a compromise between weight and strength. ACR provides crimp-on terminal lugs for 16 to 22 AWG wire for the connection to the mounting bracket. Other lugs (*Not provided*) can be used for different gauge wire.

Because two wires are required connecting the switch to the mounting bracket, a two conductor cable is ideal. This will make routing the wire easier and may provide additional strength.

3.2.4 Switch Installation

Cut a 0.638" x 0.638" (16.2 mm x 16.2 mm) square hole in the selected panel. The recommended panel thickness is 0.039" to 0.106" (1.0 mm to 3.2 mm).

Connect the wires to the back of the switch; one wire to "COM" terminal and the other to "N.O." terminal. There should be no connection to the "N.C." terminal. The wires should be soldered to the switch terminals. Once the connections are made, make sure the spring-loaded switch guard is securely attached to the switch and press the switch assembly into the panel hole. The switch will snap into place.

3.2.5 Connection to Mounting Bracket

Route the switch wire/cables from the switch locations to the **ThunderBird S.S.A.S.** beacon mounting bracket. Care should be taken to route and secure the wire/cables properly. The wires/cables should then be trimmed to the appropriate length.

If using the recommended 16 to 22 AWG wire, crimp the terminal lugs (provided) onto the wires. If other wire is used, appropriate lugs (*Not provided*) can be used. Alternatively, the wire can be connected directly to the terminal block on the mounting bracket. Connect one wire from each switch to one of the two terminals on the top of the mounting bracket by placing the lug under the screw and tightening the screw. Repeat with the other wire from each switch in the other terminal.

3.2.6 Switch Installation Verification

To verify proper installation of the switches, the following procedure should be followed (requires two persons, preferably with 2-way radio communications):

- Disconnect the beacon cable from the mounting bracket cable (2-pin waterproof connector on the left side of the beacon), leaving the beacon in the mounting bracket.
- With a multi-meter, measure the resistance between the two pins on the mounting bracket connector. This should be an open. If not, check the switch wire connections to make sure the two wires from each switch are connected to different screws on the mounting bracket terminal block.
- Depress each switch (one at a time) while measuring the resistance between the two pins on the mounting bracket connector. The resistance should momentarily (as long as the switch is depressed) read a short. If the resistance never reads a short, verify all connections are per 3.2.4 and 3.2.5 above.

3.3 Cross Dipole Antenna Installation

3.3.1 General Information

The cross dipole antenna is intended for operation far away from a ground plane. With this in mind, the location of installation should be carefully selected to keep the antenna as far from horizontal conductive (metallic) planes as possible.

The length of cable from the SSAS beacon to the cross dipole should be kept as short as possible.

If the supplied bracket is not ideal for the desired mounting location, the cross dipole has a standard female 1" x 14 thread allowing it to be mounted to a variety of off-the-shelf brackets and masts (*Not provided*).

3.3.2 Mounting Guidelines

- Minimum height above deck: 10 feet
- Allowable obstructions: Obstructions are allowable only below the antenna. There should be no conductive (metallic) objects in the entire hemisphere above the antenna.
- 100 feet (30.48 m) of RG-8U coaxial cable is supplied with each **ThunderBird S.S.A.S.** Appropriate connectors are also supplied. Contact the factory if longer runs or different coaxial cable is required.

3.3.3 Antenna Assembly

The antenna is shipped with the four elements removed from the housing. Before using the antenna, these elements must be assembled to the antenna housing.

For each element, assemble as follows:

- Slide the element into a hole in the side of the housing until it stops
- Tighten appropriate set screw through hole in the bottom housing using included wrench

3.3.4 Antenna Installation

Select mounting location using guidelines and general information above. The top of a mast is an ideal location for the cross dipole. Mounting to an existing spar or to a bracket attached to a mast is also acceptable. See Figure 7 for examples. The antenna must be mounted with the connector pointing down and the elements horizontal. If mounting on a spar or bracket, the antenna elements must be oriented approximately 45° to the horizontal support when looking from the top or bottom, as shown in Figure 7.

Use one of the following methods to mount the antenna per the guidelines and general information above with all four elements in the horizontal plane:

- The included mount can be used to attach to any small, flat, horizontal surface; i.e. the top of a mast or a spar. In this case drill holes in the pattern of the mount and attach with screws as needed.
- The included mount can be used to attach the antenna to a round spar using U-bolts.
- The antenna can be mounted to any bracket or mast with the standard 1" x 14 thread.

3.3.5 Connection to Beacon

Attach male TNC connector (supplied) to coax cable per included instructions. Connect to mating female TNC connector on antenna.

Route cable to SSAS beacon as needed, making sure to adequately secure the cable. Provide a drip loop in the cable near the beacon to prevent water from running directly on to the beacon.

