

# SR-100 SMART Release

## User's Manual

P/N M846-0016, Rev. A



Benthos, Inc.  
49 Edgerton Drive  
North Falmouth, MA 02556  
U.S.A.  
Tel: (508) 563-1000  
Fax: (508) 563-6444  
[www.benthos.com](http://www.benthos.com)

## Notices

### Proprietary Information

The information, descriptions, photos and illustrations in this manual are the property of Benthos, Inc. Materials may not be reproduced or disseminated without the prior written consent of Benthos.

### Warranty

**LIMITED WARRANTY.** Benthos warrants that the products sold hereunder shall be free from defects in materials and workmanship under normal use and service when correctly installed, used and maintained for a period of 12 months from date of shipment from Benthos. Purchaser's receipt of any product delivered hereunder shall be an unqualified acceptance of and a waiver by Purchaser of the right of Purchaser to make a claim with respect to such product unless Purchaser gives Benthos notice of any claim within 12 months after the receipt of such product. This warranty is limited to repair or replacement of the said product at Benthos' option, F.O.B the Benthos plant in North Falmouth, Massachusetts, providing the product was not abused or operated other than in accordance with the Benthos instruction manuals. Since all Benthos oceanographic instruments are pressure tested to rated depth prior to shipment, Benthos does not assume responsibility for any damage due to leakage or implosion. Benthos reserves the right to modify its warranty at any time, in its sole discretion. THIS LIMITED WARRANTY IS NOT TRANSFERABLE.

**LIMITATION OF LIABILITY.** BENTHOS MAKES NO OTHER WARRANTY REGARDING ITS PRODUCTS OR THE PRODUCTS OF OTHERS EITHER EXPRESS OR IMPLIED; AND, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE FORGOING WARRANTIES IS HEREBY DISCLAIMED BY BENTHOS AND EXCLUDED FROM ANY AGREEMENT MADE BY ACCEPTANCE OF ANY ORDER.

BENTHOS DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH HEREIN INCLUDING ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST OR CORRUPTED DATA, LOSS OF BUSINESS, LOSS OF PROFITS, LOSS OF USE OF THE PRODUCT OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF SUBSTITUTE OR REPLACEMENT PRODUCT, FACILITIES OR

SERVICES, DOWN-TIME, CHARGES FOR PURCHASER'S TIME AND EFFORT, THE CLAIMS OF THIRD PARTIES, INJURY TO PROPERTY, OR ANY OTHER DIRECT, INDIRECT, SPECIAL, RELIANCE, INCIDENTAL OR CONSEQUENTIAL DAMAGES, REGARDLESS OF THE NATURE OF THE CLAIM AND WHETHER OR NOT FORESEEABLE AND WHETHER OR NOT BASED ON BREACH OF WARRANTY, CONTRACT OR TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY, EVEN IF BENTHOS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY THIRD PARTY EXCEPT AS EXPRESSLY PROVIDED HEREIN. THIS LIMITATION OF LIABILITY APPLIES BOTH TO PRODUCTS AND SERVICES AND SUPPORT PROVIDED PURCHASER UNDER THIS AGREEMENT. NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY BENTHOS, ITS AGENTS OR EMPLOYEES SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THE LIMITED WARRANTY PROVIDED ABOVE. ANY AND ALL LIABILITY OF BENTHOS IS EXPRESSLY LIMITED TO THE PRICE PURCHASER HAS PAID FOR THE PRODUCTS. PURCHASER'S SOLE REMEDY AGAINST BENTHOS IN ANY DISPUTE UNDER THIS AGREEMENT SHALL BE TO SEEK RECOVERY OF THE AMOUNTS PURCHASER PAID, PURSUANT TO THE LIMITED WARRANTY PROVIDED ABOVE, UPON THE PAYMENT OF WHICH BENTHOS, ITS AGENTS AND EMPLOYEES, AND AFFILIATES, WILL BE RELEASED FROM AND DISCHARGED OF ALL FURTHER OBLIGATIONS AND LIABILITY TO PURCHASER.

THE LIMITED WARRANTY OF BENTHOS GIVES PURCHASER SPECIFIC LEGAL RIGHTS, AND PURCHASER MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO PURCHASER.

## Liability

Benthos assumes no liability for damages, losses or costs incurred consequentially through operation or malfunction of Benthos products.

---

## Title

Title shall pass to the Buyer on delivery to the carrier at North Falmouth, Massachusetts, U.S.A. Risk of damage or loss following such delivery shall be the Buyer's, and Benthos shall in no way be responsible for safe arrival of the shipment. Title shall so pass to the Buyer regardless of any provision for payment of freight or insurance by Benthos, and regardless of the form of the shipping documents. If shipment is consigned to Benthos, it shall be for the purpose of securing the Buyer's obligations under contract.

## Changes

Benthos reserves the right to make changes to the design or specifications at any time without incurring any obligation to modify previously installed units. In addition, while considerable effort has been made to ensure that the information in this manual is accurate and complete, Benthos assumes no liability for any errors or omissions.

# Preface

Congratulations on your purchase of a Benthos SR-100 Smart Modem Acoustic Release Technology (SMART) Release! The SR-100 is *both* a full ocean depth release designed for mooring recovery operations *and* an acoustic modem that employs the latest in digital signal processing technologies for reliable wireless digital communications underwater.

This manual provides information on setting up, testing and operating the SR-100. It is divided into the following 5 sections:

**Section 1 - Overview** reviews the release and modem components of the SR-100.

**Section 2 - Specifications** lists the specifications for the release and modem functions of the SR-100 and the battery pack.

**Section 3 - Setup, Deployment and Recovery** provides instructions on how to unpack the SR-100, test the release mechanism, connect the SR-100 to an instrument, and deploy and recover the SR-100.

**Section 4 - Maintenance and Troubleshooting** provides instructions for cleaning and inspecting the SR-100, replacing the batteries and troubleshooting operational problems should they occur.

**Section 5 - User Replaceable Parts** provides a list of common user replaceable parts available from Benthos for the SR-100.

## Notes and Warnings

Where applicable, special notes and warnings are presented as follows:



---

**NOTE** A referral to another part of this manual or to another reference; a recommendation to check that certain criteria are met before proceeding further in a step or sequence; or general information applicable to the setup and operation of the SR-100 SMART Release.

---



---

**WARNING** A reminder that dangerous or damaging consequences could result if certain recommended procedures are not followed.

---

## Customer Service

We welcome your comments and suggestions for improving our products and documentation as well as developing better ways of serving you with acoustic technology. Therefore, please contact Customer Service should you have any comments or suggestions about this manual or the SR-100, or if you require service or support.

Please contact us at:

**BENTHOS, INC.**  
**Attention: Customer Service**  
**49 Edgerton Drive**  
**North Falmouth, MA 02556**  
**U.S.A.**

**Telephone: (508) 563-1000**

**Fax: (508) 563-6444**

**E-mail: [info@benthos.com](mailto:info@benthos.com)**

**[www.benthos.com](http://www.benthos.com)**

# Contents

|                                                                                 |         |
|---------------------------------------------------------------------------------|---------|
| Notices .....                                                                   | ii      |
| <b>Proprietary Information</b> .....                                            | ii      |
| <b>Warranty</b> .....                                                           | ii      |
| <b>Liability</b> .....                                                          | iii     |
| <b>Title</b> .....                                                              | iv      |
| Preface .....                                                                   | v       |
| <b>Notes and Warnings</b> .....                                                 | v       |
| <b>Customer Service</b> .....                                                   | vi      |
| Contents .....                                                                  | vii     |
| List of Figures .....                                                           | ix      |
| List of Tables .....                                                            | x       |
| <br><b>1 Overview</b> .....                                                     | <br>1-1 |
| Operation as a Release .....                                                    | 1-1     |
| Operation as an Acoustic Modem .....                                            | 1-4     |
| <br><b>2 Specifications</b> .....                                               | <br>2-1 |
| Release .....                                                                   | 2-1     |
| <b>General</b> .....                                                            | 2-1     |
| <b>Physical Characteristics</b> .....                                           | 2-1     |
| Modem .....                                                                     | 2-2     |
| <b>General</b> .....                                                            | 2-2     |
| <b>Power Requirements</b> .....                                                 | 2-3     |
| <b>Transducer</b> .....                                                         | 2-3     |
| Battery Pack .....                                                              | 2-3     |
| <br><b>3 Setup, Deployment and Recovery</b> .....                               | <br>3-1 |
| Unpacking and Inspection .....                                                  | 3-1     |
| Testing the Release Mechanism .....                                             | 3-1     |
| <b>Testing the Release Mechanism Manually</b> .....                             | 3-3     |
| <b>Testing the Release Mechanism by</b><br><b>Acoustic Command in Air</b> ..... | 3-4     |
| Connecting the SR-100 to an Instrument .....                                    | 3-5     |

