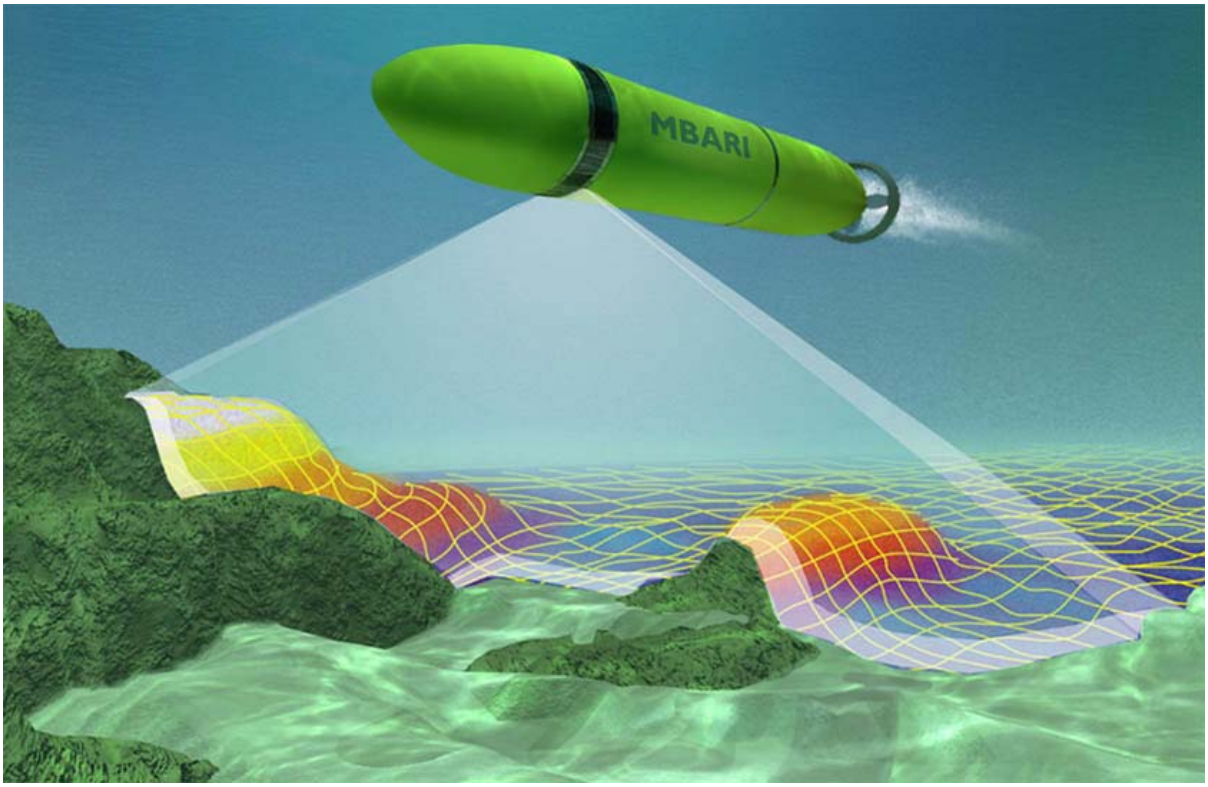
# ACCEPTANCE TEST PLAN

## SeaBat 7100 Sonar System
## for
# MBARI AUV




**Revision 004**

**by**
**RESON Inc.**

## REVISION HISTORY

| Revision | Date | Prepared By | Comment |
|---|---|---|---|
| Draft 001 | Aug 1, 2001 | Thomas Meurling | Initial release |
| Draft 002 | Aug 5, 2001 | Burr Bridge | Updated Sea Acceptance Test section |
| 003 | September 20, 2001 | Dan Suchman | Modified to Reflect Agreements from 18 Sept Mtg. |
| 004 | January 10,2003 | Dan Suchman | Finalize and Release |
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## GLOSSERY OF TERMS

| | |
|---|---|
| PFAT | Transducer Pre-Factory Acceptance Test |
| PFATP | Transducer Pre-Factory Acceptance Test Procedure |
| PFATR | Transducer Pre-Factory Acceptance Test Report |
| FAT | Factory Acceptance Test |
| FATP | Factory acceptance Test Procedure |
| FATR | Factory Acceptance Test Report |
| SAT | Sea Acceptance Test |
| SATP | Sea Acceptance Test Procedure |
| SATR | Sea Acceptance test Report |

# 1 INTRODUCTION

This Acceptance Test Plan (ATP) describes the plan for testing and validating the performance of the RESON SeaBat 7100 Multibeam Echosounder System, 6046 Payload Controller and Data Visualization Utility.

The ATP is delivered as part of Contract Milestone D as defined in Section 3 of Attachment A (Scope of Supply) to the Purchase and Sale Agreement.

# 2 GENERAL ACCEPTANCE TEST PHILOSOPHY

## 2.1 General

The acceptance tests for the SeaBat 7100 delivered to MBARI will be less formal than those used for most procurements. Acceptance will consist of meeting mutually agreed upon criteria during tank and sea trials conducted in accordance with Acceptance Test Procedures.

