

UAT-376 Series Underwater Acoustic Transponder

**UAT-376
UAT-376/EL**

USER'S Manual

January 2005

Revision A

(P/N 006220)



Benthos, Inc.
49 Edgerton Drive
North Falmouth, MA 02556
www.benthos.com
www.pingers.com

Tel: (508) 563-1000
Fax: (508) 563-6444
e-mail: sales@benthos.com
pingers@benthos.com

Preface

This user's manual provides the necessary information needed to operate and maintain the Benthos UAT-376 Series Underwater Acoustic Transponders. The manual covers the following models:

- **UAT-376** – The base model
- **UAT-376/EL** – The base model UAT-376 configured in a longer housing for additional batteries and extended operating life.

If this is the first time using the UAT-376 Series Underwater Acoustic Transponders, please read the entire manual to become familiar with the unit's operation before deployment. The manual is divided into four sections:

Section 1 Introduction describes the transponder and its typical uses.

Section 2 Specifications lists general specifications for all standard UAT-376 Series Underwater Acoustic Transponders.

Section 3 Deployment covers unpacking, battery installation and transponder configuration for the UAT-376 Series Underwater Acoustic Transponders. The section concludes with brief notes on pre-deployment and maintenance.

Section 4 Warranty Information.

Proprietary Information

The information, descriptions, 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.

Changes

Benthos reserves the right to make changes to meet new specifications at any time without incurring any obligation to modify previously installed units. This manual is provided for informational and reference purposes only and is subject to change without notice.

Notes and Cautions

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

 **Note:** A reminder to check that certain criteria are met before proceeding further in a step or sequence.

 **Caution:** A reminder that dangerous consequences could result if certain recommended procedures are not followed.

Table of Contents

SECTION 1 INTRODUCTION.....	1
1.1 Overview.....	1
1.2 External Construction	2
1.3 Internal Construction	2
1.4 Series Models.....	2
SECTION 2 SPECIFICATIONS.....	3
SECTION 3 DEPLOYMENT	4
3.1 Unpacking and Inspection.....	4
3.2 Transponder Setup	4
Step 2 Transmit Frequency Selection	6
Step 3 Battery Installation.....	6
3.3 Pre-Deployment Check.....	8
3.4 Maintenance	9
SECTION 4 WARRANTY	10

List of Figures

<i>Figure 1 The Benthos UAT-376 Series Underwater Acoustic Transponders</i>	<i>1</i>
<i>Figure 2 The UAT-376 Series Hardware Settings</i>	<i>5</i>
<i>Figure 3 The UAT-376 Series Battery Installation</i>	<i>7</i>

List of Tables

<i>Table 1 Model UAT-376 Series Specifications</i>	<i>3</i>
<i>Table 2 UAT-376 Series Transmit Frequency DIP Switch Settings.....</i>	<i>6</i>

Section 1 Introduction

1.1 Overview

The Benthos UAT-376 Series Underwater Acoustic Transponders offer a versatile array of low-cost sub-sea acoustic markers (Figure 1) for relocation when used with the Benthos Dive Ranger DRI-267A Diver-Operated Transponder Interrogator or other compatible transponder interrogation equipment. The units are capable of receiving a single frequency and replying with one of eight user selectable transmit frequencies. The receive frequency is factory set to work in conjunction with the DRI-267A (Please contact Benthos if other receive frequencies are required).

The Model UAT-376 is a water-activated device and is powered by standard off the shelf alkaline or lithium 9-volt transistor batteries.

The Benthos Model UAT-376/EL is longer than the standard unit, to accommodate more batteries, and functions identically to the Model UAT-376, providing three times the operational life.