Attach male SMA connector (supplied) to coax cable per included instructions. Connect to mating female SMA connector on the beacon.

SECTION 4 - OPERATION

4.1 General

- 4.1.1 The **ThunderBird S.S.A.S.** Beacon is designed to be manually activated while installed in the mounting bracket. In fact, the **ThunderBird S.S.A.S.** beacon can only be activated manually.
- 4.1.2 The following two conditions must be satisfied to activate the **ThunderBird S.S.A.S.:**
 - 1) The switch on the beacon must be placed in the “READY” position.
 - 2) One of the remote activation switches must be depressed.
- 4.1.3 The **ThunderBird S.S.A.S.** is designed to allow the user to perform periodic testing while S.S.A.S is in the mounting bracket to assure a functioning beacon.

4.2 Controls

- 4.2.1 Thumb Switch: The thumb switch on the top left part of the beacon controls the mode of operation of the **ThunderBird S.S.A.S.** There are three switch positions:
 - 1) Off: Down to the front, indicated by “O”
 - 2) Self-Test: Vertical
 - 3) Ready: Down to the back, indicated by “|”
- 4.2.2 Remote Activation Switches: These are momentary switches installed on the ship that are used to activate the beacon when placed in READY mode. To activate, lift the spring-loaded guard and press the button.

4.3 Indicators

- 4.3.1 LED's: There are two LED indicators located on the top right part of the beacon:
 - 1) TEST LED: Green
 - 2) XMIT LED: Red
- 4.3.2 Buzzer: There is an internal buzzer in the **ThunderBird S.S.A.S.** The buzzer beeps during the Self-Test.
- 4.3.3 There are no indicators of beacon's mode of operation at the remote activation points.
- 4.3.4 There is no audio indication of transmission mode.

4.4 Modes of Operation

- 4.4.1 OFF Mode: The **ThunderBird S.S.A.S.** can not be activated when in OFF mode. The beacon is in OFF mode whenever the thumb switch is in the “Off” position (down to the front) as indicated by the “O” symbol displayed on the thumb switch.

- 4.4.2 READY Mode: The **ThunderBird S.S.A.S.** is capable of being activated when in READY mode. The beacon is in READY mode whenever the thumb switch is in the “Ready” position (down to the back) as indicated by the “|” symbol displayed on the thumb switch.
- 4.4.3 ON Mode: The **ThunderBird S.S.A.S.** is activated and is transmitting bursts of data when in ON mode. The beacon is in ON mode when one of the remote switches are depressed while the beacon is in READY mode. ON mode is indicated by a flashing red XMIT LED.
- 4.4.4 SELF-TEST Mode: The **ThunderBird S.S.A.S.** is in SELF-TEST mode while it is performing the self-test. The beacon goes into SELF-TEST mode when the thumb switch is held in the Self-Test position (vertical) for at least 1 second. SELF-TEST mode is indicated by a series of flashing green TEST LED and red XMIT LED’s and beeps as detailed in section 4.7.

4.5 Activation

- 4.5.1 The **ThunderBird S.S.A.S.** can be manually activated by first placing the beacon in READY mode. This is done by lifting the thumb switch to a vertical position, sliding it to the left and pushing it down to the back side of the S.S.A.S. READY mode is indicated by the “|” symbol displayed on the thumb switch.
- 4.5.2 Once in READY mode, the **ThunderBird S.S.A.S.** is activated by depressing one of the remote activation switches. At the remote activation locations, there is no indication that the beacon is activated. This is intentional to ensure covert operation. The flashing red XMIT LED on the beacon indicates it’s activated.
- 4.5.3 The **ThunderBird S.S.A.S.** should only be activated when the ships security has been threatened or compromised. However, applicable personnel must be familiar with its operation so the beacon can be activated when needed.

4.6 Deactivation

- 4.6.1 The **ThunderBird S.S.A.S.** can be deactivated by returning the thumb switch to the “OFF” position.
- 4.6.2 If the beacon continues to operate after it has been deactivated, remove the four screws holding the unit together and unplug the battery to disable the unit. Return it to a Service Center for repair.

4.7 Full Functional Self Test

Please read all instructions before performing any of the tests. Be prepared to record data from the test.

- 4.7.1 The **ThunderBird S.S.A.S.** can be tested in or out of the release bracket. A Self Test is initiated by lifting the thumb switch to a vertical position and holding it in this position for at least one second. The initiation of the test is indicated by the simultaneous and brief lighting of the green and red LED's.

The sequence of tests is:

1. Check Data IntegrityBeep and lights up LEDs if passed

-Stop if failed
- 2. Check 406 MHz SynthesizerBeep and lights up LEDs if passed
.....Stop if failed
- 3. Check RF Power/BatteryBeep and lights up LEDs if passed
.....Stop if failed
- 4. Turn on green LED to indicate Successful Test.

