

The Robot Mounted Shock Tube Reel Dispenser

by Bill Hakim, 1957-2008

The Haley Caster MWB/Hydra-Jet Nonel Deployment System described in the *Detonator*, Volume 35, number 4, is an innovative and cost effective approach similar in concept to a system developed by Ideal Products. This article describes the development and general use of the Robot-Mounted Shock Tube Reel Dispenser. We are not suggesting that one system is better than the other. It is another tool in the toolbox to help the Bomb Technician complete the mission safely, professionally and smoothly.

One of the problems associated with shock tube tools that are fired off of the robot is keeping the shock tube from ending up in the tracks, getting tangled, or pulling loose from the shock tube initiator during tool placement. The same entanglement problems arise during re-approach, with the possibility of the expended shock tube hanging off the robot. The challenge was to develop a shock tube dispensing reel that could be mounted on the robot. This reel would function like the robot's electric charge dropper spool but would use shock tube instead of electrical cord. The challenge was to develop a rotary shock tube joint that allows a fixed piece of shock tube to be connected to the outside of the reel, and a pre-determined amount of shock tube spooled on the reel for playing out at different distances, depending on the circumstances and characteristics of the tool. The energetic tool is placed with the robot and then backed up a safe distance from the suspect item. The shock tube is initiated via the robot's weapon board with either one of the commercially available electronic units or by an STI. The shock tube signal would need to propagate through the rotary joint from the initiator into the spooled shock tube on the reel, firing the detonator and the explosive tool. This signal propagation has to be successful 100% of the time.

Discussions with Scott Johns of Ideal

Products, resulted in the development of the first prototype reel incorporating a rotary joint with quick disconnect shock tube fittings. The reel was easily attached to the robot using a receiver system (coincidentally) similar to that of the Haley Caster. (*photo 1*)



photo 1

The Robot-Mounted Shock Tube Reel Dispenser was tested with a number of different energetic tools. A 64-ounce Hydra-Jet full of water can be placed near the target by the robot, and the shock tube dispensed off the reel as the robot backs up to a safe distance, without moving or tipping over the Hydra-Jet. In a second prototype, Scott added a line guide slot to the front of the reel. This slot keeps the shock tube from riding up over the reel when playing out. The shock tube can be dispensed forward or from the rear. For larger tools, such as "Big Mike's" or the



photo 2

"Battlewagon", the reel (*photo 2*) is simply turned around in the robot-mounted receiver, and the shock tube is now paid out to the rear as the robot moves forward

to a safe distance (preferably behind a solid building 300' from the target.)

In addition to the test shots by Scott at Ideal, we have fired shock tube through the rotary joint about 20 times in various configurations and using different shock tube lengths, and so far it works perfectly. The shock tube is hand-wound onto the reel (up to 300') with one end protruding through the slot in the (rotary joint) side of the reel. A clear shock tube connector is used to splice this end to a short (8-12") piece of shock tube going to the rotating quick disconnect (QD) fitting. (*photo 3*) Another length of shock



photo 3

tube (24-30") is inserted into the center, or fixed, QD fitting, going to the robot's shock tube initiator. When the shock tube is fired, the splice breaks free and the robot then backs up a bit further, leaving the expended shock tube down range. This pretty slick breakaway scheme was devised by Lance Brown from NAVEO-DTECHDIV. The expended shock tube's "memory" now works to the operator's advantage by "springing" the line back towards the target. The robot can then approach the target from a different angle with less concern about the expended shock tube getting tangled in the tracks.

Adding an improvised line guide between the reel and the explosives or energetic tool will help prevent the shock tube from binding while dispensing forward from the reel. Shown in *photo 4* is a zip tie loop loosely attached to the wrist

extender actuator.

Some of the common sense precautions that must be taken with the Robot-Mounted Shock-Tube Reel dispenser include:

-The shock tube-to-detonator splice, with its recommended strain-relief knot, (not shown) must be forward of the improvised line guide.