---

---

|                                                           |             |
|-----------------------------------------------------------|-------------|
| Deploying the SR-100 .....                                | 3-7         |
| <b>Installing a Drop Link and Arming the SR-100 .....</b> | <b>3-7</b>  |
| <b>Checking the Status of the SR-100 .....</b>            | <b>3-8</b>  |
| <b>Verifying Some Important Deployment</b>                |             |
| <b>Considerations .....</b>                               | <b>3-9</b>  |
| <b>Performing the Predeployment Checks .....</b>          | <b>3-9</b>  |
| <b>About Static and Dynamic Loading .....</b>             | <b>3-10</b> |
| Recovering the SR-100 .....                               | 3-11        |
| <br>4 Maintenance and                                     |             |
| Troubleshooting .....                                     | 4-1         |
| General Cleaning and Inspection .....                     | 4-1         |
| Replacing the Battery Pack and/or O-Rings .....           | 4-2         |
| Installing the Sacrificial Bar Anode .....                | 4-8         |
| Troubleshooting .....                                     | 4-10        |
| <br>5 User Replaceable Parts .....                        | 5-1         |

## List of Figures

|                   |                                                                                                                                                      |            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Figure 1-1</b> | <b><i>The SR-100 SMART Release</i></b> .....                                                                                                         | <b>1-2</b> |
| <b>Figure 1-2</b> | <b><i>The ATM-891 Deck Box</i></b> .....                                                                                                             | <b>1-2</b> |
| <b>Figure 1-3</b> | <b><i>SR-100 Deployed with a Moored Instrument Array</i></b> .....                                                                                   | <b>1-3</b> |
| <b>Figure 3-1</b> | <b><i>The Rotary Switch on the Release End Cap—Shown<br/>in the HOLD (EXTEND) Position</i></b> .....                                                 | <b>3-2</b> |
| <b>Figure 3-2</b> | <b><i>Swinging the Release Lever away from the<br/>Release Pin</i></b> .....                                                                         | <b>3-3</b> |
| <b>Figure 3-3</b> | <b><i>SR-100 Power/Serial Connector</i></b> .....                                                                                                    | <b>3-5</b> |
| <b>Figure 3-4</b> | <b><i>Location of the Power/Serial Connector</i></b> .....                                                                                           | <b>3-6</b> |
| <b>Figure 4-1</b> | <b><i>Location of Hardware that Secures the Release End<br/>Cap to the Housing</i></b> .....                                                         | <b>4-3</b> |
| <b>Figure 4-2</b> | <b><i>Battery Pack Connector and Battery Pack<br/>Connector Pigtail</i></b> .....                                                                    | <b>4-3</b> |
| <b>Figure 4-3</b> | <b><i>Location of Release Mechanism Mounting Plate<br/>Hardware, Battery Pack and Electronics Chassis<br/>Assembly, and Limit Switches</i></b> ..... | <b>4-4</b> |
| <b>Figure 4-4</b> | <b><i>Nuts Securing Battery Pack Cover Plate to Battery<br/>Pack Tube</i></b> .....                                                                  | <b>4-4</b> |
| <b>Figure 4-5</b> | <b><i>Removing the Battery Pack and Electronics<br/>Chassis Assembly from the Release Mechanism<br/>Mounting Plate</i></b> .....                     | <b>4-5</b> |
| <b>Figure 4-6</b> | <b><i>Battery Pack Cover Plate Removed</i></b> .....                                                                                                 | <b>4-5</b> |
| <b>Figure 4-7</b> | <b><i>Checking the Battery Pack Voltage</i></b> .....                                                                                                | <b>4-6</b> |
| <b>Figure 4-8</b> | <b><i>Installing the Sacrificial Bar Anode across One<br/>of Two Pairs of Mounting Pad Eyes</i></b> .....                                            | <b>4-9</b> |

# List of Tables

*Table 3-1 SR-100 Power/Serial Connector Pinouts . . . . . 3-6*

*Table 3-2 SR-100 Power/Serial Cable to DB-9 Pin-to-Pin  
Connections . . . . . 3-7*

*Table 5-1 SR-100 SMART Release User Replaceable Parts . . . . . 5-1*

# 1 Overview

The Benthos SR-100 Smart Modem Acoustic Release Technology (SMART) Release is both a full ocean depth acoustic release plus an acoustic modem that provides reliable wireless digital communications with other deployed underwater instrument packages and surface or subsea platforms. It is completely self contained in a thick walled stainless steel housing and includes a battery pack and an omnidirectional transducer that is specifically designed for full ocean depth applications. In addition to releasing deep sea instruments from their mooring, the SR-100 can transmit real time or stored data from those instruments at baud rates up to 15,360 bits/sec. The SR-100 can also receive data at baud rates up to 2400 bits/sec.

The SR-100, which is shown in Figure 1-1 with an optional vertical mounting bracket, combines the same reliable high torque motorized release mechanism used in the Benthos 865-A Deep Sea Acoustic Release with the same modem technology provided by the Benthos ATM-880 Series Acoustic Telemetry Modems. The Benthos ATM-891 Deck Box, which is shown in Figure 1-2, is used to communicate with the SR-100 and to acoustically release it. Telesonar PC, which is provided with the ATM-891, is a graphical users interface (GUI) software program that runs on a PC and provides a user friendly means of configuring and operating the release and the modem.

## Operation as a Release

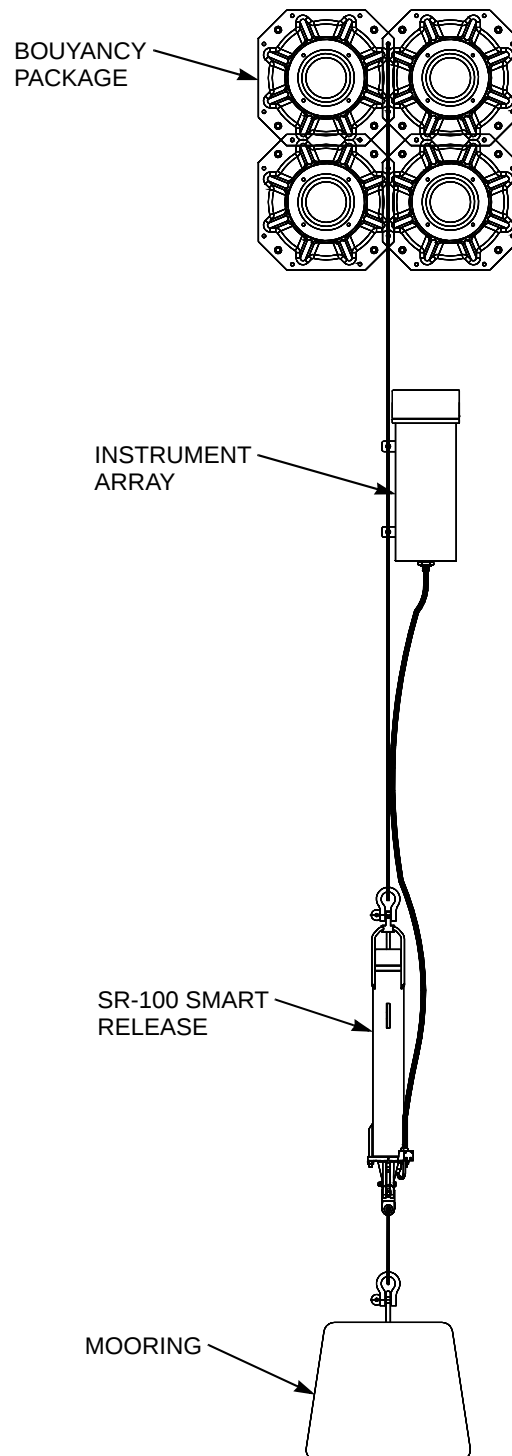
The SR-100 is designed for long range, heavy duty, deep or shallow water applications. It can support a static load of 4540 kg (10,000 lb), and each release is factory tested to a simulated depth of 12,000 m (39,360 ft). Its primary function is the release of a moored instrument array as shown in Figure 1-3. In addition, the SR-100 functions to assist in the relocation of the array as it can be commanded to operate as a transponder for measuring slant range. As a transponder, the SR-100 transmits replies to interrogation transmissions from the ATM-891 Deck Box, and the two-way travel time of the sound propagation is measured and converted into the one-way distance. Upon recovery, the SR-100 can be easily re-armed and redeployed. The battery life is up to two years, depending on the number of transponder replies and the amount of data transmitted and received. In addition, the acoustic telemetry is disabled when the battery voltage falls below a safe threshold at which only the release and transponder functions and the ability to send status messages can be activated.



**Figure 1-1 The SR-100 SMART Release**



**Figure 1-2 The ATM-891 Deck Box**



**Figure 1-3 SR-100 Deployed with a Moored Instrument Array**

The SR-100 is released by a command from the ATM-891 Deck Box when it is connected over its serial interface to a host processor, which is usually a PC. The Release command, which is transmitted using the same secure and highly reliable modulation techniques used by the modem, is sent by either entering the command directly from the keyboard or by choosing the command from a menu in Telesonar PC. If entering directly from the keyboard, the computer must be set up to run a terminal program, such as ProComm Plus. The Release command requires both the address of the modem and its release code. The factory default address is 0, and the release code is the serial number of the SR-100 and is printed on the label that is attached to the housing.