If all of the above occurs, the test has been successful.

- 4.7.2 It is strongly recommended to test the **ThunderBird S.S.A.S.** on a Monthly basis.

4.8 External GPS Interface

- 4.8.1 Using the GPS Interface: Once a compatible operating GPS receiver (Figure 4) is connected to the Beacon, the beacon will store data for incorporation into the emergency message, which is transmitted to the satellite. This can provide more accurate positioning data to the National Authority and may lead to faster response. Since the last valid GPS position data is always kept in the memory of the Beacon, the user should take care to make sure that the GPS position data stored is accurate. This can be accomplished by two methods: First, by always leaving a properly functioning GPS connected to the Beacon before activation. Second, by connecting a properly functioning GPS with a valid position fix to the Beacon and allowing sufficient time for the Beacon to acquire valid position data from the GPS. This will take a nominal 20 minutes if old GPS position data is stored in the Beacon's memory. If there is no old GPS position data present, the Beacon will acquire current data within a minute of being connected to a GPS with a valid position fix. You can force the Beacon to update its position at any time by initiating the Beacon's Self-Test, see 4.8.2 and 4.8.3. If valid GPS position data is not available, it is preferable to reset the Beacon with the beacon's default message (See Section 4.8.4).
- 4.8.2 Testing the GPS Interface: Connect the Optical Interface Plug to the Beacon bezel and allow sufficient time for the GPS receiver to acquire valid GPS position data (usually less than 1 minute; but it can take up to 30 minutes). Lift the thumb switch to the vertical (Self-Test) position and release. Your Beacon will confirm that it has acquired valid GPS data by emitting a beep along with a flash of the red and green LED's. This will occur approximately 2.5 seconds after the Self-Test.
- 4.8.3 Updating GPS Position data: When the beacon is properly connected to a functioning and compatible GPS receiver, GPS position data is automatically updated about every 20 minutes, while valid GPS position data is present. The operator can force the acquisition of new GPS position data, by executing Self-Test of the beacon. This bypasses the normal, programmed, waiting time of 20 minutes for the automatic update of GPS position data. Once the beacon has completed the Self-Test sequence by emitting the beep and flash of red and green LEDs, as described in 4.8.2, the Beacon will request and acquire new position data from the GPS. This can take a nominal 15 seconds or up to one minute.

NOTE: When the beacon is not activated, GPS position data will be received and stored by the Beacon **(No GPS position data updates will occur while the beacon is activated).**

- 4.8.4 Position data set to default: A new ThunderBird is programmed with the GPS position data set to "default". This "default" GPS position data indicates, upon activation, to the satellite system that the beacon has no valid GPS position stored in memory. Once a functioning and compatible GPS

receiver is properly connected to the beacon, this “default” data will be replaced by valid GPS position data, as described in the previous sections.

Position data will be reset to default by activating the beacon (by placing the thumb switch in the ready position and then pressing one of the remote activation points) and then turning the beacon off by returning the thumb switch to the off position. Once the beacon is in ON mode, it must be turned OFF within approximately 50 seconds to prevent transmission of a live burst. Because the activation points must be remote from the beacon, it is recommended that two people with 2-Way radios perform this procedure to prevent false alarms.

NOTE: THIS BEACON IS AUTHORIZED FOR USE ONLY DURING SITUATIONS WHERE THE SECURITY OF YOUR VESSEL IS UNDER THREAT OR HAS BEEN COMPROMISED AND POLICE ACTION IS REQUIRED.

ALSO NOTE: The action of turning the beacon ON and then OFF clears any stored GPS position data.

SECTION 5 - CARE AND MAINTENANCE

- 5.1 At least every ninety days, the mounting bracket and **ThunderBird S.S.A.S.** should be inspected for deterioration and/or buildup that may affect the function of the beacon or its mounting.

Also carefully inspect the S.S.A.S case for any visible cracks. Cracks may admit moisture, which could falsely activate the beacon or otherwise cause a malfunction. Any cracking observed should be immediately referred to ACR for evaluation, (1-800-432-0227 Ext. 112)

- 5.2 Clean the beacon and the mounting bracket to remove residue buildups. It is recommended that the mounting bracket be wiped with a damp cloth.
- 5.3 Check coaxial connector on cable from the antenna for tightness.
- 5.4 The battery (P/N 1096) must be replaced by the date indicated on the beacon. At each inspection, check the time remaining until replacement is required. Battery should be replaced if the beacon has been activated for any use other than the self test.

NOTE: There are no user serviceable items inside the S.S.A.S. DO NOT OPEN THE S.S.A.S UNLESS TO DISABLE IN CASE OF FAULTY ACTIVATION.

