COBHAM
Tracking & Locating

271 Brownlow Avenue
Dartmouth, Nova Scotia
Canada
B3B 1W6
Phone: +1 (902) 468-3007
Fax: +1 (902) 468-3009

NOVATECH Beacons & Flashers

COBHAM
Tracking & Locating

ST-400A

Xenon Flasher

Operation & Maintenance

Manual

UM06-35

COBHAM Avionics & Surveillance

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ST-400A Xenon Flasher
February 2007
Operation & Maintenance Manual
Version 2.0

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SALES AND SERVICING

For Sales or Technical Assistance Please Contact:

Cobham Tracking & Locating Ltd.

271 Brownlow Avenue

Dartmouth, Nova Scotia

B3B 1W6

Canada

Ph: +1 (902) 468-3007

Fax: +1 (902) 468-3009

sales@seimac.com

SPECIFICATIONS

Flash Tube	Replaceable – rated for 20 x 10^6 flashes
Flash Rate	Adjustable 14/minute to 60/minute ±5% over 3 to 6 volt battery life (factory set at 20/minute)
Visible Range	Adjustable to 2 to 4 nautical mile range (0.2 to 0.6 watt-seconds) ±5% over 3 to 6 volt battery life (factory set at 3 nm range)
Effective Intensity	Adjustable 6 to 35 candelas (factory set at 20 candelas)
Operating Temperature Range	-40ºC to +60ºC
Ocean Depth Rating	Approx. 7,300 meters (24,000 feet)
Pressure Switch	Pressure activated switch turns ST-400A ON at the surface, OFF at depths below approx. 10 meters. Manual override, ON/OFF control knob.
Batteries	4 alkaline “C” cell
Battery Life @ 4ºC	Approximately seven days, ON at night, OFF during day at factory settings
Pressure Case Material	6061-T6 Aluminum, Hard Anodized to Mil-Spec A8625 Type 3
Weight with Batteries	In water 2.2 lbs (2.2 kgs) In air 3.7 lbs (1.7 kgs)
Pressure Case Dimensions	18.5” long (470 mm), 1.7” diameter (43 mm)

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1 Safety Information

1.1 Pressure Case

As with any sealed pressure case, the contents could be under pressure due to battery or seal failure. This could expel the batteries when the Pressure Switch is removed. To be safe, always point the open end away from you and always remove the Pressure Switch first. The Pressure Switch is designed to vent any internal pressure when it is being removed. If a battery is trapped in the case take extreme care, there could be a pressure buildup behind it and the battery could be expelled at any time.

2 Introduction

The ST-400A is a self-contained submersible Xenon Flasher designed to assist in the location and recovery of underwater oceanographic equipment.

It may be submerged for long periods in ocean depths to 7,300 meters (24,000 feet). The activation of the ST-400A is completely automatic, when submerged below 10 meters it is OFF and at the surface it is ON at night only.

At the surface, the ST-400A “double burst” flashes for approximately 7 days at night only and visual range is up to 3 miles at factory settings.

9 Warranty

Cobham Tracking & Locating Ltd. guarantees this product to be free from defective materials and workmanship and agrees to remedy any such defects for a period of one year commencing from the date of purchase. **The Pressure Switch is guaranteed for two years, excluding corrosion damage.**

This warranty does not apply if the equipment has been subject to misuse, neglect, accident or improper installation, or altered outside our factory, or to damage caused by defective batteries. Cobham Tracking & Locating Ltd. neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with this product, including damage resulting from design or equipment failure.

7. Install the Delrin carrier
8. Lubricate the two socket head cap screws
9. Install Zinc Anode and secure with the two socket head cap screws. It will be necessary to rotate the Delrin knob carrier to line up the threaded holes in the aluminum body.

8.4.4 Testing

1. Install the PS-200 on your equipment
2. Make sure the Unit is ON when the PS-200 ON/OFF knob is in the ON position
3. Make sure the Unit is OFF when the PS-200 ON/OFF knob is in the OFF position

8.5 Corrosion Prevention

Corrosion is a problem common to all metals used in the ocean. To help minimize corrosion the ST-400A is made with 6061-T6 aluminum and is hard anodized; it is also fitted with a Zinc Anode. If the Zinc is more than 50% water, replace it with part number ZN-100. If the anodized surface is damaged, pitted or gouged, protect it against further corrosion by applying tape, paint or fast cure epoxy.

