

# UNDERWATER

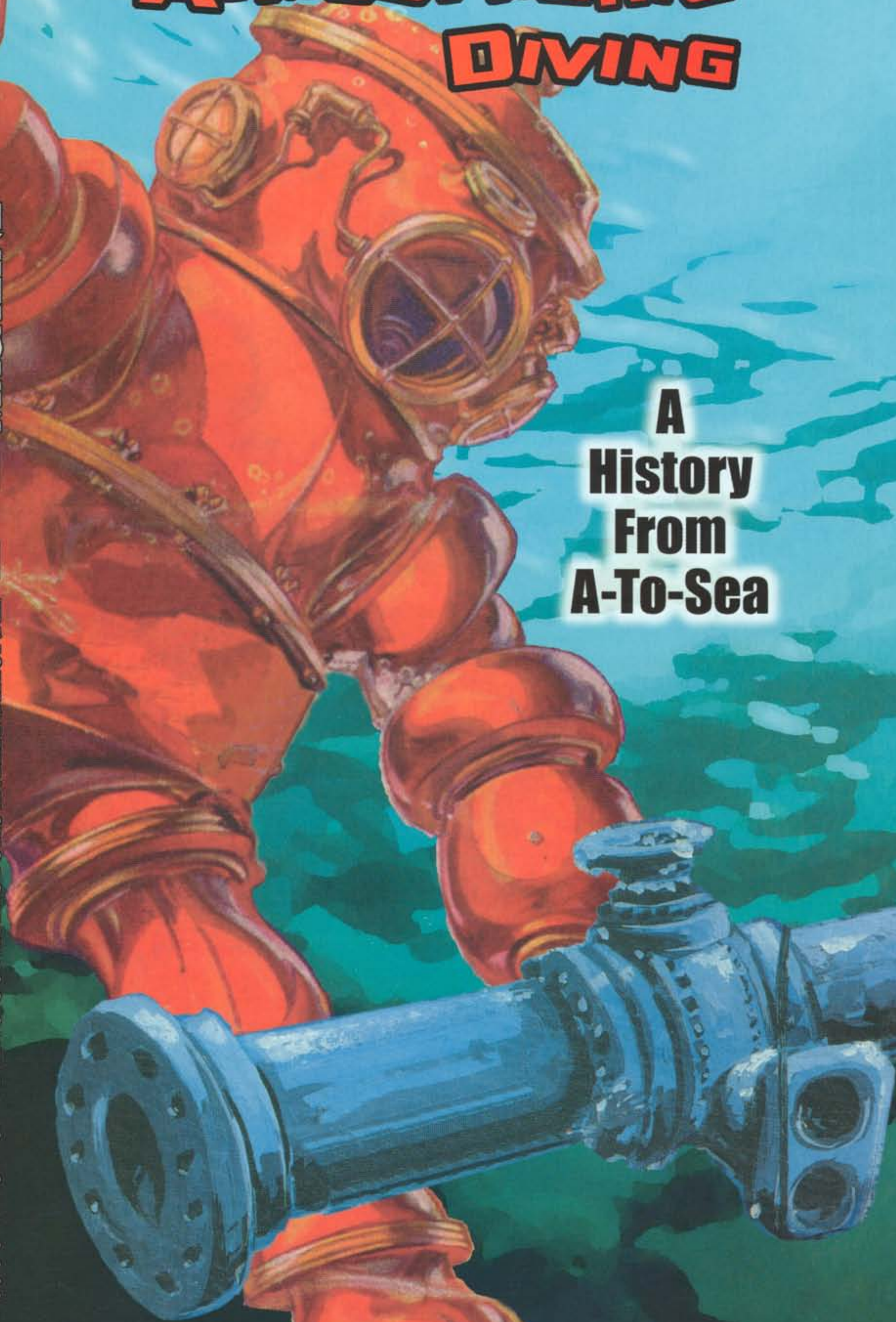
ASSOCIATION OF DIVING CONTRACTORS INTERNATIONAL