Self contained long life batteries with a five-year recommended replacement cycle provide power. *See Factory Authorized Service Center for replacement.*

Battery replacement includes servicing the S.S.A.S by replacing all o-rings, testing the water seal and the electrical properties.

Always refer all long life battery replacement and other S.S.A.S service to a factory authorized service center.

For the nearest location of a factory authorized service center, call 1-800-432-0227 Ext. 112 (toll free) or visit our website at www.acrelectronics.com

- 5.5 The **ThunderBird S.S.A.S.** contains lithium batteries which meet the requirements of the DOT Hazardous Materials Regulations. They also meet the United Nations Classification of Lithium Batteries for Shipment as "Non – Dangerous Goods".

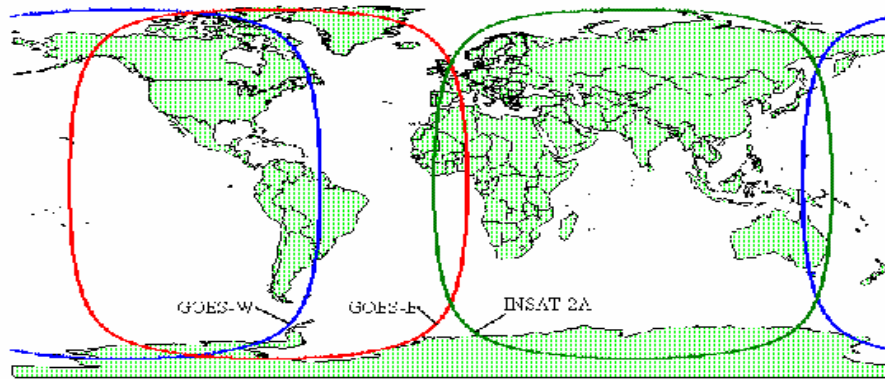
SECTION 6 – THE COSPAS-SARSAT SYSTEM

- 6.1.1 The **ThunderBird S.S.A.S.** Beacon provides security alerting via radio transmission on 406 MHz to satellites of the COSPAS-SARSAT network. The beacon can also transmit a distress alert to the GEOSAR network that includes GPS latitude and longitude coordinates that are inputted through an I/R Interface that connects to the data output of a GPS Receiver.
- 6.1.2 The message transmitted by the **ThunderBird S.S.A.S.** is unique for each S.S.A.S, which provides identification of the transmitter through computer access of registration files maintained by the National Oceanic and Atmospheric Administration or other national authority. **It is the user's responsibility to fill out and mail the enclosed registration form to the appropriate agency of the country under which the vessel is registered.** US flagged vessels send the enclosed NOAA/NESDIS form to NOAA in the stamped envelope provided. For vessels registered in other countries, the beacon must be reprogrammed by an ACR authorized programming facility for the registered country. Remember, if your S.S.A.S is not registered, security Authorities do not know who you are, what type of vessel, your homeport, or where to contact anyone who might know anything about your situation.
- 6.1.3 Once the beacon's signal (406 MHz) is relayed through the COSPAS-SARSAT and/or GEOSAR network and security forces are alerted, they can converge on the GPS navigation position or the position estimated by the satellite. When the GPS interface is used with a properly functioning GPS system, security authorities can know your precise location immediately and speed up reaction time.
- 6.1.4 The **ThunderBird S.S.A.S.** can be activated by lifting the thumb switch to a vertical position, sliding it toward the antenna and pushing back down to the opposite side of the S.S.A.S. to place it in READY mode. Once in READY mode, pressing any one of the remote activation points activated the beacon.
- 6.1.5 Self contained long life batteries with a five-year recommended replacement cycle provide power. *See Factory Authorized Service Center for replacement (Section 5 – Care and Maintenance).*
- 6.1.6 Self-test is initiated by momentarily lifting the thumb switch to a vertical position and holding it in this position for at least one second. The simultaneous lighting of the green and red LED's indicate the initiation of the test. The buzzer will beep three times as both the red and green LED's light simultaneously. The green LED will then light, followed by a flash of the strobe, indicating a successful test. During self-test, an actual satellite message is transmitted while certain key performance parameters are measured and recorded. The self-test message is modified to prevent the satellite from forwarding an alert message during self-test.
- 6.1.7 Following self test, the **ThunderBird S.S.A.S.** (if GPS data has been acquired), will beep and simultaneously light the green and red LED's, to indicate GPS data has been stored in the Beacon. This GPS data would be included in the transmitted message if the Beacon were to be activated. (See Section 4.5)