Three (3) test sequences are anticipated:

- Transducer Pre-Factory Acceptance Test (PFAT)
- Factory Acceptance Test (FAT)
- Sea Acceptance Test (SAT)

The Pre-FAT Test Procedure (PFATP) is a RESON responsibility. RESON will prepare the PFATP and submit it to MBARI not later than 4 weeks before the PFAT will be conducted. RESON and MBARI will jointly prepare Acceptance Test Procedures for the other two test sequences.

The SAT will be conducted after successful integration of the MBES with the AUV midbody and will involve testing in both tank and ROV-mounted settings. Both RESON and MBARI will participate in the SAT. Each party will be responsible for all of their own costs associated with participating in the tests.

Acceptance testing will be performed in accordance with procedures that are mutually acceptable to RESON and MBARI.

Each Acceptance Test will be documented by an Acceptance Test Report (ATR). The ATRs for the PFAT and the FAT are the responsibility of RESON. The ATR for the SAT is the responsibility of MBARI.

## 2.2 MBARI Responsibilities

MBARI is responsible for the following:

- Overall system integration of the MBES into the ROV and AUV
- Dynamic and final system testing (with RESON support)
- Collaboration with RESON during the generation of the ATPs for FAT and SAT
- Performing tank tests and sea-trials of the integrated system with RESON participation. These tests will verify that the fully integrated hydrographic sensor system is fit for its intended purpose.
- Preparing and issuing the Acceptance Test Report for the SAT.

## 2.3 RESON Responsibilities

RESON is responsible for the following:

- Manufacturing the 7100 MBES equipment
- Preparing and submitting the Pre-FAT Acceptance Test Procedure (PFATP)
- Conducting the Pre-FAT Acceptance Tests and issuing the Acceptance Test Report (PFATR)
- Collaborating with MBARI during the generation of the ATPs for FAT and SAT
- Integrating the 7100 MBES with the 6046 Payload Controller and the Data Visualization Utility
- Conducting the FAT and issuing the Factory Acceptance Test Report (FATR)
- Supporting MBARI during system integration
- Supporting MBARI during the SAT
- Providing continuing support to MBARI after final system testing through contract change orders, using standard cost reimbursement rates.

# 3 ACCEPTANCE TESTS

## 3.1 General

This portion of the ATP describes the objectives of the PFAT, the FAT and the SAT. These objectives will be satisfied by tests conducted in accordance with separate Acceptance Test Procedures, which will be provided as described in section 2.1.

## 3.2 Test Readiness Review

Prior to each Acceptance test, a test readiness review (TRR) will be held which will confirm that the product and it's supporting documentation are ready for the test in question by review of internal tests, simulations etc.

TRR supporting documentation is:

- Final as delivered configuration documentation
- Final system and document family tree
- Review of system problems report records
- Results of physical and functional configuration audit

## 3.3 Transducer Pre-Factory Acceptance Test (Pre-FAT)

The sonar transducers are designed and built at RESON A/S in Denmark. The transducer performance will be validated prior to shipment to RESON, Inc.

Measurements, tests and simulations that directly relate to sonar specifications, such as pressure tests, mechanical interface and element level beam pattern will be presented at the FAT and will not be repeated.

The following items will be measured at RESON A/S and documentation delivered with the transducers to RESON Inc.

- Vertical beamwidth (single stave)
- Horizontal beamwidth (single element)
- Mechanical interface
- Pressure test
- Transmit sensitivity
- Receive sensitivity
- Impedance value

It is recognized that only near-field measurements are possible.

### 3.4 Factory Acceptance Test (FAT)

Following the successful validation testing in Denmark, the sonar transducers will be shipped to RESON, Inc. for integration with the 6046 Payload Controller and Data Visualization Utility, and FAT.

FAT will be conducted at the RESON Inc. facility on Goleta, CA, in accordance with the agreed upon Factory Acceptance Test Procedure. The FAT will demonstrate compliance with functional and interface aspects of the specification. Static acoustic performance specifications will be validated by measuring the characteristics of a sonar subset, and extending the results to full sonar performance by simulation and analysis.

The following capabilities will be demonstrated at FAT:

- Source level
- Operating frequency
- Command and control
- Data flow
- Data recording and playback
- Operational Stability and Reliability

### 3.5 Sea Acceptance Test (SAT)

After the successful completion of FAT, the sonar systems will be shipped to MBARI Robotics for physical and electrical integration with the AUV. RESON will assist MBARI in this process.

Sea Acceptance Tests (SAT) will be performed in accordance with the agreed upon Sea Acceptance Test Procedure.

The following capabilities will be demonstrated at SAT

- Interface to the AUV
  - Offset Measurements (Roll, Latency, Pitch, Yaw)
  - Position Error Calibration
- Data collection
  - Swath Coverage
  - Backscatter imagery
  - Repeatability
  - Accuracy
- Data export

Satisfactory SAT will be deemed to have proved that the fully integrated hydrographic sensor system is fit for purpose, and therefore, constitutes final acceptance of the RESON equipment.