MAGAZINE

MAR-APR 2001

## ATMOSPHERIC DIVING

**A  
History  
From  
A-To-Sea**



# The Marketplace: ROV Tooling

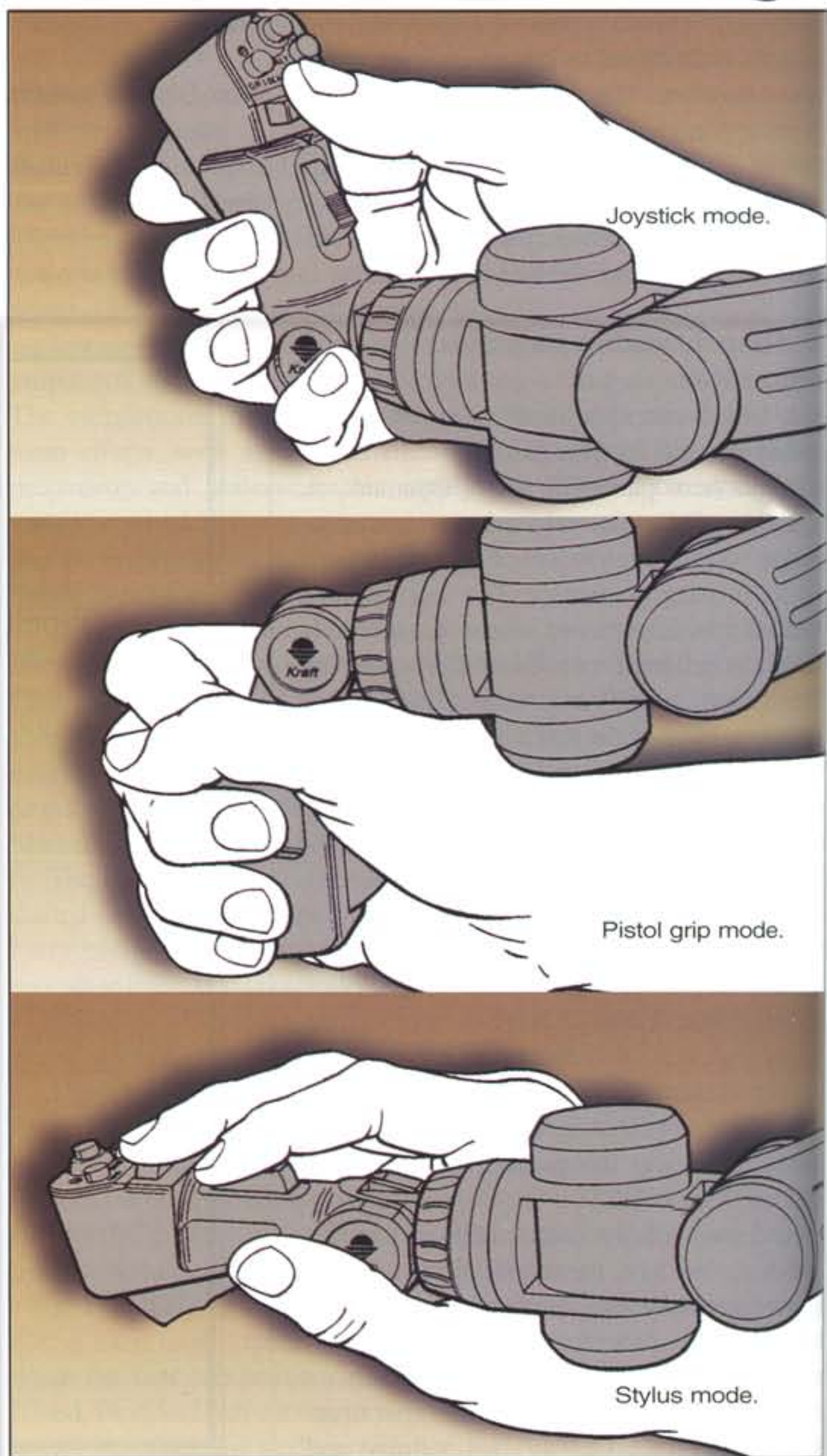
Much is made of the technological wonder that is the modern ROV, and deservedly so. The manufacturers continue to outdo themselves in producing rugged and dependable vehicles to allow contractors to reach into the smallest of spaces or the deepest of oceans. However, less attention is paid to the part of the ROV that actually does the work – the tooling packages. Without the technological advancements of the leaders in the remote intervention field, which we present here, ROVs would be little more than fancy and expensive underwater cameras.

## Kraft TeleRobotics

For more than two decades, Kraft TeleRobotics has demonstrated the ability to envision and develop technology that improves man's ability to perform work in hostile environments. In pursuit of its goal to produce the best manipulator systems possible, Kraft places a great deal of importance on the design of the operator's control interface (hand controller). When using a manipulator arm to perform remote tasks, the vital link between the human operator and the remote arm is the "master controller." It is this master controller that transforms a powerful hydraulic arm into a human-like machine that's capable of performing the most difficult of tasks.

Kraft TeleRobotics has introduced a unique, six-degree-of-freedom, miniature force feedback master controller, the Kraft mini-master, which is well suited for use within the confined operating environment typically found in a manned undersea vehicle or an ROV operator's control

Kraft's mini-master is a six-degree-of-freedom force feedback master controller. The inset shows a diagram of its rotatable grip. Several operator grip options are shown below.