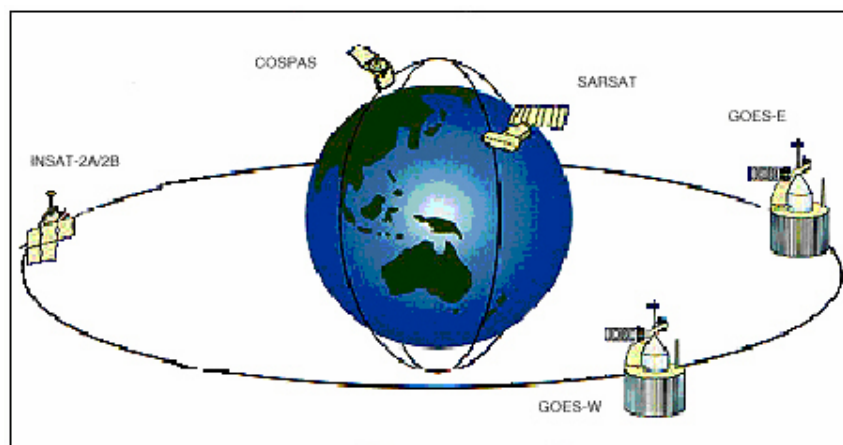
6.2 Satellite Detection

- 6.2.1 The **ThunderBird S.S.A.S.** transmits an encoded phase modulated radio signal to the satellite portion of the COSPAS-SARSAT System. The system was developed and implemented by the COSPAS-SARSAT Partners (Russian Federation, Canada, France and the United States).
- 6.2.2 COSPAS-SARSAT is an international system that uses Russian Federation and United States low altitude, near-polar orbiting satellites that assist in detecting and locating activated 406 MHz beacon signals. The Russian Federation provides aboard COSMOS navigation spacecraft COSPAS payloads that are inter-operable with the SARSAT System. In addition to weather and environmental sensors, SARSAT payloads, provided by Canada and France, are carried aboard the United States National Oceanic and Atmospheric Administration's (NOAA's) Advanced TIROS environmental satellites. (See Figure 1: Satellite Coverage)
- 6.2.3 COSPAS and SARSAT satellites receive distress signals from satellite beacons transmitting on the frequencies of 406.025 and 406.028 MHz. The COSPAS-SARSAT 406 MHz satellite S.S.A.S signal consists of a transmission of non-modulated carrier followed by a digital message format that provides identification data. The 406 MHz system uses spacecraft-borne equipment to measure and store the Doppler-shifted frequency along with the satellite S.S.A.S digital data message and time of measurement. This information is transmitted in real time to an earth station called the Local User Terminal (LUT), which may be within the view of the satellite, as well as being stored for later transmission to other LUTs. In the real-time mode, the signal detection is limited to a mutual S.S.A.S-satellite-LUT circular visibility area of about 2500 km radius that moves with the satellite along its track. However, because of the stored-mode capability at 406 MHz, the need for this mutual S.S.A.S-satellite-LUT visibility is not essential, and the system is fully functional worldwide.
- 6.2.4 The LUT processes the Doppler-shifted signal and determines the location of the satellite S.S.A.S; then the LUT relays the position of the distress to a Mission Control Center (MCC) where the distress alert and location information is immediately forwarded to an appropriate maritime Rescue Coordination Center (RCC). The RCC dispatches security forces.
- 6.2.5 The COSPAS-SARSAT System includes 36 LEOSAR LUT stations, 6 GEOSAR LUT stations and 19 Mission Control Centers that provide real-time as well as global-mode coverage for the Northern Hemisphere, while the Southern Hemisphere is presently served primarily by the global mode. Additional LUTs and MCCs are planned for installation in the near future both in the northern and southern hemispheres.

The addition of the GEOSAR Satellite system greatly improves the reaction time for a security event. This satellite system has no Doppler capabilities at 406 MHz but will relay the distress alert to any of the LUT stations. When there is GPS data included in the distress message this will instantly tell SAR authorities where you are located at. Hence speeding up the reaction time by not having to wait for one of the LEOSAR satellite's to come around.



**GEOSAR SATELLITE COVERAGE
FIGURE 1**



**SAR SATELLITE ORBITS
FIGURE 2**

SECTION 7 - AUTHORIZATIONS

7.1.1 The **ThunderBird S.S.A.S.** meets the requirements of Federal Communications Commission (FCC) Part 80 and GMDSS.

7.2 Characteristics

7.2.1 The **ThunderBird S.S.A.S.** is a floatable, battery operated unit. The beacon case, with its external antenna, is waterproof. The semiconductor circuits are mounted within the case assembly that also contains the battery power supply. A thumb switch is installed on top of the beacon. The beacon must be stored in its special mount.

