RJE INTERNATIONAL, INC.

ATT-400 SERIES
ACOUSTIC TARGET TRANSPONDER
USER MANUAL
REV 1.8

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Forward

This manual is comprised of figures and text intended to provide descriptions and instructions for the installation, operation, and maintenance of the RJE International ATT-400 Series Acoustic Target Transponder. The information herein is arranged into chapters and sections as follows:

Chapter 1 – An overview of the ATT-400. General notes including brief sections describing the applications and physical characteristics of the beacon itself.

Chapter 2 – Specifications. Section comprised of a list of both general and unique- to-the-unit specifications.

Chapter 3 – Operation and Installation Notes. Sections detail the unpacking and pre-deployment checkout procedures for the ATT-400.

Chapter 4 - Maintenance. Sections detail periodic maintenance, battery replacement and calibration procedures.

Please forward comments, questions, suggestions, or problems with the text, figures, or equipment to RJE International.

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PROPRIETARY MATERIAL

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This manual is provided for information and reference purposes only and is subject to change without notice.

LIMITED WARRANTY

RJE International, Inc. (RJE) guarantees its products to be free from defects in materials and workmanship for a period of one year from the date of shipment. In the event a product malfunctions during this period, RJE's obligation is limited to the repair or replacement, at RJE's option, of any product returned to the RJE factory. Products found defective should be returned to the factory freight prepaid and carefully packed, as the customer will be responsible for any damage during shipment.

Repairs or replacements, parts, labor, and return shipments under this warranty will be at no cost to the customer. This warranty is void if, in RJE's opinion, the product has been damaged by accident or mishandled, altered, or repaired by the customer, where such treatment has affected its performance or reliability. In the event of such mishandling, all costs for repair and return freight will be charged to the customer. All products supplied by RJE that are designed for use under hydrostatic loading have been certified by actual pressure testing prior to shipment. Any damage that occurs as a direct result of flooding is NOT covered by this warranty.

If a product is returned for warranty repair and no defect is found, the customer will be charged a diagnostic fee plus all shipping costs. Incidental or consequential damages or costs incurred as a result of a product's malfunction are not the responsibility of RJE.

All returned products must be accompanied by a Case Number issued by RJE International, Inc. Shipments without a Case Number will not be accepted.

LIABILITY

RJE shall not be liable for incidental or consequential damages, injuries, or losses as a result of the installation, testing, operation, or servicing of RJE products.

RETURN PROCEDURE

Before returning any equipment to RJE, you must contact RJE and obtain a Case Number. The Case Number assists RJE in identifying the origin and tracking the location of returned items.

When returning items to RJE from outside the United States, follow the checklist presented below to prevent any delays or additional costs.

- ✓ Include with all shipments two copies of your commercial invoice showing the value of the items and the reason you are returning them. Whenever possible, send copies of the original export shipping documents with the consignment.
- ✓ Route via courier (FedEx or UPS).
- ✓ If there is more than one item per consignment, include a packing list with the shipment. It is acceptable to combine the commercial invoice and packing list with the contents of each carton clearly numbered and identified on the commercial invoice.
- ✓ If it is necessary to ship via airfreight, contact RJE for specific freight forwarding instructions.
- ✓ You will be charged for customs clearance and inbound freight.
- ✓ Insure the items for their full value.
- ✓ Refer to the RJE-issued Case Number on all documents and correspondence.
- ✓ Prepay the freight.

TITLE

Title shall pass to buyer on delivery to carrier at Irvine, CA. Risk of damage or loss following such delivery shall be to the buyer and RJE International shall in no way be responsible for safe arrival of the shipment. Title shall so pass to buyer regardless of any provision for payment of freight or insurance by RJE International or in the form of shipping documents. If shipment is consigned to RJE International, it shall be for the purpose of securing buyer's obligations under the contract.

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1.1 Overall Description

The RJE International ATT-400 Series Acoustic Target Transponder is an underwater acoustic signaling device that works with transponder interrogators for diver marking and relocation. In addition, the ATT-400 Series Transponder can be configured to operate as a free-running pinger with eight user-selectable operating frequencies.