- Do not mount the flasher against metal.
- Wrap the entire flasher with vinyl tape. Take care not to cover the hole in the bottom of the Pressure Switch or the Zinc Anode.
- Prevent the anodized surface from being scratched or damaged. Damage to the anodized surface can cause pitting.

3 Unpacking

Be sure to check shipping container for signs of damage that might have damaged the contents. Report any such damage to the carrier.

4 Quick Start

1. The ST-400A is shipped with batteries installed.

2. Check that the Pressure Switch is secure, clockwise finger tight.

3. Turn Pressure Switch knob to ON position.

4. Cover lens for darkness and verify “double burst” flash.

5. The ST-400A is ready to be deployed.

replaced every two years or sooner. Lightly lubricate the Cup Seal by performing the following procedure:

8.4.1 Disassembly

1. Remove the two socket head cap screws on the Zinc Anode.
2. Withdraw the Zinc Anode and the black “Delrin” Knob Carrier.
3. Make sure the PS-200 Pressure Switch is in the **upright position** (Cup Seal up, spring down); this will make sure a small internal pin will not fall out. **Do not lose that pin.**
4. Carefully pry off the rubber Cup Seal, do not scratch the Cup Seal or the mating “O” ring surface.
5. Observe the S.S. Flat Spring and note how it is installed.

8.4.2 Lubrication

1. Clean all surfaces and the Cup Seal.
2. Lubricate (very lightly) the “O” ring shaped portion of the Cup Seal and the mating aluminum surface with silicone grease (Parker Super O Lube). **Do not spread the silicone grease anywhere else. Excess silicone grease can cause the Pressure Switch to fail.**

8.4.3 Reassembly

1. Be sure the small pin is in place
2. Place the Stainless Steel Flat Spring back in its correct position
3. Install the Cup Seal and rotate the Cup Seal ¼ turn to make sure it is seated correctly
4. Test the operation by pressing the Cup Seal with your finger and listen for the micro switch clicking as you press down firmly
5. Thoroughly lubricate the outer portion of the Cup Seal
6. Make sure the Delrin Knob carrier is clean and lubricated

- Temperature does not have to be that cold for an “O” ring to lose a great deal of its flexibility. At 4ºC, an “O” ring has stiffened significantly.
- “O” rings must be lightly lubricated with silicone-based grease. We recommend “Parker Super O Lube”.
- A typical seal failure results in a very small amount of water, not a flooded case. Most seal failures occur near the surface.
- The “O” ring becomes less flexible as the rubber ages.
- If you are operating or storing at low temperature, it makes it even more important to service the “O” ring regularly.

8.3 “O” Ring Maintenance

Cobham Tracking & Locating Ltd. strongly recommends that “O” rings be serviced on a regular basis to ensure a reliable seal. **Remove and lubricate at least once a year or sooner and replace every two years or sooner.** With regular maintenance, “O” rings will be very reliable and trouble free. It has been, however, our observation that most “O” rings are neglected for years and expected to perform at the extremes of their design limits.

There are two “O” rings and a Cup Seal to service. The “O” rings are at the top end of the Pressure Case and on the Pressure Switch, the Cup Seal is on the Pressure Switch. Replace the two “O” rings with Parker #218 or equivalent available from Cobham Tracking & Locating Ltd. or your local “O” ring supplier. Lubricate lightly with a silicone grease, we recommend Parker Super O Lube. Instructions for lubricating or replacing the Cup Seal are below.

8.4 Pressure Switch Cup Seal

The Cup Seal must not be overlooked when lubricating the “O” rings. The Cup Seal should be lubricated every year and

5 Installation

5.1 Pressure Case

When mounting the pressure case take care to prevent any side loading on the Pressure Switch or the top end Delrin bulkhead cap. Over time, side loading on those parts can cause a leak. Never attached anything to the two mounting screws on the Pressure Switch Zinc anode.