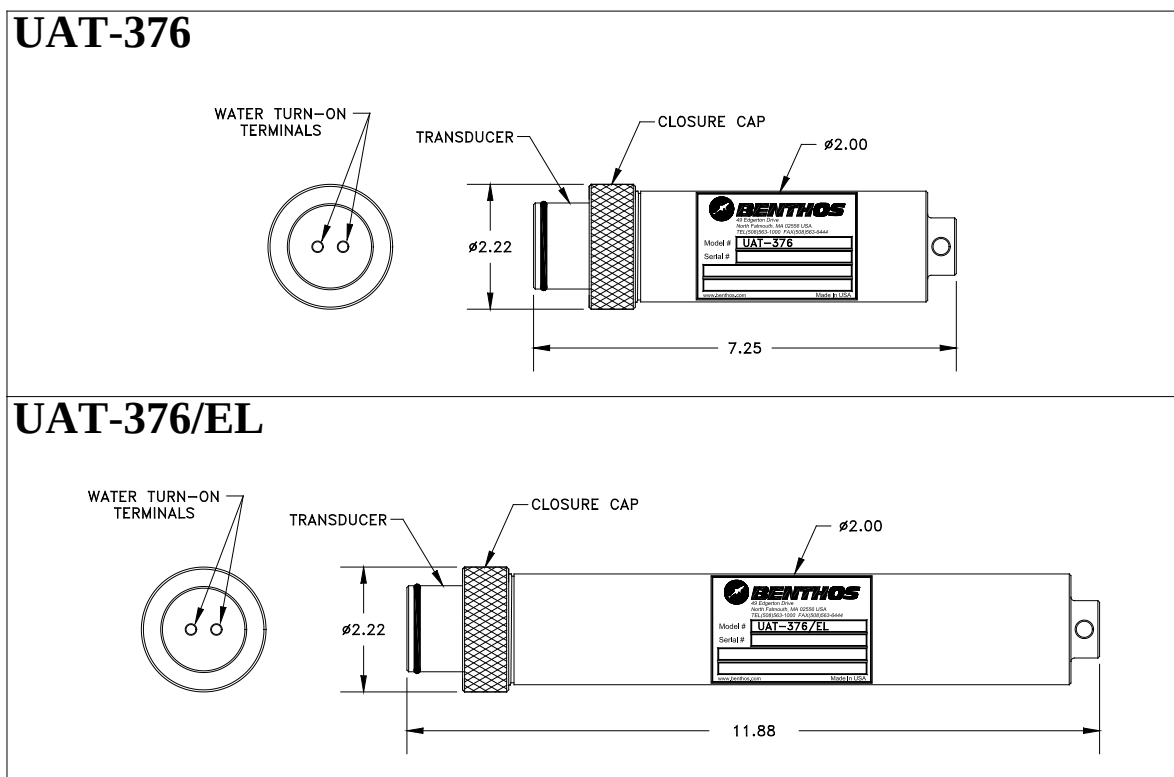


Figure 1 The Benthos UAT-376 Series Underwater Acoustic Transponders

1.2 External Construction

The UAT-376 Series Underwater Acoustic Transponders are small, self-contained units housed in cylindrical, hard-anodized aluminum pressure housings. A removable end-cap assembly includes a transducer and two terminals for the transponder's water-activated switch. Removing the threaded Delrin closure cap provides access to the battery clips and electronics mounted on the inside of the end cap.

A drill-through flange at the other end of the UAT-376 is provided for tethering the transponder to instrumentation or an anchor.

The product label affixed to the housing lists the unit's model number and serial number.

1.3 Internal Construction

The internal components include an electronics assembly and connections for 9-Volt batteries mounted on a single printed circuit board. Two Customer-supplied 9-Volt batteries power the UAT-376 and six Customer-supplied 9-Volt batteries power the UAT-376/EL.

Battery clip(s) are provided to keep the batteries connected when the unit is exposed to shock and vibration. The clip(s) held onto the PCB via an o-ring must be pressed on to the back of the battery that is recessed on the PCB assembly.

There is one user selectable switch located on the printed circuit board to change the transmit frequency. Instructions for battery installation and hardware settings are given in Section 3.2.