Figure 1-1
DTI-300A Diver Transponder Interrogator

Figure 1-2
VADR-6000M Vehicle Acoustic Receiver

1.2 ATT-400 Series Acoustic Target Transponder

The ATT-400 series transponders are small battery operated underwater acoustic devices that work with the DTI-300A and STI-350 transponder interrogators or VADR-6000M subsea vehicle acoustic receivers to mark and relocate targets underwater in a range of up to 750 meters (2461ft). The ATT-400 comes in five models:

- ATT-400 Standard
- ATT-400EL Extra Life
- ATT-400/6KM Deep Water
- ATT-400EL/6KM Extra Life Deep Water
- ATT-400ST Strobe Light

Once deployed, a water switch activates the transponder. The activated ATT-400 remains in the receive mode for up to 36 months, waiting quietly for an interrogation signal from a transponder interrogator. Once interrogated, the ATT-400 transponder responds to the interrogator using eight different user-programmable channels. The ATT-400STwill flash its strobe light when interrogated, as an additional locating aid.

The ATT-400 series transponder can also be operated as a free-running pinger by changing the setting on the PCB as shown in section 3.3 of this manual. By selecting this option, the ATT-400 sends an acoustic signal continuous with eight user-selectable channels.

Constructed of non-corrosive material, the ATT-400 transponders can be deployed to depth from 100 meters to 6000 meters, depending on the Model.

Figure 1-3
ATT-400 Transponder

Figure 1-4
ATT-400EL Long Life Transponder

Figure 1-5
ATT-400/6KM and ATT-400EL/6KM
Transponder, Deep Water

Section

2

2.1 ATT-400 Acoustic Target Transponder Specifications

Table 2-1 ATT-400 Series Acoustic Transponder Specifications

Receive Frequency	26 kHz
Acoustic Source Level	180 dB re 1µPa @ 1 meter
Transmit Repetition Rate	Normal: 1.0 second
Transmit Pulse Length	5.0 ms
Transmit Frequency	Switch-selectable to 27, 28, 29, 30, 31, 32, 33, 34 kHz
Transponder Turnaround Time Compensation	20 ms
Activation	Water Activated Switch
Battery	9 Volt Battery, Alkaline or Lithium
Range	750m (2461ft) with DTI-300A, STI-350, or VADR-6000M
Operating Life	**ATT-400, ATT-400/6KM:** Alkaline Battery: 6 Months Stand-by or 360,000 Replies in Transponder Mode. 4 Days in Pinger Mode Lithium Battery: 12 months Stand-by or 720,000 Replies in Transponder Mode. 8 Days in Pinger Mode **ATT-400EL, ATT-400EL/6KM** Alkaline Battery: 18 Months Stand-by or 1,000,000 Replies in Transponder Mode. 12 Days in Pinger Mode Lithium Battery: 36 months Stand-by or 2,000,000 Replies in Transponder Mode. 24 Days in Pinger Mode **ATT-400ST:** Alkaline Battery: 6 months stand-by or 270,000 Replies in Transponder Mode. 4 Days in Pinger Mode. Lithium Battery: 12 months stand-by or 540,000 Replies in Transponder Mode. 4 Days in Pinger Mode.
Operational Depth	ATT-400, ATT-400ST, ATT-400EL: 1,000 Meters (3,281ft) ATT-400/6KM, ATT-400EL/6KM: 6,000 Meters (19,685ft)
Housing Material	ATT-400, ATT-400ST, ATT-400EL: Anodized Aluminum ATT-400/6KM, ATT-400EL/6KM: Titanium
Dimensions	ATT-400, ATT-400ST, ATT-400/6KM: 23cm x 6.4cm⦸ (9.0in x 2.5in⦸) ATT-400EL, ATT-400EL/6KM: 30cm x 6.4cm⦸ (12.0in x 2.5in⦸)
Weight	ATT-400, ATT-400ST: In Air: 1.8 (806g) ATT-400EL: In Air: 2.0lbs (907g), ATT-400/6KM: In Air 3.85lbs (1.1kg):

Specifications are subject to change.

Section

3

OPERATION & INSTALLATION NOTES

3.1 Introduction

The ATT-400 is a small, self-contained acoustic device that can operate as a transponder or a free running pinger. Using a water switch, the ATT- 400 activates once it is placed in the water and shuts down when removed from the water. It operates in both fresh and salt water environments.