To minimize corrosion never mount the pressure case directly to metal. Isolate the pressure case by wrapping it with vinyl tape at the contact points.

6 Operating Instructions

6.1 Batteries

The ST-400A uses 4 Alkaline “C” cells for approximately 7 days of nighttime flashing. Install fresh batteries with the positive terminal towards the antenna. The circuit is reverse polarity protected. Rechargeable batteries are not recommended. Always remove and discard batteries when the ST-400A is not in use.

6.2 Turn On & Off

A manual ON/OFF switch is incorporated in the Pressure Switch. To turn the ST-400A ON or OFF, rotate the knob as shown in Figure 1 below.

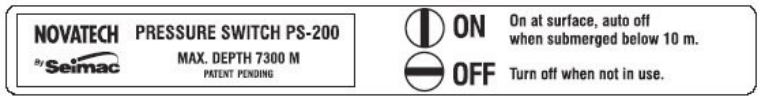

Figure 1 - PS-200 Label

Prior to deployment or testing, check that the pressure switch is secure by turning it fully clockwise, finger tight. **FAILURE TO SECURE PRESSURE SWITCH CAN RESULT IN A FLOODED BEACON.**

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8 Maintenance

There are no user repairable parts in the ST-400A. Return the unit to the factory for repairs.

8.1 Regular Maintenance

- Rinse thoroughly with fresh water after every use
- Always remove batteries when not in use
- Always use fresh batteries
- Protect “O” ring surface from damage
- Replace worn or damaged “O” rings
- Keep batteries and electronics dry

8.2 “O” Ring Facts

A conservative estimate is that “O” rings will last for two to five years.

The main problem with “O” rings is that over time they can take a “set”. They lose their original round shape and they become slightly flattened resulting in less compressibility. Reduced compressibility can lead to a water leak near the surface. The best way to prevent a problem is to service the “O” rings before every deployment.

Some of the main factors that can cause a “set” are:

- High storage temperature (exceeding 40ºC) over time will cause the rubber to harden.
- Exposure to sunlight and ozone will cause the “O” ring to deteriorate and stiffen.

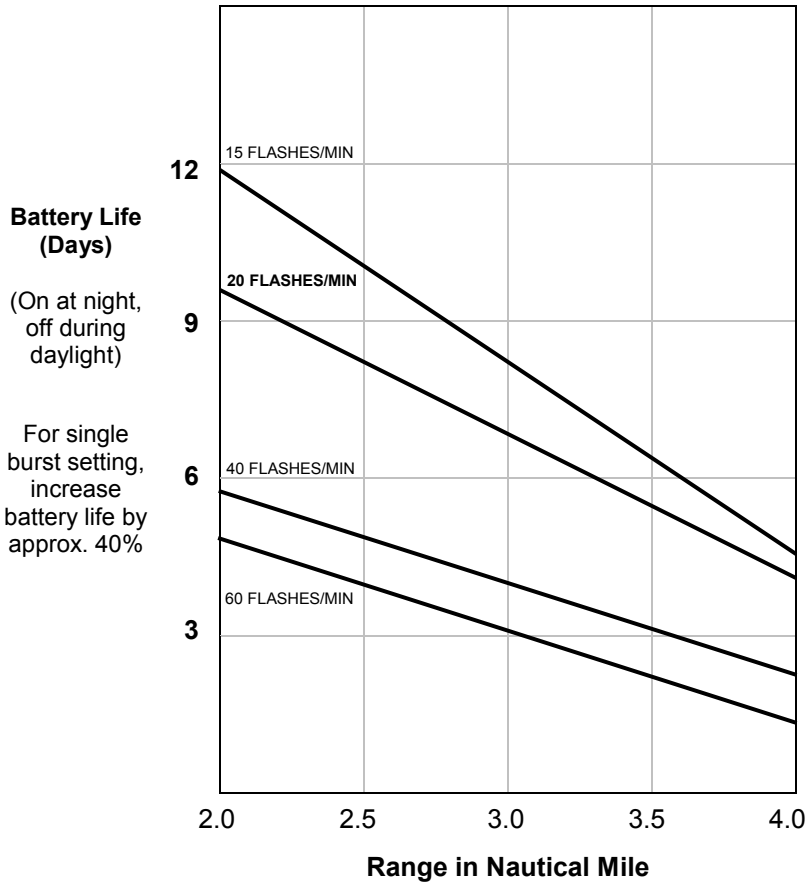

Figure 2 - ST-400A, Battery Life Estimates "Double Burst" Flash

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6.3 Test Operation

The following quick test verifies the ST-400A is functioning properly:

1. Turn Pressure Switch knob to ON
2. Cover the lens for darkness.
3. Verify a “double burst” flashing.
4. Expose lens to light, flasher stops flashing.
5. Turn Pressure Switch knob to OFF, flasher stays off in the dark.
6. ST-400A is ready to be deployed.

7 Adjustments

To gain access to the electronic board, remove the top cap (bulkhead connector end) on the pressure case by rotating the black Delrin cap counterclockwise by hand. Only hand tighten when reinstalling.

CAUTION: The ST-400A generates high voltage so do not operate it without the protective sleeve around the electronic board.

7.1 Single Flash (disable "double burst")

Remove black jumper on lower end of PC Board (end opposite the flash tube). Battery life will increase by approximately 30%.

7.2 Adjust Flash Rate

Flash rate control location is marked on the yellow label – use a small flat screwdriver to prevent damage to the control. Higher flash rate will decrease battery life (see graph in Figure 2).

7.3 Adjust Intensity (Visible Range)

Intensity control location is marked on the yellow label. Increasing intensity will decrease battery life (see graph in Figure 2).

The measurement of light and the units used can be confusing and misleading. The standard in the marine industry is Effective Intensity measure in Candelas. Tests were performed in clear nighttime conditions at sea. From the resulting data, the Table 1 was prepared.

Note: As conditions are highly variable, your actual range may be less than the estimates below.

INTENSITY SETTING	EFFECTIVE INTENSITY (Candelas)	RANGE (Nautical Miles)
MINIMUM	6	2.0
FACTORY SETTINGS	20	3.0
MAXIMUM	35	4.0

Table 1 - Effective Intensity measured in Candelas (estimated)

7.4 Battery Life

The following graph (Figure 2) may be used to estimate the approximate battery life for different flash rates and intensity settings. Your actual results may vary since we have assumed 1 day is 12 hours of daylight, 12 hours night. (ST-400A operates 12 hours per 24-hours period). Your actual day to night ratio will depend on the season and your lattitude.