7.3 Technical Data — ThunderBird S.S.A.S.

7.3.1 Applicable Documents
IMO

Chapter XI-2, Regulation 6: Ship Security Alert System

RTCM	Recommended Standards for Ship Security Alert Systems (SSAS) Using the Cospas-Sarsat Satellite System
COSPAS-SARSAT	Interim Cospas-Sarsat Type Approval Guidelines for 406 MHz SSAS Beacons
FCC	Part 80 and GMDSS

7.3.2 Specifications

406 MHz Transmitter

Frequency	406.028 MHz
Frequency Stability	±2 parts per billion/100ms
Output Power	5 watts
Digital Message	
Format	Serialized ¹
Duration	520 ms
Rate	400 bps
Encoding	Biphase L
Modulation	±1.1 radians peak

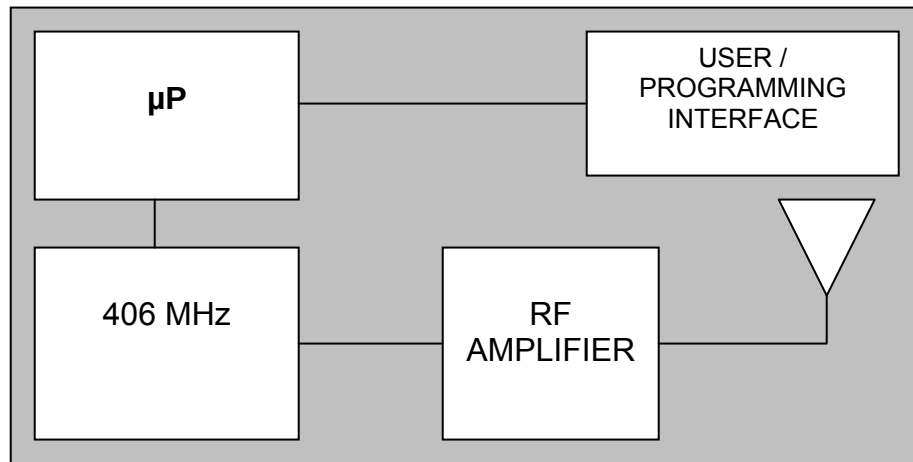
Antenna

Frequency	406.028 MHz
Polarization	Right-Hand Circular (RHCP)
VSWR	Less than 1.5:1

General/Environmental

Battery Life	
Operating	48 hours minimum
Replacement Interval	5 years
Size	
S.S.A.S less Antenna	7.20" (18.29 cm)
Material, S.S.A.S	High impact and UV resistant plastic
Color	Blue
Weight	1.9 lbs.
Temperature Range	
Operating	-25°C to +55°C
Stowage	-25°C TO +70°C

¹ Leaves ACR with Serialized U.S. code but must be reprogrammed at a Service center to Maritime MMSI before installation on a ship.



**S.S.A.S BLOCK DIAGRAM
FIGURE 3**

Manufacturer	Model	Notes	Y2K and EOW Compliant
B&G	Network LCD Plotter / DGPS	*	Yes
B&G	Network LCD Plotter / GPS	*	Yes
B&G	Network GPS and DGPS	*	Yes
B&G	Network GPS	*	Yes
Data Marine	Chartlink D7000 XT	*	Yes
Data Marine	Chartlink D7000 XTC	*	Yes
Data Marine	Chartlink II D8000	*	Yes
Data Marine	Link D3500	*	Yes
Data Marine	Link D3500 LD	*	Yes
Furuno	GP1810F	*	Yes
Furuno	GP1810	*	Yes
Furuno	GP1610C	*	Yes
Furuno	GP1600F	*	Yes
Furuno	GP1600	*	Yes
Furuno	GP30	*	Yes
Furuno	GP35	*	Yes
Garmin	10	*	Yes
Garmin	12	*	Yes
Garmin	20	*	Yes
Garmin	25	*	Yes
Garmin	30	*	Yes
Garmin	31	*	Yes
Garmin	35	*	Yes
Garmin	36	*	Yes
Garmin	38	*	Yes
Garmin	40	*	Yes
Garmin	45	*	Yes
Garmin	48	*	Yes
Garmin	50	*	Yes
Garmin	75	*	Yes
Garmin	85	*	Yes
Garmin	89	*	Yes
Garmin	90	*	Yes
Garmin	92	*	Yes
Garmin	95	*	Yes
Garmin	120	*	Yes
Garmin	126	*	Yes
Garmin	128	*	Yes
Garmin	130	*	Yes
Garmin	135	*	Yes
Garmin	175	*	Yes