1.4 Series Models

- | | |
|-----------------|---|
| Base Model - | The base model UAT-376 features a range of selectable transmit frequencies. This general-purpose transponder is suited for applications such as long-term deployment on offshore moorings. |
| Extended Life - | The UAT-376/EL is a UAT-376 with an extended housing that accommodates four additional batteries. The additional batteries triple the operating life of the transponder. |

Section 2 Specifications

Table 1 Model UAT-376 Series Specifications		
Transmit Frequency:	(corresponding to DRI-267 receive frequencies)	
	CH1 25 kHz	CH2 27 kHz
	CH3 28 kHz	CH4 29 kHz
	CH5 30 kHz	CH6 31 kHz
	CH7 32 kHz	
Transmit Pulse Length:	5.0 mS	
Transmit Lockout Time:	246 mS	
Acoustic Output:	180 db ref 1 μ Pa @ 1 meter	
Receive Frequency:	UAT-376	26.0 kHz (using DRI-267A)
	UAT-376/EL	26.0 kHz (using DRI-267A)
	UAT-376/SX	24.0 kHz (using DRI-267SX) Contact Benthos for this model or other receive frequencies
Receiver Turn-Around Time:	20 mS	
Receiver Bandwidth:	700 Hz	
Receive Sensitivity:	-95 db ref 1 Vrms	
Range (using DRI-267A):	> 2,460 feet (750 meters)	
Operational Depth:	2,460 feet (750 meters)	
Power:	Two 9-Volt alkaline or lithium batteries (Customer Supplied)	
Operational Life:	UAT-376	Alkaline: 4 months or 150,000 replies Lithium: 8 months or 300,000 replies
	UAT-376/EL	Alkaline: 12 months or 450,000 replies Lithium: 24 months or 900,000 replies
Activation:	UAT-376	Water Turn-On contacts
	UAT-376/EL	Upon battery Installation
Dimensions:	UAT-376	7.25 in. (18.5 cm) long 2.0 in. (5.1 cm) diameter
	UAT-376/EL	11.88 in. (30.2 cm) long 2.0 in. (5.1 cm) diameter
Weight:	UAT-376	1.5 pounds (0.68 kg) in air 0.5 pounds (0.23 kg) in water
	UAT-376/EL	2.25 pounds (1.0 kg) in air 1.0 pounds (0.45 kg) in water
Specifications are subject to change.		

Section 3 Deployment

3.1 Unpacking and Inspection

Each UAT-367 Series Underwater Acoustic Transponder is packed in cushioning material and shipped in a sealed cardboard carton. Every effort is made at the factory to pack the equipment to prevent damage during shipment.

The transponder is shipped without batteries and is set to the operating parameters specified by the Customer or randomly set if not specified.

As with any sophisticated electronic equipment, Benthos products should be handled with a reasonable amount of care during unpacking, transporting and storing.

- ◆ Carefully inspect the pinger for physical damage when unpacked, and report any such damage to the freight carrier and to the Benthos sales office at (508) 563-1000.
- ◆ Pay particular attention to make sure that:
 - The seal between the top end cap and the pressure housing is intact.
 - There are no gouges or defects in the transducer or pressure housing itself.
 - The information on the product label tag affixed to the pinger matches the Customer's requested specifications.
 - If the UAT-367 is to be stored for an extended period, do not install the batteries.

3.2 Transponder Setup

Preparing the UAT-367 Series Underwater Acoustic Transponder deployment involves:

- Step 1** Opening the Unit
- Step 2** Transmit Frequency Selection
- Step 3** Battery Installation

Check all switch and battery connections before use to ensure the settings best match the deployment application.

Step 1 Opening the Unit

Follow these procedures to open the unit:

- ◆ Remove the transducer end cap.
 - Unscrew the Delrin closure cap by turning it counterclockwise.

☒ **Note:** Make sure the unit is thoroughly dried before removing the end cap.

 **Caution:** Never use a screwdriver or other prying device to separate the end cap from the housing. Damage to the end cap or housing could result in leakage when deployed.

- ◆ Gently slide the electronics and battery assembly out of the housing.
- ◆ Note the location of the switches for setting the operating parameters (Figure 2).