---

**NOTE** For information on how to enter the Release command, refer to Section 6, "Modem Operating Codes and Commands," of the "Acoustic Telemetry Modems User's Manual," and to Section 5, "Telesonar PC," for information on how to use Telesonar PC.

---

## Operation as an Acoustic Modem

The SR-100 operates as an acoustic modem with the same functions as the Benthos ATM-880 Series Acoustic Telemetry Modems. It operates in the same operating modes, includes the same S Registers and executes the same commands. Plus it includes Release and Release Status commands. The modem uses an omnidirectional transducer that operates in the 9–14 kHz (LF) frequency band. This transducer provides omnidirectional transmit and receive beam patterns and is very effective in both deep and shallow water applications where the direction of the receiving transducer is not known or is not fixed. The modem also includes a power/serial connector that is installed on the bottom end cap. This connector is used to input external power for powering the modem instead of using its internal battery pack, and to connect to either the RS-232 or RS-422 serial interface of an instrument or a PC. The modem inputs data from the instrument and outputs data to the instrument on the serial interface.



---

**NOTE** For detailed information on the Benthos ATM-880 Series Acoustic Telemetry Modems and how to operate them, refer to the "Acoustic Telemetry Modems User's Manual."

---

# 2 Specifications

This section provides the specifications for the Benthos SR-100 SMART Release. The specifications encompass the release and modem functions and the battery pack.

## Release

The specifications for the release primarily apply to the housing and the release mechanism of the SR-100.

### General

|                           |                                          |
|---------------------------|------------------------------------------|
| <b>Release actuation:</b> | High torque motor                        |
| <b>Rated load:</b>        | 4540 kg (10,000 lb)                      |
| <b>Tilt indication:</b>   | When greater than 25° from vertical      |
| <b>Operator controls:</b> | Rotary switch for power on, arm and test |

### Physical Characteristics

|                              |                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Housing construction:</b> | Duplex stainless steel 17-4                                                                                   |
| <b>Dimensions:</b>           | 20.3 cm (8 in.) max dia by 116.8 cm (46 in.) long                                                             |
| <b>Weight in air:</b>        | 47.7 kg (105 lb) with vertical mtg. bracket<br>44.5 kg (98 lb) without vertical mtg. bracket                  |
| <b>Weight in water:</b>      | 37.7 kg (83 lb) with vertical mount<br>34.5 kg (76 lb) without vertical mount                                 |
| <b>Rated depth:</b>          | 12,000 m (39,360 ft)                                                                                          |
| <b>Operating life:</b>       | Up to 2 years depending on the number of replies and the amount of data transmitted and received by the modem |

# Modem

The specifications for the modem primarily apply to the electrical and transducer components of the SR-100. For information on the PSK and FSK modulation techniques and the processing features, refer the "Acoustic Telemetry Modems User's Manual."

## General

|                                |                                                                                                      |
|--------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Frequency band:</b>         | 9–14 kHz (LF)                                                                                        |
| <b>Data modulation:</b>        | PSK and MFSK                                                                                         |
| <b>Baud rate:</b>              | 2560–15,360 bits/sec (PSK transmit);<br>140–2400 bits/sec (MFSK transmit and receive)                |
| <b>Addressable modems:</b>     | 100                                                                                                  |
| <b>Processing features:</b>    | Data redundancy<br>1/2 rate convolutional coding<br>Multipath guard period                           |
| <b>Operating temperature:</b>  | -5°C to 50°C                                                                                         |
| <b>Storage temperature:</b>    | -45°C to 80°C (Refer also to "Battery Pack" on page 2-3.)                                            |
| <b>Serial interface:</b>       | RS-232/422 at 9600, 4800, 2400, or 1200 baud                                                         |
| <b>Power/serial connector:</b> | Subconn MCLPIL9M inline, for RS-232 and RS-422 serial interface and external DC input power          |
| <b>Flow control:</b>           | RS-232—hardware RTS/CTS handshaking or software XON/XOFF<br><br>RS-422—software XON/XOFF handshaking |
| <b>Device enable:</b>          | Active low, open collector output. Maximum sink current is 80 mA. Maximum applied voltage is 40 VDC. |

## Power Requirements

|                                      |                                                                            |
|--------------------------------------|----------------------------------------------------------------------------|
| <b>Lowpower state current:</b>       | 0.5 mA typical, 1.0 mA maximum                                             |
| <b>DSP/receiver current, active:</b> | 25 mA typical                                                              |
| <b>Transmitter current, active:</b>  | 1 A average, 3 A peak @ 21 V (MF, HF)<br>2 A average, 5 A peak @ 21 V (LF) |

## Transducer

|                                                               |                               |
|---------------------------------------------------------------|-------------------------------|
| <b>Type:</b>                                                  | Built-in omnidirectional (LF) |
| <b>Source level @ 22.5 V (typ.):</b>                          | 190 dB re 1 $\mu$ Pa @ 1 m    |
| <b>Source level @ 16.5 V,<br/>end of battery life (typ.):</b> | 187 dB re 1 $\mu$ Pa @ 1 m    |

## Battery Pack

The battery pack used in the SR-100 is composed of 30 alkaline “D” cells, where two sets of 15 series-connected cells are wired in parallel.

|                              |               |
|------------------------------|---------------|
| <b>Capacity:</b>             | 28 A·h @ 21°C |
| <b>Open circuit voltage:</b> | 22.5 V        |



**NOTE** The energy capacity of a stored battery pack *decreases* with *increasing* temperature. To maintain relative freshness and optimal battery pack life during long term storage, always store a fresh battery pack, or a SR-100 with a fresh battery pack installed, in a cool environment. A storage temperature between 10°C and 25°C is recommended.



# 3 Setup, Deployment and Recovery

This section provides instructions on how to unpack the Benthos SR-100 SMART Release, test the release mechanism, connect the SR-100 to an instrument, and deploy and recover the SR-100.

## Unpacking and Inspection

The SR-100, a drop link and this manual are carefully packed in a sealed box. Additional drop links, battery packs and other optional components may be included, depending on the order. Carefully inspect the box for any signs of external damage and immediately report any damage to Benthos and to the freight carrier.

After inspecting the box, locate and remove the packing list, which is on the outside of the box. While referring to the packing list, carefully remove the contents of the box, checking the items against the packing list to verify that all the items on the list are included. Inspect the items for any physical damage that might have occurred during shipment. Immediately report any damage to Benthos and to the freight carrier.

## Testing the Release Mechanism

The SR-100 is switched on and armed, and the release mechanism tested, using a single rotary switch that is located on the release end cap as shown in Figure 3-1. The release mechanism should always be tested both manually and by acoustic command in air before deploying the SR-100. The rotary switch is operated using a coin or screw driver. An arrow stamped on the switch indicates its position. There are three switch positions, and they function as follows:

### **HOLD (EXTEND):**

The SR-100 is switched off. When switching to this position, the release pin will extend if it is not already extended. The SR-100 should always be stored with the rotary switch in this position.



**Figure 3-1 The Rotary Switch on the Release End Cap—Shown in the HOLD (EXTEND) Position**



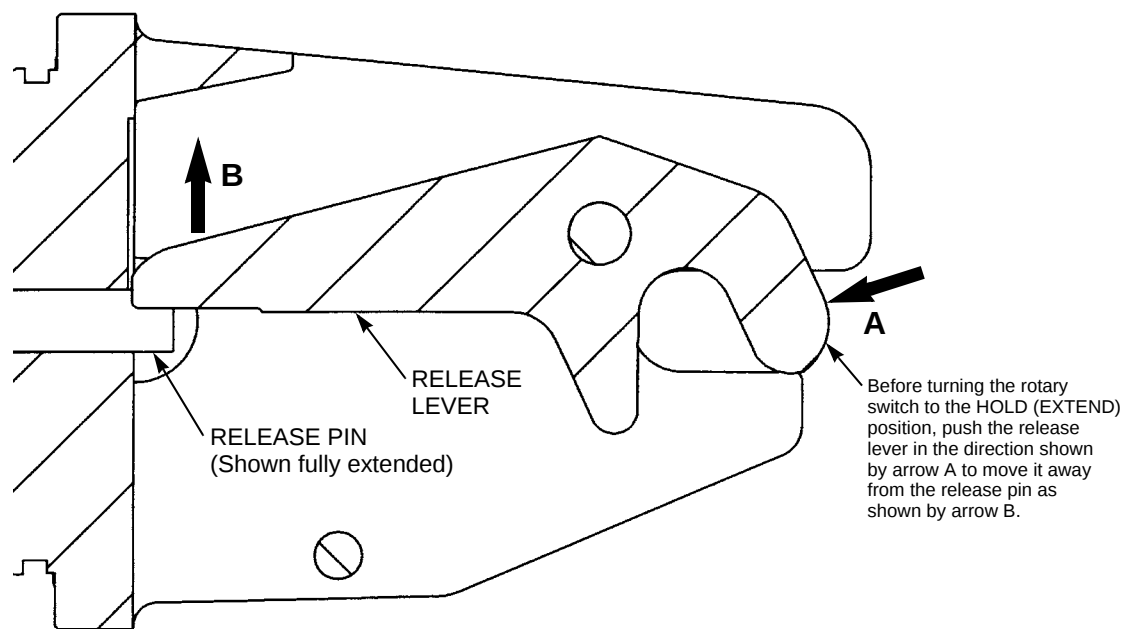
**WARNING** Before turning the rotary switch to the HOLD (EXTEND) position, swing the release lever out of the way of the release pin—so that the pin will not jam into the end of the lever—by pushing and holding the release lever in the direction shown in Figure 3-2. Failure to position the lever in this manner will trip the fuse and may cause damage to the release mechanism. For the location of the fuse, refer to Figure 4-2 on page 4-3. The fuse is resettable and resets itself once the condition that caused it to trip is eliminated.