ST-400A Xenon Flasher

Specifications

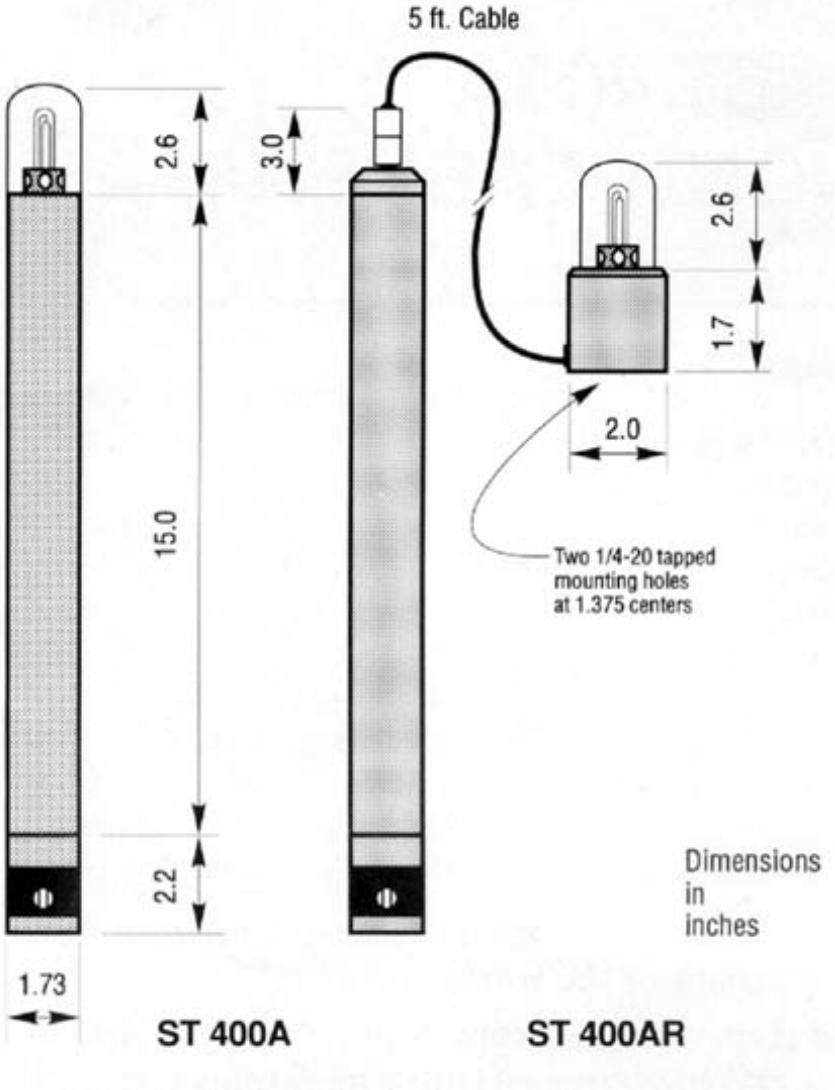
Flash Rate:	Adjustable 14/min. to 60/min. ±5% over 3 to 6 volt
(ST-400A only)	battery life (factory set at 40/min.)
Intensity:	Adjustable 2 to 4 nautical mile range (0.2 to 0.6 watt-seconds)
	±5% over 3 to 6 volt battery life (factory set at 3 nm range)
Daylight Off Switch:	Turns flasher ON @ 55 LUX
	Turns flasher OFF @ 65 LUX
Operating Temperature Range:	-40°C to +60°C
Ocean Depth Rating:	Approx. 24,000 ft. (7300 m)
ON/OFF Control:	Pressure activated switch turns flasher ON at the surface, OFF at depths below approx. 25 ft. (8 m). Manual override ON/OFF control by rotating knob
Batteries:	4 "C" cell alkaline
Battery Life @ 4°C:	
At Factory Setting	5 days, ON at night
3 nautical miles,	OFF during day
40 flashes/min.	(60 hours continuous)
At Reduced Setting	15 days, ON at night
2 nautical miles,	OFF during day
15 flashes/min.	(180 hours continuous)
Materials (case):	6061-T6 Aluminum, Hard Anodized to Mil Spec A8625 Type 3
Weight with Batteries:	In water 2.2 lb. (1 Kg)
	In air 3.7 lb. (1.7 Kg)

Dimensions

Options

Mercury Tilt Switch MS 740

Automatically turns the flasher ON in the upright position, OFF when inverted



Visibility & Range

The ST-400 Series Xenon Flashers have been developed to provide a highly visible light over a great distance while consuming as little battery power as possible. This Xenon Flasher is equipped with our new "double burst" flash rate. The double burst flash improves visibility. A xenon flash is an extremely short burst of light - it is only about .00002 seconds long (20microseconds). If you blink, you will obviously miss it, and also your eye cannot appreciate all that light energy, as the light just isn't there long enough to see all of it. So we give you two flashes about 0.2 seconds (200milliseconds) apart. It is not a solid long duration flash - you will see two distinct flashes, but they are close enough together to greatly improve visibility. As the flash is so short, Peak Intensity ratings used by many manufacturers are of little value. A more useful rating, in common use by the marine industry, is Effective Intensity (measured in candelas). This rating can be used to predict range at sea. The ST-400 Series Xenon Flashers were rigorously tested in clear night time marine conditions (visibility 10 nautical miles). From the resulting data the following table was prepared. As conditions are highly variable, it should only be used as a rough guide.

INTENSITY SETTING	EFFECTIVE INTENSITY (Candelas)	RANGE nautical miles
MINIMUM	6	2.0
FACTORY SETTINGS	15	3.0
MAXIMUM	35	4.0

A rapid flash rate is easier to locate than a slower one; however, maximum battery life can be significantly extended with the slower rate.