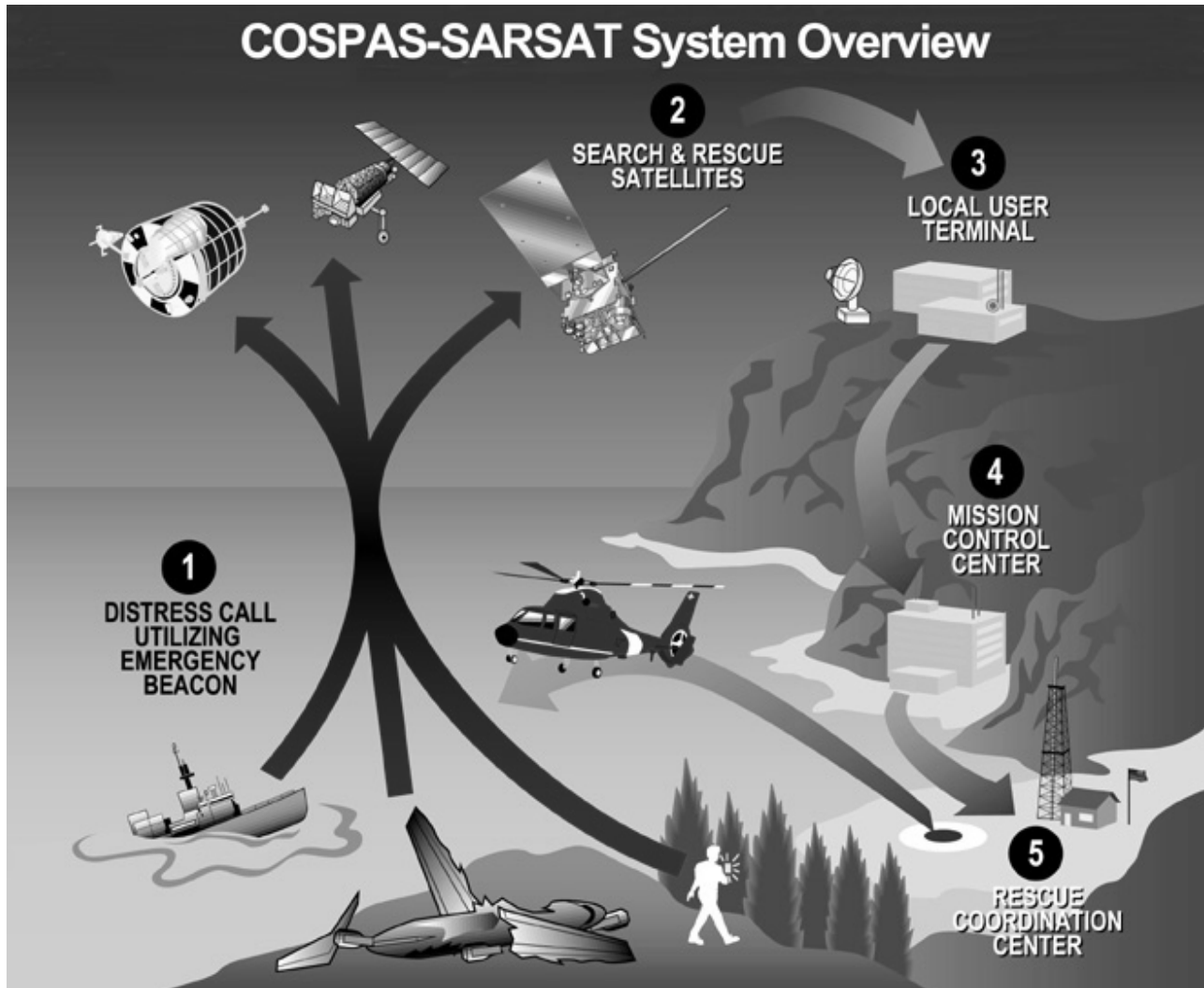
Manufacturer	Model	Notes	Y2K and EOW Compliant
Garmin	180	*	Yes
Garmin	185	*	Yes
Garmin	190	*	Yes
Garmin	195	*	Yes
Garmin	210	*	Yes
Garmin	GPSMAP 215	*	Yes
Garmin	220	*	Yes
Garmin	GPSMAP 225	*	Yes
Garmin	GPSMAP 230	*	Yes
Garmin	GPSMAP 235 SOUNDER	*	Yes
Garmin	120XL	*	Yes
Garmin	12XL	*	Yes
Garmin	45XL	*	Yes
Garmin	55AVD	*	Yes
Garmin	95XL	*	Yes
Garmin	GPS II	*	Yes
Garmin	GPS II+	*	Yes
Garmin	GPS III	*	Yes
Lowrance	GlobalMap 12	*	Yes
Lowrance	GlobalMap 1600	*	Yes
Lowrance	GlobalMap Sport	Some older versions of software may not output GGA, contact Manufacturer	Yes
Lowrance	LMS-160	*	Yes
Magellan	GPS 2000 XL	*	Yes
Magellan	GPS 3000	*	Yes
Magellan	GPS 3000 XL	*	Yes
Magellan	GPS 4000	*	Yes
Magellan	GPS 4000XL	*	Yes
Magellan	Meridian XL	*	Yes
Magellan	Trailblazer	*	Yes
Magellan	Trailblazer XL	*	Yes
Magellan	White Meridian	*	Yes
NorthStar	941X	*	Yes
NorthStar	951X	*	Yes
NorthStar	961X	*	Yes
Raytheon	Autohelm ST50 Plus GPS	*	Yes
Raytheon	GPS-11	*	Yes
Raytheon	HSB Chart Plotter	*	Yes
Raytheon	NavCenter 600	*	Unit will display wrong time and date after Y2K. Send unit to manufacturer for upgrade