**ON (ARMED):**

The SR-100 is switched on. The SR-100 must always be deployed with the rotary switch in this position.

**TEST (RETRACT):**

The SR-100 is switched on. When switching to this position, the release pin will retract to verify operation of the release mechanism and to allow reloading of an expendable link.



**Figure 3-2 Swinging the Release Lever away from the Release Pin**

## Testing the Release Mechanism Manually

Before the release mechanism can be tested manually, the rotary switch must be in either the HOLD (EXTEND) or the ON (ARMED) position with the release pin in its fully extended position as shown in Figure 3-2.



**NOTE** If the release pin is not in its fully extended position, push and hold the release lever in the direction shown in Figure 3-2, and then turn the rotary switch to the HOLD (EXTEND) position. The release pin should fully extend.

To test the release mechanism manually, turn the rotary switch to the TEST (RETRACT) position. The release pin should fully retract, allowing the release lever to swing free.

## Testing the Release Mechanism by Acoustic Command in Air

An ATM-891 Deck Box and a remote transducer are required to test the release mechanism by acoustic command in air. The ATM-891 must also be connected to a computer running Telesonar PC or a terminal program such as ProComm Plus. In addition, before the release mechanism can be tested, the rotary switch must be in the ON (ARMED) position with the release pin in the fully extended position as shown in Figure 3-2.



**NOTE** If the release pin is not in its fully extended position, push and hold the release lever in the direction shown in Figure 3-2, and then turn the rotary switch to the HOLD (EXTEND) position. The release pin should fully extend. Then turn the rotary switch to the ON (ARMED) position.

To test the release mechanism by acoustic command in air:

1. Refer to Section 4, "Setup and Test," of the "Acoustic Telemetry Modems User's Manual" and set up the ATM-891 Deck Box.
2. Place the remote transducer used with the ATM-891 within a foot of the SR-100 transducer. Be sure no obstacles are between the transducers.
3. Switch the AC ON/OFF switch on the front panel of the ATM-891 to ON, or switch on the DC power supply.



**NOTE** When testing the release mechanism by acoustic command in air, should the release mechanism not activate, vary the separation of the transducers. In addition, it may be required to change the transmit power level of the ATM-891 Deck Box, usually to a lower level. The transmit power level is set by using the Set Register command (ATSn=n) to change the setting of S Register 6 when using a terminal program. For instructions on how to use the Set Register command, refer to Section 6, "Modem Operating Modes and Commands," of the "Acoustic Telemetry Modems User's Manual." Refer also to Section 7, "Modem Operating Parameters (S Registers)" for information on the available transmit power level settings provided by S Register 6. If using Telesonar PC, refer to Section 5, "Telesonar PC," of the manual.

4. If using a terminal program, send the Release command by typing AT\$Rn,m [Enter], where n is the address of the SR-100 and m is the release code. The factory default address is 0, and the release code is the serial number of the SR-100 and is printed on the label that is

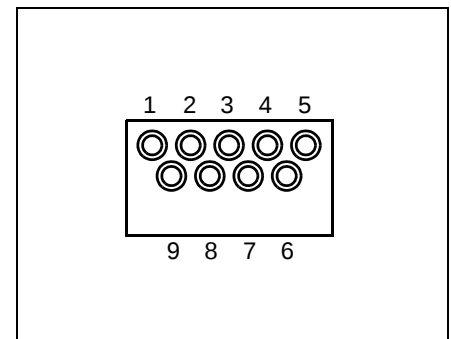
attached to the housing. If using Telesonar PC, refer to Section 5, "Telesonar PC," of the "Acoustic Telemetry Modems User's Manual" for instructions on how to send a Release command.

The message "Valid release code-waiting for confirmation..." should be displayed, and the release pin should fully retract, allowing the release lever to swing free. After the pin has fully retracted, "RELEASED and CONFIRMED" should be displayed if using a terminal program, or if using Telesonar PC, an indication in the Main window should be displayed.

## Connecting the SR-100 to an Instrument

Connecting the SR-100 to an instrument requires making the serial interface connections to the instrument and, if required, the DC power connections.

The power and serial interface connections are made to the SR-100 using the power/serial connector which is located on the release end cap as shown in Figure 3-4. Either an RS-232 or an RS-422 serial interface connection can be made. The power/serial connector pin orientation is shown in Figure 3-3, and the pinout information is shown in Table 3-1. The power/serial connector is a 9-pin Subconn MCLPIL9M inline connector which requires a Subconn MCLPIL9F mating connector pigtail.



**Figure 3-3 SR-100 Power/Serial Connector**

To connect the SR-100 to an instrument using the RS-232 or RS-422 serial interface, and if required, to external DC power, refer to the pinout information provided in Table 3-1 and to the connector information provided with the instrument. In addition, a power/serial cable is provided which includes a mating Subconn MCLPIL9F connector and a DB9 connector for connecting the RS-232 serial interface to a PC and to a DC power supply. The pinout information for this cable is shown in Table 3-2 on page 3-7. In addition, the red lead of the cable connects to Pin 1 (21–28 VDC), and the black lead, to Pin 3 (Common Ground) of the MCLPIL9F connector.



**NOTE** When the SR-100 is switched on, the internal batteries automatically power the SR-100 when there is no external power or if the external power drops below 22 VDC.



**Figure 3-4 Location of the Power/Serial Connector**

**Table 3-1 SR-100 Power/Serial Connector Pinouts**

| PIN | LABEL     | FUNCTION                          | SIGNAL DIRECTION                  |
|-----|-----------|-----------------------------------|-----------------------------------|
| 1   | Power     | External Power Input (21–28 VDC)  | To Modem                          |
| 2   | —         | Reserved                          | —                                 |
| 3   | GND       | Common Ground                     |                                   |
| 4   | TX(+)     | RS-422 Transmit(+)                | Modem to Instr                    |
| 5   | DE        | Device Enable (See NOTE below.)   | Modem to Instr                    |
| 6   | RTS/RX(+) | Request to Send/RS-422 Receive(+) | Modem to Instr/<br>Instr to Modem |
| 7   | TX(-)     | RS-422 Transmit(-)                | Modem to Instr                    |
| 8   | RXD       | RS-232 Receive                    | Instr to Modem                    |
| 9   | TXD/RX(-) | RS-232 Transmit/RS-422 Receive(-) | Modem to Instr/<br>Instr to Modem |



**NOTE** Refer to Section 6, "Modem Operating Modes and Commands," of the "Acoustic Telemetry Modems User's Manual" for more information on the Device Enable output.

**Table 3-2 SR-100 Power/Serial Cable to DB-9 Pin-to-Pin Connections**

| SR-100<br>POWER/SERIAL<br>CONNECTOR |       |                 | SIGNAL<br>DIRECTION | PC DB-9<br>CONNECTOR |       |               |
|-------------------------------------|-------|-----------------|---------------------|----------------------|-------|---------------|
| PIN                                 | LABEL | FUNCTION        |                     | PIN                  | LABEL | FUNCTION      |
| 3                                   | GND   | Common Ground   |                     | 5                    | GND   | Ground        |
| 6                                   | RTS   | Request to Send | Modem to PC         | 8                    | CTS   | Clear to Send |
| 8                                   | RXD   | Receive         | PC to Modem         | 3                    | TXD   | Transmit      |
| 9                                   | TXD   | Transmit        | Modem to PC         | 2                    | RXD   | Receive       |

## Deploying the SR-100

Before deploying the SR-100, a drop link should be installed, the SR-100 must be armed, its status should be checked after arming, some important deployment considerations should be verified, and a few predeployment checks should be performed. Some of these checks require accessing the inside of the housing. For instructions on how to open and close the housing and how to replace the battery pack and O-rings, refer to "Replacing the Battery Pack and/or O-Rings" on page 4-2. After completing these tasks, deploy the SR-100 and its mooring.

### Installing a Drop Link and Arming the SR-100

The drop link part number is B-855-186. One drop link is included with the SR-100.

To install a drop link and arm the SR-100:

1. Turn the rotary switch to the TEST (RETRACT) position.  
The release pin should fully retract.
2. Install the drop link into the slot of the release mechanism such that it rests in the slot of the release lever.
3. Push and hold the release lever in the direction shown in Figure 3-2 on page 3-3 while turning the rotary switch to the HOLD (EXTEND) position.  
The release pin should fully extend, locking the drop link in place.
4. Turn the rotary switch to the ON (ARMED) position.

