

Echoes and Images

The Encyclopedia of
Side-Scan and Scanning Sonar Operations

by

Mark W. Atherton

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DEDICATION

This book is dedicated to Angus William Atherton, father, mentor, inspiration and friend.

This man taught me that at no age does learning cease. At this writing, 'Gus'—95 years young—daily searches the internet for interesting information to share with others.

I also learned from my father the importance of knowing how to work with both my mind and my hands.

Angus Atherton epitomizes this philosophy.

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And to my wife, Jane Lynn Atherton, a heartfelt thank you for the continued encouragement, editing and keeping me focused. Without you, this book would *never* have been completed.

FOREWORD

The first time I worked with Mark Atherton was December, 1979, in the Canadian Arctic. It was one of those moments in life when you know you are working with a gifted individual.

The client was causing blood pressures to rise despite the temperature dropping to -30°F . Mark was up to his elbows repairing an underwater television camera. When told he'd be fired if he didn't get the camera immediately into the water, his response was to tell the dive supervisor to go away—and fire him *after* the equipment was fixed. The repair was made; the job was a success; Atherton remained employed.

His love for cameras and underwater photography expanded to include another form of underwater imaging—acoustical. Again, Mark showed his zeal to excel in the relatively new and expanding commercial sonar industry. While many struggled to use sonar for even basic target detection, Atherton was looking to the future and figuring out how this technology could be used to fulfill the long-range imaging needs of the ROV industry. This is where his love of underwater imaging took on new dimensions.

Mark is one of the world's foremost authorities in scanning sonar operation and data interpretation. While operating sonar has become a common place task in the ROV industry, interpreting these images, improving the equipment and pioneering new sonar applications have been Mark's lifelong passions—passions that are evident in his teaching of acoustics to sonar operators. He has been instrumental in showing operators and ROV companies the enormous potential of using sonar for qualitative imaging and precise measurement applications.

In addition to ROV and marine engineering service companies, Atherton has worked with the dive teams of the FBI, state, provincial and international police forces to develop their sonar skills for diver support, search, underwater security and evidence documentation and recovery.

With over 35 years of experience in underwater imaging, Mark has written this book to educate others on the untapped potential of sonar for a wide range of undersea applications. *Echoes and Images, The Encyclopedia of Side-scan and Scanning Sonar Operations* is the most comprehensive publication of its kind on side-scan and scanning sonar. It leaves no doubt that Atherton is an expert in his field.

This book is a step-by-step guide to getting the best data possible from side-scan and scanning sonar—and exhibits an insight into the passion Mark Atherton brings to the underwater imaging industry.

There is great pride in knowing we have remained friends after so many years in our respective fields.

Darryl Rundquist, *Oceaneering International*,
Sr. Operations Manager

PREFACE

The fax read: “How accurate is your sonar?”

I spent about an hour writing a response and in it discussed acoustic geometry, transverse resolution, frequency, pulse length, bandwidth, and then gave what I thought was a reasonable answer: with all things added, one could expect to resolve a target within half percent or better of range. I faxed my reply to our Japanese client.

The next morning, I walked into the office where their responding fax awaited me. It was curt: “We want no mo (sic) excuses! How accurate is your sonar?”

Wow! My response to their second fax was much more formal. The pages were written and formatted to look like they had been copied from a book, and I didn’t suggest otherwise. The fact that I may have stretched the truth and intimated this information was from a sonar training manual may have helped. I subsequently received a note saying they were satisfied with the answer.

Little did I know that this correspondence would be a defining moment in my career. It was the start of a series of training notes that were eventually reviewed by Robert (Bob) Tether, C.V., a retired Royal Canadian Mounted Police officer and former RCMP dive team leader. Bob was also an internationally renowned expert in underwater forensics and body recovery. We had worked together years earlier when a bridge washed out and seven people lost their lives having been swept by the river into the ocean. He was the investigating officer and I was supervising the remotely operated vehicle crew contracted to do the underwater search and body recovery.

Years passed and by chance we were both presenting at a conference in Florida. When he saw my lecture/training notes he said: “Mark, you have to formalize these and get this information to those that are in the business—they need to know this!” By this time, Bob had written a series of books of which *The Encyclopedia of Underwater Investigations* is still considered the “bible” in the field of underwater body recovery. Here was a noted author telling *me* I needed to get this information into print.

That was many years ago, and if there is any sadness in life, it is that Bob was unable to see this project to fruition. Wherever you are, Bob—thank you for your encouragement. Your passion for teaching and desire to pass information along remains an inspiration to the many you touched.

“The harder you work, the luckier you get” is an adage that continues to pilot my career. At times it has been a slog but, in hindsight, getting lucky was a combination of hard work *and* encountering unique and passionate individuals. I have worked

with the best in the undersea business. The information these people imparted to me—without reservation or expectation—is beyond anything I could ever imagine. If there is a lesson to be learned, it is without exception, do the very best job you possibly can within the time allotted, and “luck” will follow.

Another observation I’ve garnered over the years: In every business the “straight shooters” are easy to spot, so align yourself with them and keep the pirates at arm’s length.

Mark William Atherton

August, 2011

DISCLAIMER

With the exception of quoted material, the opinions, recommendations and conclusions in this book are solely that of the author.

The identification of specific models of equipment, product, software or the names of companies does not imply endorsement.

Safe working practices have been stressed through out this text. Use the information contained in this book as an operational guideline with the understanding all conceivable safety issues cannot be foreseen and identified. Every work situation is unique and requires those on-site to identify and address potential safety hazards and create a safe working environment.

References to sonar and diving, manned submersible, vessel handling, electrical systems and water safety stress that these operations need to be conducted in accordance to all federal and state (provincial) regulatory codes, including workplace, health and safety and dive agency standards.

Therefore, the author accepts no liability for injury, accident or death incurred when using or applying information provided within this text.

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