Manufacturer	Model	Notes	Y2K and EOW Compliant
Raytheon	Raychart 620	*	Unit will display wrong time and date after Y2K. Send unit to manufacturer for upgrade
Raytheon	RC-520	*	Yes
Raytheon	RL-70RC	*	Yes
Si-Tex	DGPS-11	*	Yes
Si-Tex	GPS-1	*	Yes
Si-Tex	GPS-10	*	Yes
Si-Tex	GPS-10A	*	Yes
Si-Tex	GPS-4A	*	Yes
Si-Tex	GPS-5	*	Yes
Si-Tex	GPS-6	*	Yes
Si-Tex	GPS-7	*	Yes
Si-Tex	GPS-77P	*	Yes
Si-Tex	GPS-8	*	Yes
Si-Tex	GPS-88P	*	Yes
Si-Tex	GPS-9	*	Yes
Si-Tex	GPS-99P	*	Yes
Si-Tex	GPS-9D	*	Yes
Si-Tex	HG-7	*	Yes
Si-Tex	SBR-90	*	Yes
Si-Tex	SBR-91	*	Yes
Trimble	4000DSi	*	Firmware must be upgraded to V7.19 to comply
Trimble	4000RSi	*	Users of Firmware V7.15 - V7.18 must upgrade to V7.19. Users of V7.28 must upgrade to V7.29. Users of V7.29 are fully compliant
Trimble	7400MSi	*	Yes
Trimble	MS750	*	Yes
Trimble	Navgraphic XL	*	N/A - No Date Output
Trimble	NavMariner DGPS	*	Yes
Trimble	NavTrac GPS	*	Version 2.09 is compliant. Earlier versions are not being tested
Trimble	NT200	*	Yes
Trimble	NT200D	*	Yes
Trimble	NT300D	*	Yes
Trimble	DSM	*	Yes for versions 1.10 and later
Trimble	NT100	*	Yes

GPS units compatible with ACR Beacons based on vendor information
(*) indicates that unit complies with ACR requirements

Known Compatible GPS Receivers
FIGURE 4

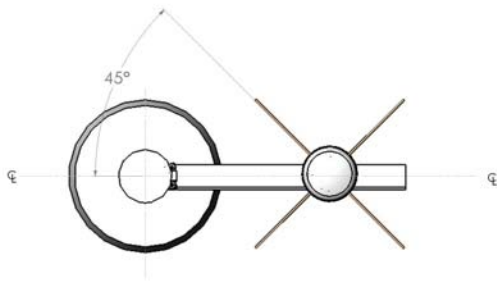
***** WARNING *****
THIS TRANSMITTER IS AUTHORIZED FOR USE
ONLY DURING SITUATIONS OF GRAVE
AND IMMINENT DANGER



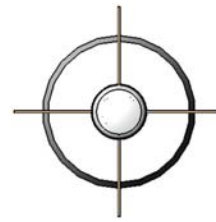
COSPAS-SARSAT System Overview
FIGURE 5



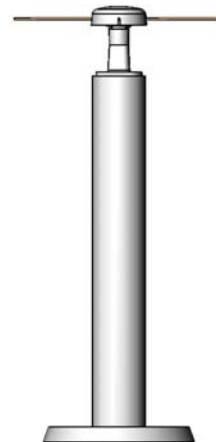
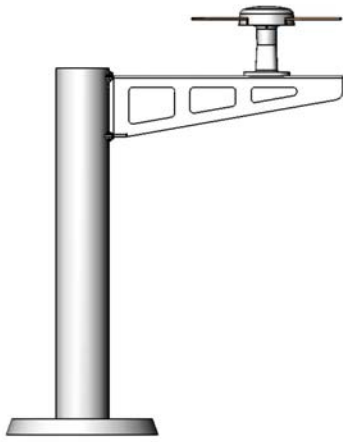
**ACR THUNDERBIRD
FIGURE 6**



UNIT MOUNTED
ON SPAR ARM



UNIT MOUNTED
TOP OF MAST



ANTENNA INSTALLATIONS
FIGURE 7