## Checking the Status of the SR-100

The Release Status command can be sent to the SR-100 at any time to check its status, even after it has been released. The status information is displayed at the command prompt when using a terminal program, or as indicators when using Telesonar PC. The command prompt displays are the following:

**ARMED.** Displayed when no Release command has been received.

**RELEASED and CONFIRMED.** Displayed when the release mechanism has been activated and the SR-100 has released from its mooring.

**RELEASED and NOT CONFIRMED.** Displayed when the release mechanism has been activated but the SR-100 has not released from its mooring.

**Tilt Sensor: Tilted.** Displayed when the SR-100 is tilted at a angle of greater than 25° from vertical.

**Tilt Sensor: OK.** Displayed when the SR-100 is not tilted or is tilted at an angle of less than 25° from vertical.

**Battery: Low.** Displayed when the battery is low and should be replaced.

**Battery: OK.** Displayed when the battery is not low and does not need to be replaced.

To check the status of the SR-100:

1. Refer to Section 4, "Setup and Test," of the "Acoustic Telemetry Modems User's Manual" and set up the ATM-891 Deck Box.
2. Place the remote transducer used with the ATM-891 within a foot of the SR-100 transducer. Be sure no obstacles are between the transducers.
3. Switch the AC ON/OFF switch on the front panel of the ATM-891 to ON, or switch on the DC power supply.
4. If using a terminal program, send the Release Status command by typing AT\$Tn [Enter], where n is the address of the SR-100. If using Telesonar PC, refer to Section 5, "Telesonar PC," of the "Acoustic Telemetry Modems User's Manual" for instructions on how to send the Release Status command.

The status should be displayed if using a terminal program, or if using Telesonar PC, corresponding indications in the Main window should be displayed.

## Verifying Some Important Deployment Considerations

Before deploying the SR-100, verify the following important deployment considerations:

- The SR-100 is isolated from its mounting to avoid or reduce corrosion from contact with dissimilar metals.
- The static and dynamic loads are within the specified ratings as described in "About Static and Dynamic Loading" below.
- The tether securing the SR-100 to the mooring is of sufficient length to avoid a collision with the mooring during deployment.
- There will be a clear acoustic path to the surface within the specified maximum range, where this range is the slant range from the transmitting transducer on the surface to the SR-100.



---

**WARNING** Verify that the rotary switch is turned to the ON (ARMED) position before deploying the SR-100, and that the release pin is in its fully extended position as shown in Figure 3-2.

---



---

**NOTE** For additional deployment considerations refer to Section 3, "Deployment Considerations" of the "Acoustic Telemetry Modems User's Manual."

---

## Performing the Predeployment Checks

Before deploying the SR-100, perform the following predeployment checks:

- Inspect the SR-100 for possible damage from a previous deployment.
- Remove the release end cap and verify that the O-rings are not scratched and that they are clean and lightly lubricated.
- Disconnect the battery pack connector and measure the battery pack voltage. The voltage should be 22.5 VDC or greater. If required, replace the battery pack.
- Verify that the sacrificial bar anode is not excessively corroded. If required, replace the anode as described in "Installing the Sacrificial Bar Anode" on page 4-8.

- Test the release mechanism manually as described in "Testing the Release Mechanism Manually" on page 3-3. Then re-arm the release mechanism as described in "Installing a Drop Link and Arming the SR-100" on page 3-7.
- Test the release mechanism by acoustic command in air as described in "Testing the Release Mechanism by Acoustic Command in Air" on page 3-4. Then re-arm the release mechanism as described in "Installing a Drop Link and Arming the SR-100" on page 3-7.
- Verify that the SR-100 is armed as described in "Checking the Status of the SR-100" on page 3-8. If using a terminal program, "ARMED" should be displayed. If using telesonar PC, the corresponding indicator should be displayed.

## About Static and Dynamic Loading

The SR-100 is a deep water, high load bearing release with a load capacity of 4540 kg (10,000 lb). However, it is important to understand the definition of loading. First, all specified loads are axial. In addition, prior to shipment, the SR-100 is tested in a load frame. Tension is first brought to 4540 kg (10,000 lb), and then reduced to 3000 kg (6,600 lb), at which point an acoustic command is given to release. The SR-100 design has been performance tested to failure and, typically, the release lever will fail at around 6820 kg (15,000 lb). Therefore a significant margin of safety is included in the rating in the event of an overload.



**NOTE** Each time a load is released between 3000 kg (6600 lb) and 4540 kg (10,000 lb) there will be slight removal of metal from the release lever tip and the release pin as they move past each other during release activation. The lever and pin should be inspected each time there is a release in this tension range.

Conventional oceanographic mooring design typically employs hardware which will either experience static or dynamic loading. Static loads typically incorporate a 2:1 safety margin, and dynamic loads usually have a 5:1 factor of safety in the design. The 4540 kg (10,000 lb) rating of the SR-100 is applied to the maximum load under any conditions. Therefore, if only static loading is expected and it is desired to work within a 2:1 safety margin, the maximum expected working load should be 2270 kg (5000 lb). Similarly, for dynamic loads, the maximum expected working load should 900 kg (2000 lb).

## Recovering the SR-100

An ATM-891 Deck Box and a remote transducer are required to recover the SR-100.

To recover the SR-100:

1. Refer to Section 4, "Setup and Test," of the "Acoustic Telemetry Modems User's Manual" and set up the ATM-891 Deck Box.
2. Lower the remote transducer used with the ATM-891 into the water.
3. Switch the AC ON/OFF switch on the front panel of the ATM-891 to ON, or switch on the DC power supply.
4. If using a terminal program, repeatedly send the Range command by typing `ATRn [Enter]`, where `n` is the address of the SR-100, until the range can be acquired to the SR-100. If using Telesonar PC, refer to Section 5, "Telesonar PC," of the "Acoustic Telemetry Modems User's Manual" for instructions on how to acquire the range to the SR-100 using Auto Range.



---

**WARNING** The range is the slant, or direct, distance from the remote transducer to the SR-100, not the horizontal distance.

---

5. While continuing to acquire range, navigate the vessel to position it such that it will be easy to sight the instrument array once it surfaces yet ensure it will surface a safe distance from the vessel.
6. If using a terminal program, send the Release command by typing `AT$Rn,m [Enter]`, where `n` is the address of the SR-100 and `m` is the release code. If using Telesonar PC, refer to Section 5, "Telesonar PC," of the "Acoustic Telemetry Modems User's Manual" for instructions on how to send a Release command.

If using a terminal program, the message "Valid release code-waiting for confirmation..." should be displayed. If the release code is incorrect, the message "Invalid release code" will be displayed, instead.

If the correct release code was received, the next message displayed should be "RELEASED and CONFIRMED," which acknowledges that the release mechanism has been activated and that the SR-100 has released itself from its mooring. If, instead, the message "RELEASED and NOT CONFIRMED" is displayed, the release mechanism has been activated but the SR-100 has not released itself from its mooring.



# 4 Maintenance and Troubleshooting

This section encompasses the recommended care and maintenance procedures for the SR-100 SMART Release. Adherence to these procedures will help to ensure years of continuous, reliable performance. In addition, a troubleshooting guide is provided which will assist in isolating and correcting some of the basic operational problems that could occur when testing the release mechanism.

The care and maintenance of the SR-100 primarily involves three tasks: general cleaning and inspection, replacing the battery pack and installing or replacing the sacrificial bar anode. The tools required to perform these tasks include the following:

- ***(2) 3/4-inch adjustable wrenches***
- ***3/8-inch adjustable wrench***
- ***Silicone O-ring lubricant***
- ***Alcohol wipes***
- ***Paper towels***
- ***Digital multimeter***

## General Cleaning and Inspection

After retrieving the SR-100, clean and inspect it as follows:

1. Wash down the SR-100 with clean, *fresh* water and remove any debris that may have become attached to the housing.
2. Unplug the cable from the power/serial connector, inspect and clean the cable, and then clean the connector with an alcohol wipe.
3. Lubricate the power/serial connector pins with a light coat of silicone lubricant and install the supplied dummy plug.



**NOTE** Be especially careful not to get any lubricant on the face of the transducer as this will severely degrade its performance.

4. Clean the transducer with a mild, non-abrasive detergent, being careful to remove any buildup. After cleaning, spray the transducer again with fresh water.