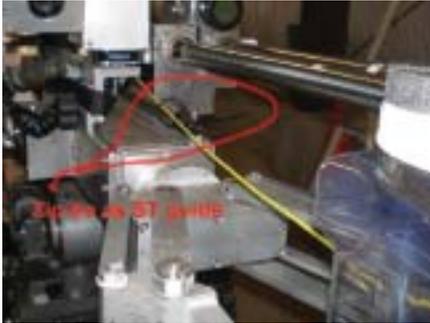


photo 4

-The “breakaway” splice (*photo 3*) must be outside of the reel.

-No splices or connectors can be within the shock tube spooled on the reel, they will get bound up in the line feed slot.

-Keep the “line of deployment” straight from the reel to the energetic tool: too much of an angle between the elbow and wrist, or between the tool and the robot will result in the shock tube either binding in the line feed slot and/or moving the tool off target.

-Observe all shock tube protocols (positive test for powder, no kinks, 1/8” gap or less).

-Adhere to shock tube / demolition safety procedures when using this system.

The reel mounting on the elbow results in some loss of range of motion: exercise caution moving the elbow up. (*photo 5*)

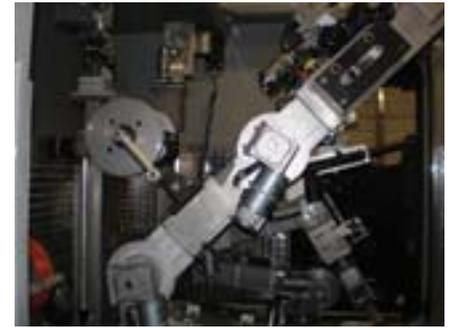


photo 5

Excessive force or repeated impact of the reel against the robot camera tower can cause damage to the tower and the weld at the tower base.

This system was originally built for the F6A. Scott Johns advises that it can be adapted to fit many different hazardous duty robots.

Robert William Hakim

August 31, 1957 - December 12, 2008



Bill Hakim was killed in the line of duty.

He was born in New York City to Victor and Suzy Hakim. The family moved overseas, to Spain and Italy, where he attended elementary school. In 1968 the family settled in Mexico City where Bill began his secondary education. He finished high school in Texas.

Bill had an adventurous childhood ; he traveled across the Atlantic on a seven month cruise and even met Pablo Picasso. He traveled through Europe, spending a summer in Switzerland. He fondly remembered eating chocolate on French bread and living in a five star hotel in Mexico City until his family settled there. During his youth he mastered French, Italian and Spanish as well as English.

He attended St. John's College in New Mexico. After leaving St. John's Bill enlisted in the navy, and finished his college education at the University of Texas with a Bachelor of Science degree and officer rank. Bill served his country as a naval officer. His proudest accomplishment as a Naval Officer was becoming an Explosive Ordnance Disposal Diver. He continued his travels in the Navy through the Persian Gulf, Hong Kong, Singapore and the Philippines. He was also a member of the Antarctic Dive Exploration team, who explored the floor of the Antarctic Ocean. In 1987 Bill met his future wife, Terri Milling and they were married in 1989 in San Francisco. Their first home was in Virginia Beach, where their two children were born.

Bill left the Navy in 1994 to raise his family in the Northwest. In 1997 he graduated from the Oregon Public Safety Academy, and joined the Oregon State Police. In 1999 he joined the arson and explosives team in Salem, where he proudly served until his death.

Bill loved his motorcycle and his 1966 cherry red Ford Mustang. He also loved coaching soccer as a volunteer coach. He used his creative talents for building furniture and barbecuing. He was an avid outdoors man with a passion for physical fitness. He had a wonderful sense of humor, laughing hardest at his own jokes. He enjoyed travelling with his wife and children and sharing exotic adventures and food with them.

Bill is survived by his wife Terri, daughter Page and son Victor. He is remembered best as a loving husband, father, brother, friend and mentor. He will be profoundly missed by all who knew him.

The world is a poorer place without this honorable man and hero.