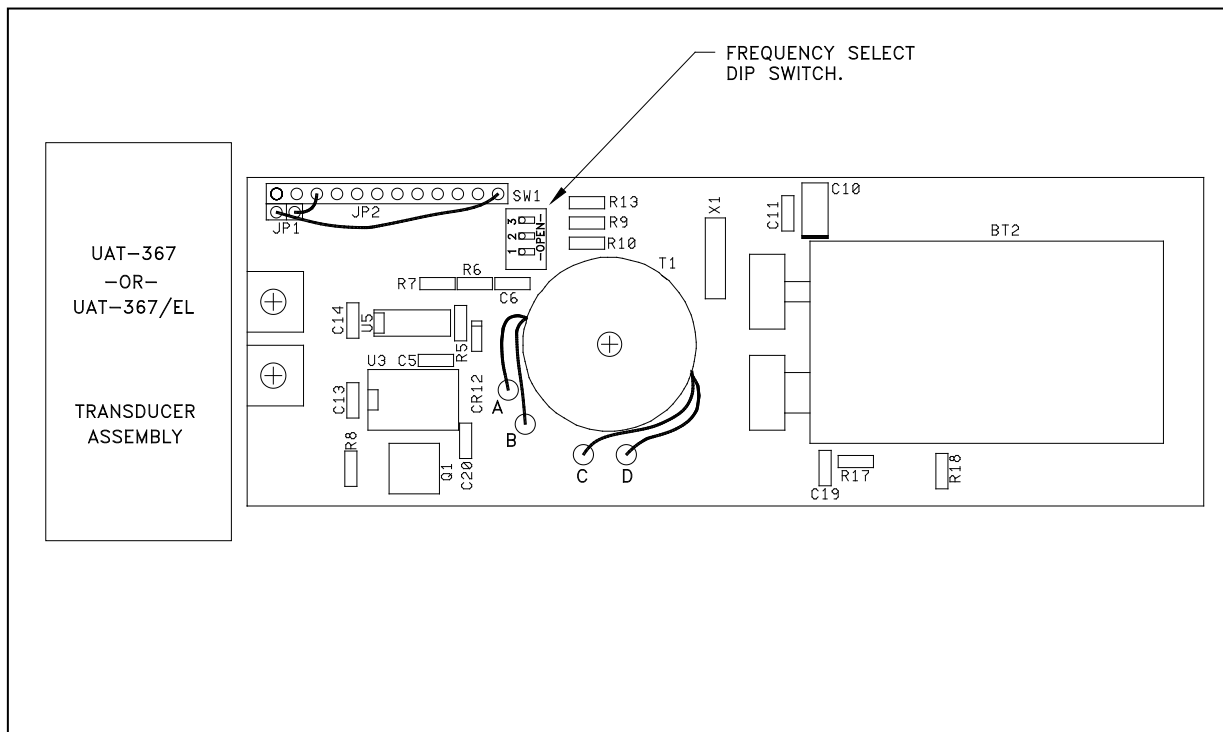


Figure 2 The UAT-376 Series Hardware Settings

Step 2 Transmit Frequency Selection

The ability to select the UAT-376 transmit frequency eases compatibility with the Benthos Dive Ranger DRI-267A channels or other equivalent interrogators and differentiates the transponder from other units deployed in the area. The frequency is set with the three-switch DIP on the circuit board adjacent to the transformer (see Figure 2).

To set the transmit frequency, set the DIP switch for the selected frequency as specified in the following table:

Table 2 UAT-376 Series Transmit Frequency DIP Switch Settings				
<i>kHz</i>	<i>Channel Corresponds to DRI-267A Receive Channels</i>	<i>Switch 1</i>	<i>Switch 2</i>	<i>Switch 3</i>
25.0	Channel 1	Open	Open	Open
27.0	Channel 2	Open	Closed	Open
28.0	Channel 3	Closed	Closed	Open
29.0	Channel 4	Open	Open	Closed
30.0	Channel 5	Closed	Open	Closed
31.0	Channel 6	Open	Closed	Closed
32.0	Channel 7	Closed	Closed	Closed
26.0	X	Closed	Open	Open
NOTE: THE STANDARD DRI-267A IS NOT CONFIGURED TO RECEIVE 26.0 KHz.				

Step 3 Battery Installation

UAT-376 Series Transponders are shipped without batteries.