**NOTE** Do not use an ammonia-based cleaner such as a glass cleaner to clean the transducer.

5. Carefully inspect the transducer for any signs of damage.
6. Using a cloth or paper towel, dry the SR-100 thoroughly.

## Replacing the Battery Pack and/or O-Rings

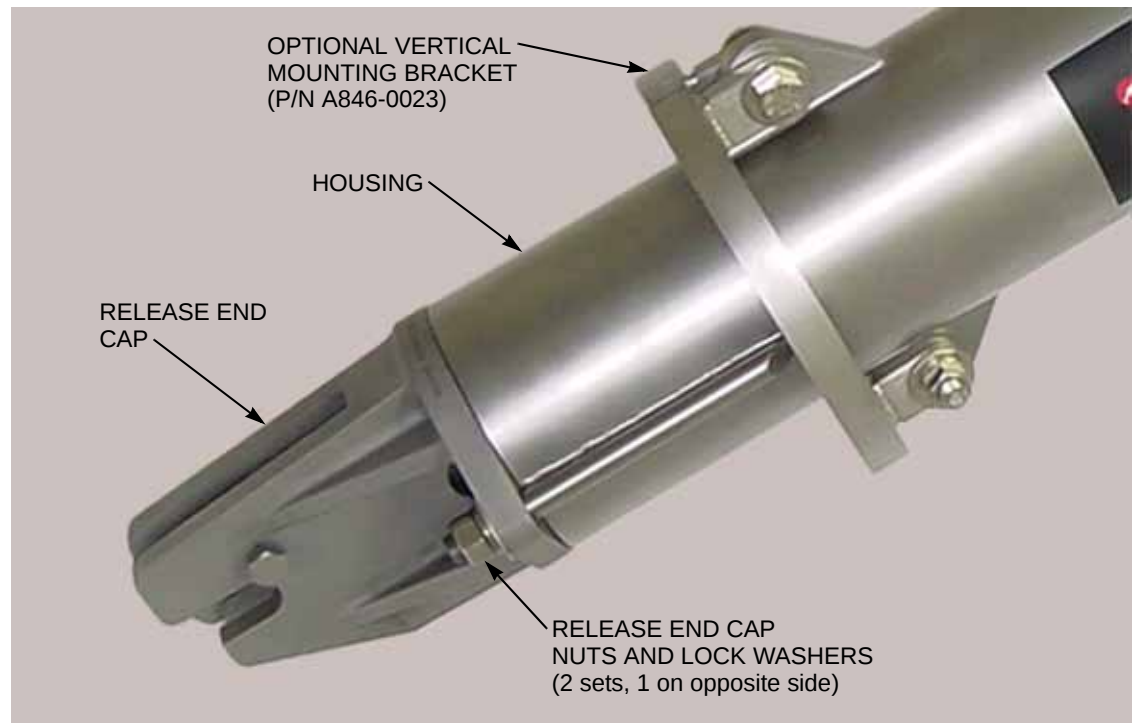
To replace the battery pack, the O-rings, or both, the release end cap and the battery pack and electronics chassis assembly must be completely removed from the housing.

To replace the battery pack or the O-rings:

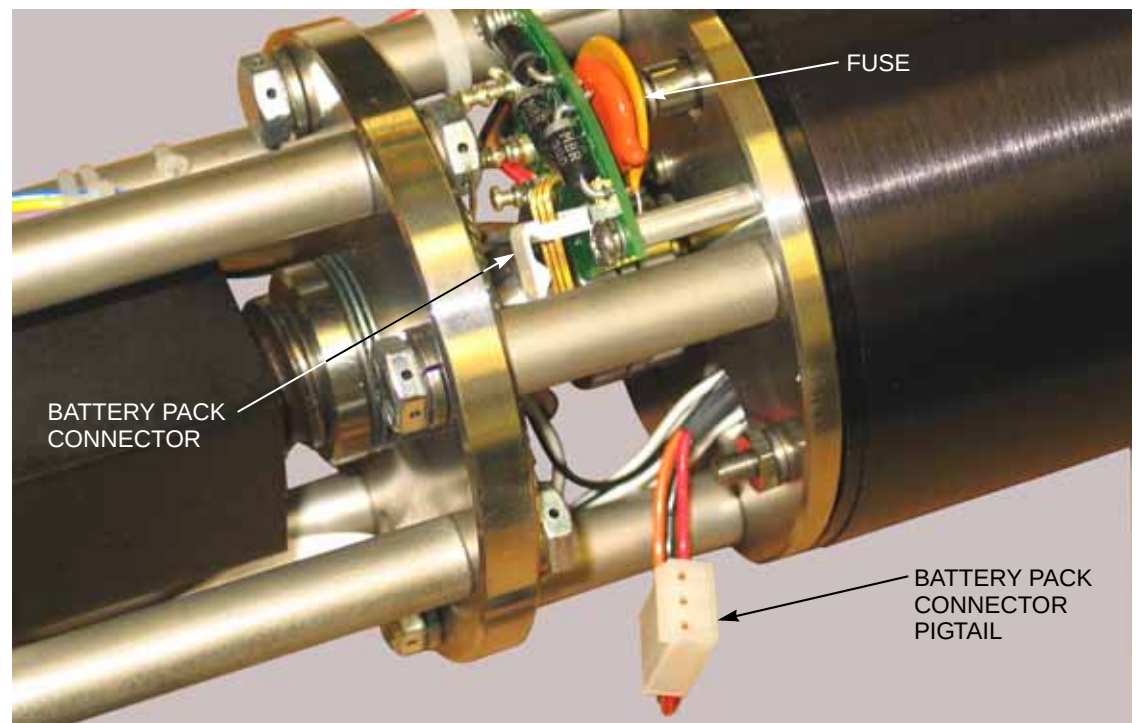
1. Lay the SR-100 down in a clean, dry work area.
2. If the release pin is not in its fully extended position, push and hold the release lever in the direction shown in Figure 3-2 on page 3-3, and then turn the rotary switch to the HOLD (EXTEND) position.

The release pin should fully extend.

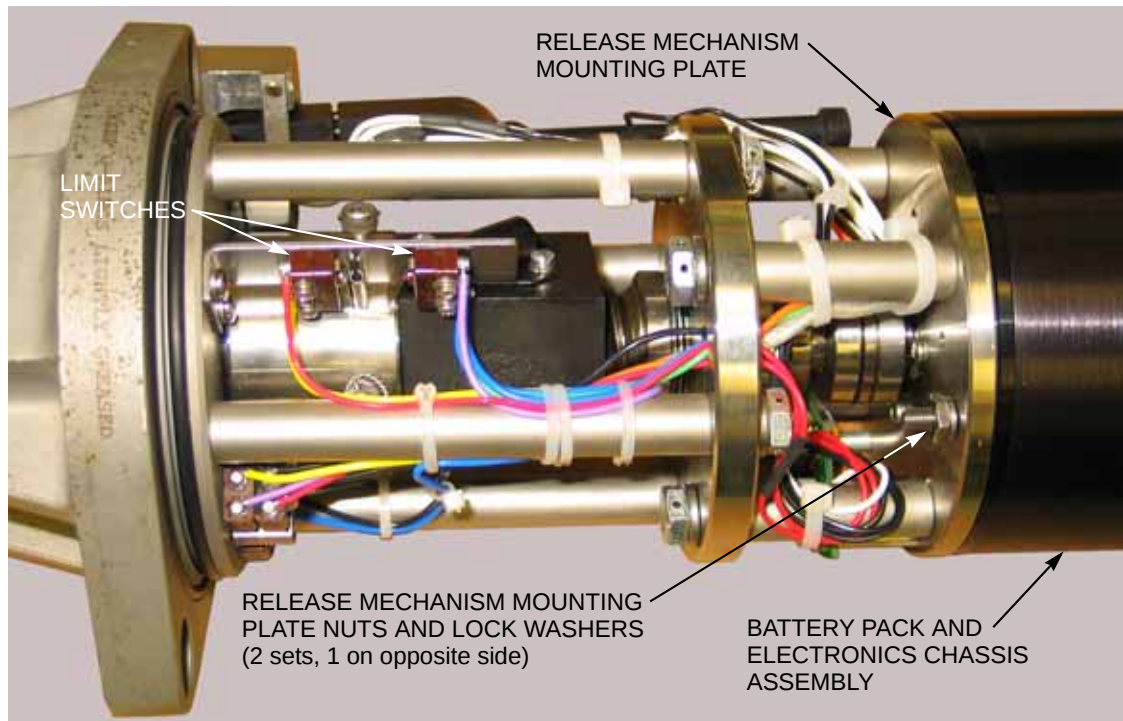
3. Using the 3/4-inch adjustable wrench, remove the two sets of hardware that secure the release end cap to the housing—two each a nut and lock washer, as shown in Figure 4-1.
4. Grasp the housing with one hand and carefully pull the release end cap away from the housing with the other, being careful not to scratch the O-ring surface on the inside of the housing, until the entire release assembly and the battery pack and electronics chassis assembly are removed from the housing.
5. If just replacing the O-rings, go to Step 22.
6. Unplug the battery pack connector pigtail from the battery pack connector as shown in Figure 4-2.
7. Using the 3/8-inch adjustable wrench, remove the two sets of release mechanism mounting plate hardware—two each a nut and lock washer, as shown in Figure 4-3 on page 4-4.