A rotary switch on the board allows the operator to select in which mode to place the ATT-400 (transponder or free-running pinger), and to select which of the eight different frequencies (from 27 kHz to 34 kHz) to transmit in.

If set up in the transponder mode, the ATT-400 will remain activated from up to six to thirty-six months (based on model and battery type) while it waits to receive a coded interrogation signal from a transponder interrogator. In the free-running pinger mode, the ATT-400 will activate once immersed and will continuously send a signal from 4 to 24 days (based on model). Because it can be programmed to operate on eight different channels, the operator can mark and relocate eight different locations simultaneously.

3.2 Unpacking

When opening the shipping carton, carefully inspect each piece of equipment as it is unpacked and report any damage to the freight carrier and to RJE International.

As with any sophisticated electronic equipment, RJE International products should be handled with a reasonable amount of care during unpacking, transporting and storing. Pay attention to make sure that:

- The end caps are properly secured and the end cap screws are tightened.
- There is no damage to the housing.

3.3 Setting the ATT-400 Transmit Frequency Using the Rotary Switch

- Remove the housing by grasping the transducer endcap and turning the housing counter-clockwise until the housing is free of the transducer/electronics module.

Figure 3-1 ATT-400 Disassembled

- Orient the ATT-400 assembly so the rotary switch is located as shown below.

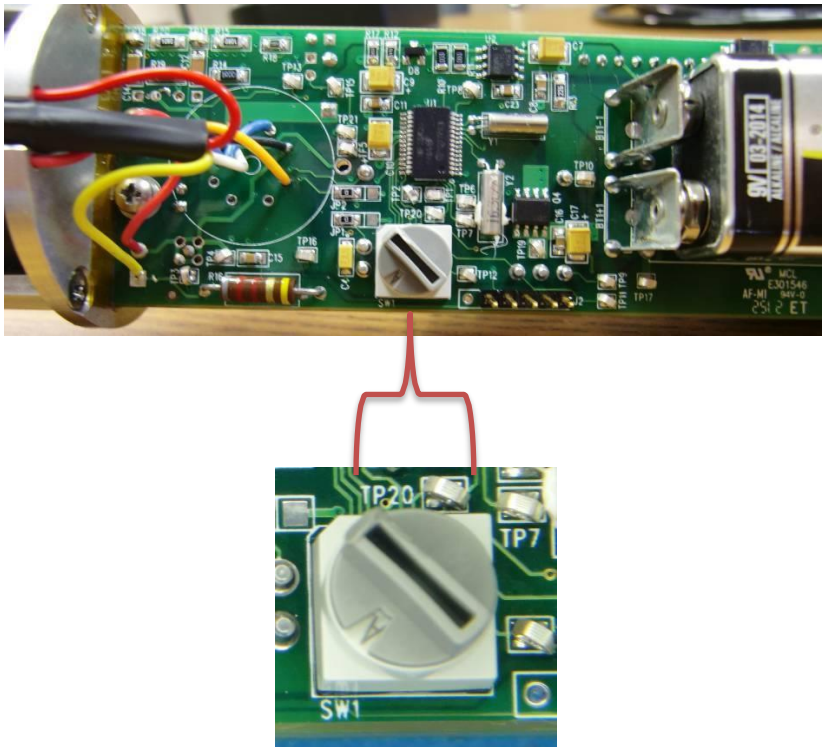

Figure 3-2 Channel Select Switch

- Set SW1 to the position for the desired channel and/or frequency (Table 3-1).

Table 3-1 Channel Select Switch Settings

Mode	SW Selection	CH#/Frequency
Transponder	0	CH1/27kHz
Transponder	1	CH2/28kHz
Transponder	2	CH3/29kHz
Transponder	3	CH4/30kHz
Transponder	4	CH5/31kHz
Transponder	5	CH6/32kHz
Transponder	6	CH7/33kHz
Transponder	7	CH8/34kHz
Pinger	8	27kHz
Pinger	9	28kHz
Pinger	A	29kHz
Pinger	B	30kHz
Pinger	C	31kHz
Pinger	D	32kHz
Pinger	E	33kHz
Pinger	F	34kHz

3.4 Pre-Deployment Check

Perform an in-air check by using the STI-350 with the following sequence:

> Turn the STI-350 receiver on by using the main power switch and press any control switch before 10 seconds pass to confirm activation.