Follow these procedures to install the batteries:

- ◆ Clip in the alkaline or lithium 9-Volt batteries (Figure 3).
 - Install two batteries for the **UAT-376**.
 - Install six batteries for the **UAT-376/EL**.
- ◆ Position the plastic battery clip(s) onto the battery (The clips are held to the board via O-rings during shipment).
 - Install the one battery clip on the recessed battery for the **UAT-376** to prevent the battery from unplugging (Figure 3).
 - Install the 5 battery clips on the recessed batteries for the **UAT-376/EL** to prevent the batteries from unplugging (Figure 3).

- ◆ Verify the foam disk is in place inside the base of the housing.
- ◆ Inspect the O-ring and O-ring surface before screwing the end cap on. Lubricate the O-ring with a light coat of O-ring lube (silicone or barium grease).
- ◆ Gently slide the electronics and battery assembly into the housing
 - For the **UAT-376** or the **UAT-376/EL**, gently screw the Delrin closure cap onto the housing until the closure is finger-tight.

! Caution: Take care to avoid scratching the O-ring surface or cross-threading the Delrin closure cap.

☑ Note: The **UAT-376/EL** will be activated upon battery installation to reduce the corrosion build up on the water-turn-on contacts for long term deployments. Remove batteries after deployment to prevent battery drain.