**Figure 4-1 Location of Hardware that Secures the Release End Cap to the Housing**

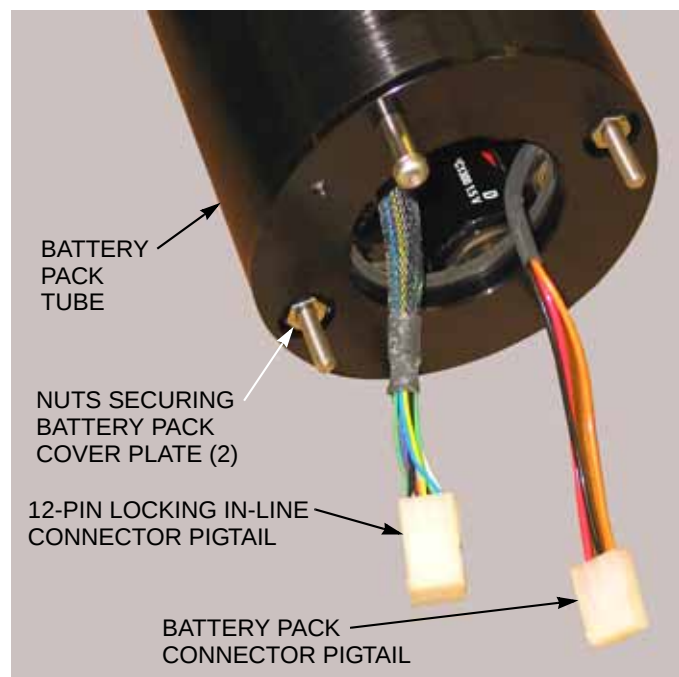


**Figure 4-2 Battery Pack Connector and Battery Pack Connector Pigtail**

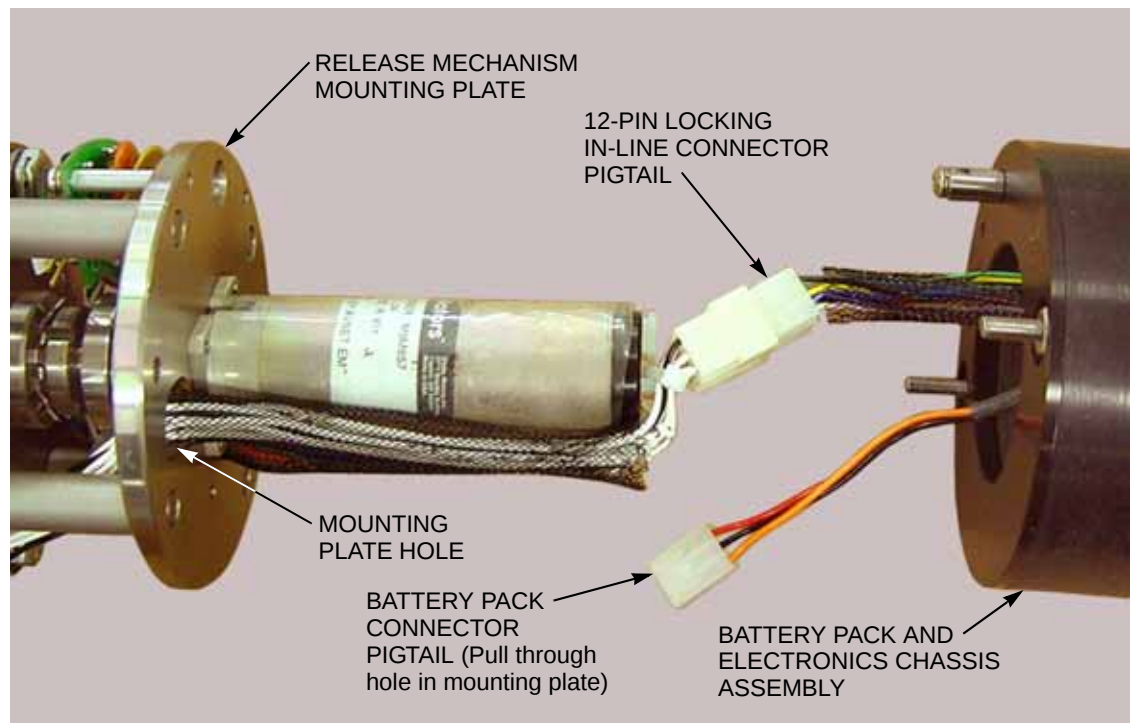


**Figure 4-3 Location of Release Mechanism Mounting Plate Hardware, Battery Pack and Electronics Chassis Assembly, and Limit Switches**

8. Slide the battery pack and electronics chassis assembly away from the release mechanism mounting plate while carefully pulling the battery pack connector pigtail through the hole in the mounting plate as shown in Figure 4-5 on page 4-5.
9. Disconnect the 12-pin locking in-line connector pigtail.
10. Remove the two nuts that secure the battery pack cover plate to the battery pack tube as shown in Figure 4-4.

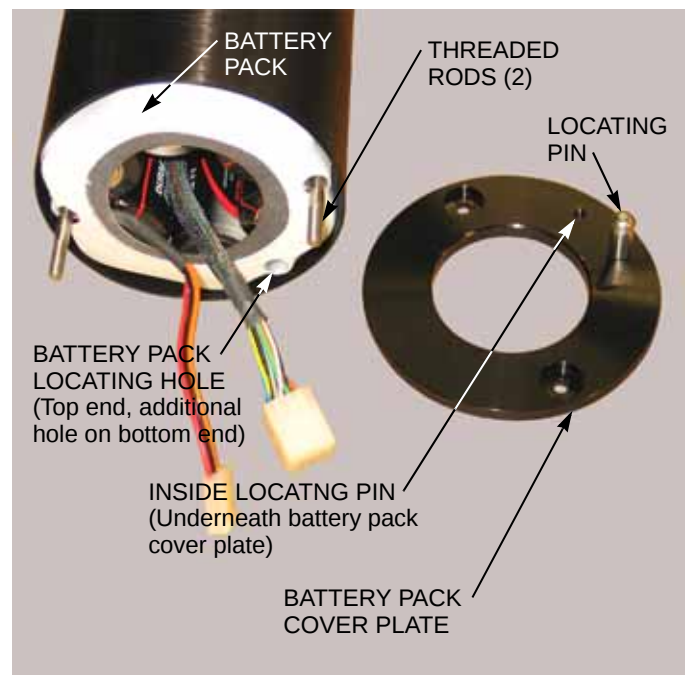


**Figure 4-4 Nuts Securing Battery Pack Cover Plate to Battery Pack Tube**



**Figure 4-5 Removing the Battery Pack and Electronics Chassis Assembly from the Release Mechanism Mounting Plate**

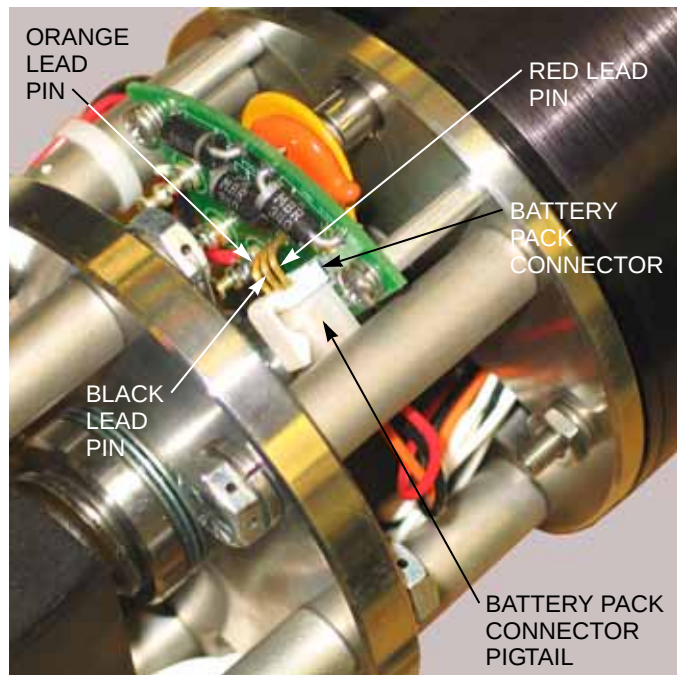
11. Remove the battery pack cover plate as shown in Figure 4-6, and then slide the battery pack tube off the battery pack.
12. Remove the old battery pack by sliding it off the two threaded rods.
13. While aligning the locating hole in the bottom end of the new battery pack (opposite battery pack connector pigtail end) with the locating pin on the electronics chassis mounting plate, slide the battery pack over the threaded rods such



**Figure 4-6 Battery Pack Cover Plate Removed**

that the locating pin fully inserts into the locating hole and the 12-pin locking in-line connector pigtail passes through the center of the battery pack and extends out the top end along with the battery pack connector pigtail.

14. Install the battery tube over the battery pack.
15. Pass both connector pigtails through the hole in the battery pack cover plate and assemble the plate to the battery pack tube such that the inside locating pin on the plate aligns with the locating hole in the top end of battery pack, and then secure the plate with the two nuts.
16. Connect the 12-pin locking in-line connector pigtail.
17. Insert the battery pack connector pigtail through the hole in the release mechanism mounting plate, and while ensuring that the locating pin on the battery pack cover plate inserts into the locating hole in the mounting plate, assemble the battery pack and electronics chassis assembly to the mounting plate using the two sets of nuts and lock washers.
18. Connect the battery pack connector pigtail to the battery pack connector. Be sure it is secure.
19. Set the digital multimeter to DC Volts and touch the ground probe to the battery pack connector pin that connects to the black lead (center pin) of the battery pack connector pigtail, and the positive probe to the connector pin that connects to the red lead. Refer to Figure 4-7.  
  