> Confirm in what mode you want to operate, Active (transponder) or Passive (free-running pinger).

ATT-400 Set as a Transponder (ACTIVE) Mode

- On the STI-350, press UP or DOWN buttons and set **FREQ:** to 30 kHz.
- On the ATT-400 transponder, set the rotary switch to position 3 (30 kHz). Activate the transponder by placing it into a glass of water and set the two devices within half a meter of each other.
- Aim the STI-350's transducer at the transponder. Observe the STI-350 **T** (transmit) flash, and verify that the STI-350 **R** (receive) flashes alternately. The unit will display an intermittent range and bearing to the transponder being tested.

Note: The range and bearing acquired during in-air testing will not be accurate as the air is a slower and more difficult sound medium than water. If the in-air testing is not satisfactory, submerge the units in water and repeat the test.

ATT-400 Set as a Pinger (PASSIVE) Mode

- On the STI-350, set the **FREQ:** to correspond with the acoustic pinger being tested. Use the lower right control to raise the frequency by 1 kHz, and use the left control to fine-tune the frequency (by 100 Hz increments).
- Place the acoustic pinger into a glass of water and set the two devices within half a meter of each other.
- Aim the STI-350's transducer at the pinger and verify that it is receiving a signal from the pinger, by observing the flashing **R** indicator. The unit will display a signal strength and bearing to the pinger being tested.

Note: You can also use the DTI-300A diver interrogator to perform the same test. Refer to the DTI-300A manual to find out how to use the DTI-300A to get the same results.

Section

4

ATT-400 MAINTENANCE

4.1 Maintenance

Upon completion of each dive mission, take these steps to assure continued reliable performance from the ATT-400.

- Wash the exterior of the equipment with fresh water and mild detergent. Make sure to clean filmy build-up on the transducer face.
- Make sure the equipment has been thoroughly dried before storage.
- Inspect all system components for damage and wear. Order needed replacement parts if required.

4.2 Battery Test

This test allows you to roughly determine the state of the 9-volt battery without removing the battery from the unit. All batteries are different and we recommend that you replace the battery after every deployment to ensure full operational life.

Using a Volt/Ohm Meter (VOM) set to measure DC voltage, place the meter's probes across the water switch contacts, which you can find on the top of the transducer. Measure the voltage and use the chart below. **Note:** Polarity is not important in this measurement.

Voltage Reading	Battery Status
>/= 3 vdc	New
>/= 2.8 vdc	Good
>/= 2.75 vdc	Marginal
< 2.75 vdc	Replace

4.3 Replacing the ATT-400 batteries

The batteries in the ATT-400 transponder should be replaced after six to ten months, based on model, or prior to each use. To change the ATT-400 batteries follow this procedure:

- Gently loosen and remove the end cap assembly from the housing by turning the housing counter-clockwise.

Figure 4-1 ATT-400 Disassembly

- Remove the old batteries (two or six batteries, based on your ATT-400 model) and install the new batteries as shown. Note the battery terminal orientation before making a connection. Ensure the battery terminals are fully seated.

Figure 4-2 ATT-400 Battery Connections

- Rotate the transponder assembly and repeat the same steps for the opposite side.

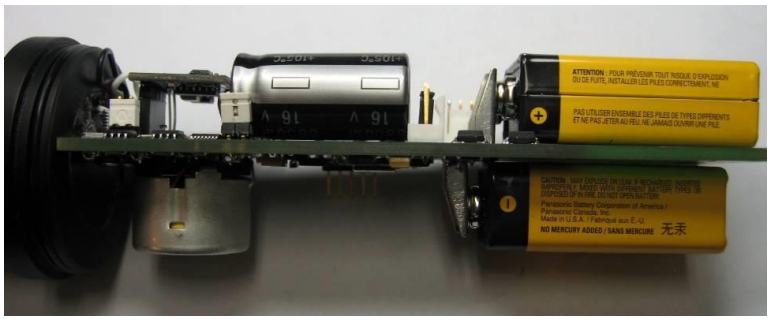

Figure 4-3 ATT-400 Battery Installation

- Before installing the end cap assembly, make sure the O-ring and O-ring surfaces are clean and free of debris. Lubricate the O-ring with a light coat of silicon grease (O-lube) supplied in the spares kit.
- Reassemble the unit.