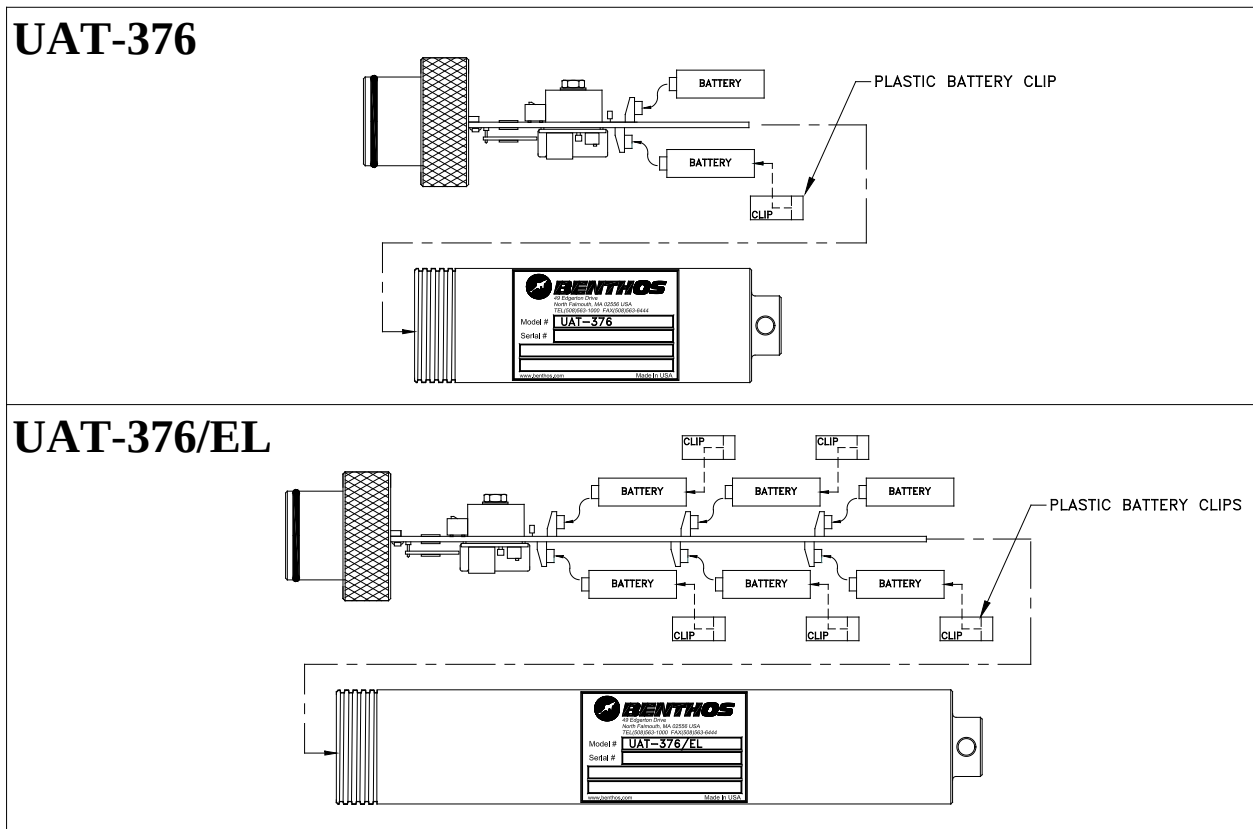


Figure 3 The UAT-376 Series Battery Installation

3.3 Pre-Deployment Check

Check the transponder operation before deployment using a Benthos Dive Ranger DRI-267A Diver-Operated Transponder Interrogator, an optional ACU-266 Topside unit (used in conjunction with the DRI-267A), or other compatible transponder interrogator equipment.

Check the transponder operation as follows:

- ◆ Set the ACU-266 Topside unit or DRI-267A interrogator receive frequency channel to match the UAT-376 transmit frequency selected in Step 2 under Section 3.2 Transponder Setup.
- ◆ For the **UAT-376** Water-Turn-On Activation:
 - Verify the transponder end cap is properly secured to the housing and the batteries have been installed.
 - Suspend the transponder over the side of the vessel or immerse it in a bucket of water to activate the unit.
 - Immerse the DRI-267A or ACU-266 transducer in the same water as the transponder (placing the transducer next to or against the water bucket may also work) to verify the unit is transmitting.
- ◆ For the **UAT-376/EL** Battery-On Activation:
 - Verify the transponder end cap is properly secured to the housing and the batteries have been installed.
 - Place the DRI-267A or ACU-266 transducer next to the transponder to verify the unit is transmitting (the in-water test can also be performed).
- ◆ If the UAT-376 does not operate according to specification, take these steps:
 - Verify there are no objects between the pinger and the locating equipment hydrophone that would obstruct the acoustic transmission.
 - Check the battery and switch settings on both the UAT-376 and the DRI-267A or ACU-266 and test again.
 - If the unit is still not functioning properly, call Benthos, Inc. (508) 563-1000.

3.4 Maintenance

The Benthos UAT-376 Series Underwater Acoustic Transponders are factory set and shipped ready for use (less batteries). No maintenance is required other than cleaning the unit and replacing the batteries.

At the conclusion of each deployment, take these steps to assure continued reliable performance from the UAT-376 Series Underwater Acoustic Transponders:

- ◆ Rinse the transponder with fresh water after each use.
- ◆ Clean the Water-Turn-On contacts thoroughly (use water or a solvent safe for PVC) and inspect the contacts for excessive corrosion. Contact Benthos if the contacts need to be replaced.
- ◆ Remove the transducer end cap and gently slide out the electronic assembly.

☒ **Note:** Make sure the unit is thoroughly dried before removing the end cap.

- ◆ Remove the batteries if the transponder will be stored for a week or more.
- ◆ Replace the batteries when needed. If the remaining battery life is unknown to meet the deployment life, replace them with new.
- ◆ Clean and inspect the O-ring and O-ring surfaces. Replace the O-ring if it is nicked, cracked or gouged.
- ◆ Lubricate the O-ring with a light coat of silicone or barium grease.
- ◆ Store the transponder in a dry area when not in use.

If spare parts or technical assistance is required, contact Benthos at (508) 563-1000.

Section 4 Warranty

Intellectual Property Rights: No rights in Intellectual property, including but not limited to, license or other rights under any patent, copyrights, trade secrets, or trademarks owned or controlled by Benthos or under which Benthos is licensed, are granted to Purchaser or implied by the sale of products or services hereunder. Purchaser shall not identify as genuine products of Benthos any Benthos products purchased hereunder which Purchaser has treated, modified, or altered in any way. Purchaser shall not use the trademarks of Benthos to identify such products provided, however, that Purchaser may identify such products as utilizing, containing, or having been manufactured from genuine products of Benthos as treated, modified, or altered by Purchaser or a representative of Purchaser. If products or services sold hereunder are manufactured according to the specifications of Purchaser, Purchaser shall indemnify Benthos against any liability for patent, copyright, or trademark infringement on account of such manufacture or performance.

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 one (1) year 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 one (1) year 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. With respect to the sale of Benthos oceanographic instruments which 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.