The voltage should be 22.5 VDC or greater.
20. Touch the positive probe of the digital voltmeter to the connector pin that connects to the orange lead.



**Figure 4-7 Checking the Battery Pack Voltage**

The voltage should be 22.5 VDC or greater.

21. Push and hold the release lever in the direction shown in Figure 3-2 on page 3-3, and then turn the rotary switch to the HOLD (EXTEND) position.

The release pin should fully extend.

22. Inspect the O-rings. They should be free of any scratches, nicks or dirt. Inspect the O-ring surfaces on the housing. They should also be free of any scratches, nicks or dirt.

Wipe the O-rings clean with an alcohol wipe and apply a thin coat of silicone lubricant. Replace any O-ring that appears cracked or nicked.



---

**WARNING** Apply only a thin coat of silicone lubricant. Too much lubricant could displace the O-ring when it is under pressure.

---

When replacing an O-ring, first clean the O-ring surfaces on the housing and the release end cap with a clean, lint-free cloth or paper towel, and then apply a thin coat of silicone lubricant to the new O-ring before installing it onto the end cap.

23. Slide the release assembly and the battery pack and electronics chassis assembly into the housing, being careful not to scratch the O-ring surface on the inside of the housing, and leave a small space between the release end cap and the housing for purging with dry gas (recommended).
24. Purge the inside of the housing with dry nitrogen gas (recommended), and then quickly press the release end cap into the housing.
25. Secure the release end cap to the housing using the two nuts and two lock washers.

## Installing the Sacrificial Bar Anode

The duplex stainless steel 17-4 housing of the SR-100 is highly resistant to corrosion during long deployments in seawater. However, the housing should still be isolated from dissimilar metals comprising the other parts of the mooring assembly.

Duplex stainless steel 17-4, like all stainless steels, is increasingly susceptible to crevice corrosion as seawater temperatures increase in aerobic (shallow water) environments. The area most prone to this corrosion is on the threaded rods under the nuts, flat washers and lock washers securing the release end cap to the housing. As a result of continual testing and customer feedback, the SR-100 includes two pairs of mounting pad eyes and a sacrificial bar anode to eliminate the initiation of any crevice corrosion.



---

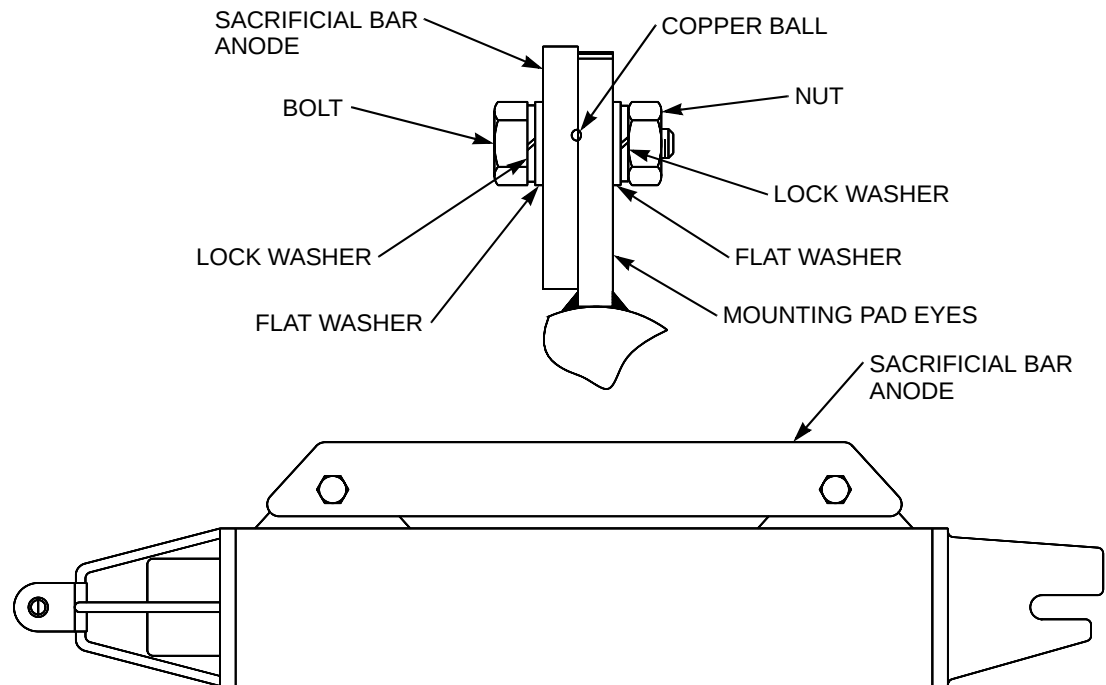
**WARNING** To maintain warranty coverage, the sacrificial bar anode must be installed when the SR-100 is deployed in water depths of less than 150 m (492 ft) when combined with a surrounding water temperature of 15°C or greater. In deep, cold water, although the sacrificial bar anode is not required, its use will add to the existing margin of corrosion protection.

---

The sacrificial bar anode has proved effective in applications where the water depth is as shallow as 12 m (39.4 ft) and the water temperature is as high as 38°C. The sacrificial bar anodes have also proved effective in water depths of 80 m (262.4 ft) combined with water temperatures of 23°C.

To install the sacrificial bar anode:

1. Ensure that all contact surfaces of the pad eyes and the sacrificial bar anode are clean. If necessary, clean the surfaces with alcohol and remove rust with fine sandpaper.
2. While placing one of the supplied copper balls in the indent of one end of the sacrificial bar anode, attach the anode to one of the pad eyes using the stainless steel hardware provided—one bolt, one nut, and two each a flat washer and a lock washer, as shown in Figure 4-8.
3. Using the two 3/4-inch adjustable wrenches, tighten the hardware securely.



**Figure 4-8** *Installing the Sacrificial Bar Anode across One of Two Pairs of Mounting Pad Eyes*

4. Repeat Steps 2 and 3 for the other pad eye.
5. Set the digital multimeter to Ohms and measure the continuity between the sacrificial bar anode and the housing.

The resistance should be less than one ohm.

## Troubleshooting

If the SR-100 release mechanism fails to operate when testing the release mechanism manually or by acoustic command in air, use the troubleshooting guide below to quickly isolate some basic operational problems that could occur. However, should further help be required, contact Benthos directly. Refer to "Customer Service" on page vi for information on how to contact Benthos.

**The release mechanism fails to operate when it is tested manually by turning the rotary switch to the TEST (RETRACT) position.**

- A.** The battery pack voltage is too low.

Verify that the battery pack voltage is greater than 16.5 VDC. For a fresh battery pack, the voltage should be 22.5 VDC or greater.

- B.** The motor fuse has tripped due to an over current condition which could be caused by a jammed release lever pin.

Check the release pin for jamming, turn the rotary switch to the HOLD (EXTEND) position, wait approximately one minute, and then test again.



**NOTE** The SR-100 uses a resetable fuse which resets itself once the over current condition is eliminated. This fuse is shown in Figure 4-2 on page 4-3.

- C.** The rotary switch or one or both of the limit switches are faulty.

Check the rotary switch and the two limit switches. The limit switches are shown in Figure 4-3 on page 4-4.

**The release mechanism operates when testing it manually by turning the rotary switch to the TEST (RETRACT) position but fails to operate when testing it by acoustic command in air.**

- A.** The address or the release code, or both, are being entered incorrectly.

Verify that the address and release code are being entered correctly. The factory default address is 0, and the release code is the serial number of the SR-100 and is printed on the label that is attached to the housing.

- B.** The rotary switch is incorrectly positioned.

Verify that the rotary switch is turned to the ON (ARMED) position.

- C.** The transducers are too close together or too far apart.

Move the transducers farther apart or closer together.

- D.** The transmit power level may be too high or too low.

When using a terminal program, use the Remote Power command (AT\$pn,m) to change the transmit power level, usually to a lower level. For instructions on how to use the Remote Power command, refer to Section 6, "Modem Operating Modes and Commands," of the "Acoustic Telemetry Modems User's Manual." If using Telesonar PC, refer to Section 5, "Telesonar PC," of the manual.



# 5 User Replaceable Parts

Below is a list of common user replaceable parts available from Benthos for the SR-100 SMART Release. Refer to "Customer Service" on page vi for information on how to contact Benthos to order parts.

**Table 5-1 SR-100 SMART Release User Replaceable Parts**

| DESCRIPTION        | PART NUMBER   |
|--------------------|---------------|
| Power/Serial Cable | C846-0020     |
| Modem pigtail      | A846-0001     |
| Dummy plug         | 011170        |
| Battery pack       | C846-0004     |
| Anode Kit          | A-855-82      |
| Bushing, bail      | A-855-163     |
| Drop link          | B-855-186     |
| O-ring kit         | 865-ORING-KIT |