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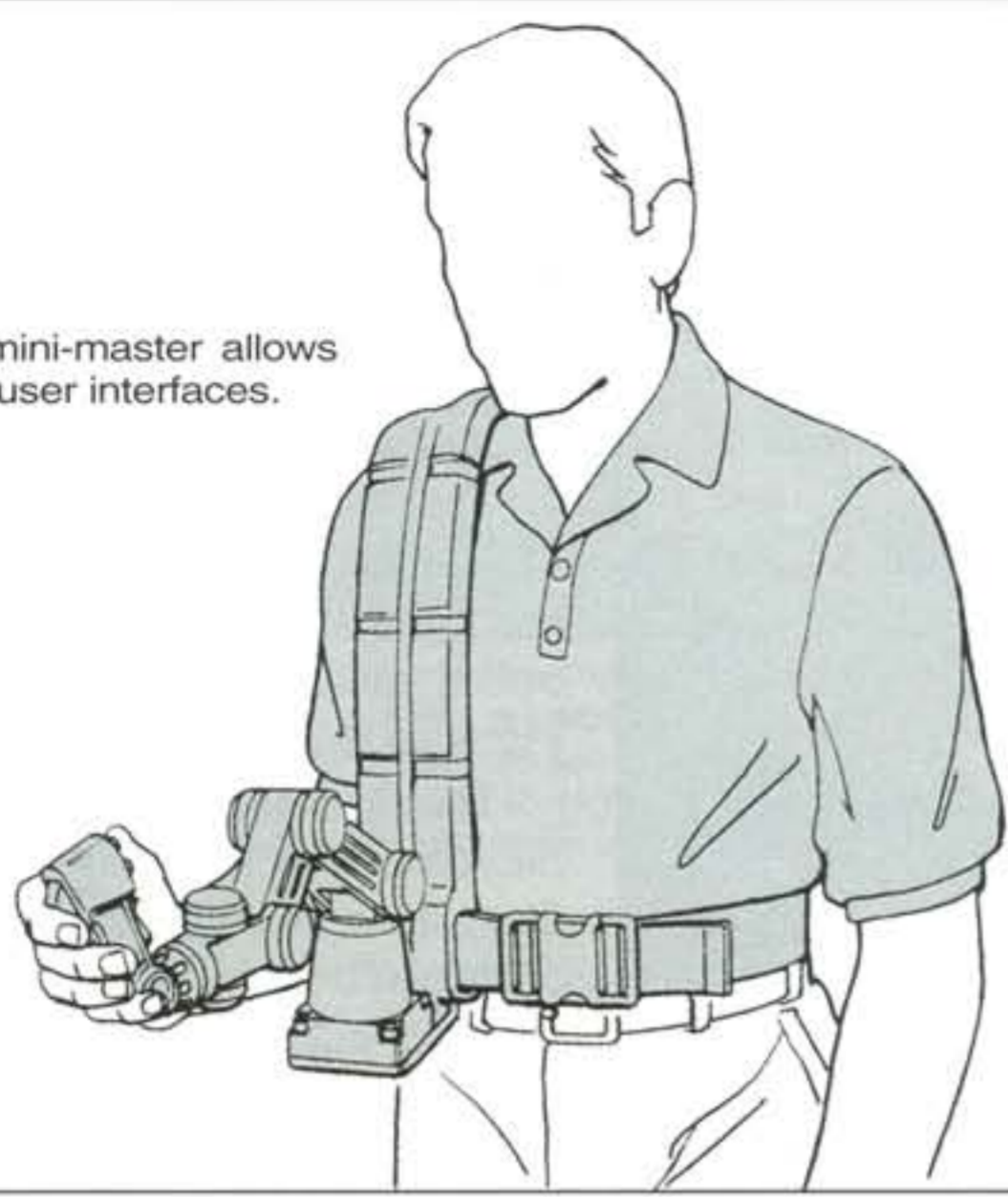
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Kraft's mini-master allows several user interfaces.



van. To accommodate operator preference, type of manipulative task, and a variety of mounting options, a multi-position hand grip allows the operator to choose the most suitable configuration for any given situation. Fingertip controls located on the hand grip provide the operator with direct access to core manipulator functions for fast, precise positioning of the manipulator arm.

Proprietary electric actuators on the mini-master deliver high-fidelity, scaled force feedback to the operator. This, in turn, dramatically improves operator awareness by allowing the operator to experience the dynamic forces acting on the remote arm. Improved operator awareness

greatly reduces the risk of damage to both the work site and the manipulator arm itself.

The bottom line is that a superior hand controller will allow the operator to do a superior job, and any shortcomings in hand controller design weigh heavily on both operator and manipulator performance.

**International Submarine Engineering**

In addition to developing ROVs, AUVs, and robotic manipulators, International Submarine Engineering Ltd. (ISE) also supports the ROV industry by providing spare parts and specialized tools.

For instance, ISE has developed a number of tools for its Hysub 50-2000 Deep Seabed Intervention System (DSIS) ROV. These tools include rescue pod clamps, torpedo clamps, and rod clamps. The clamps are operated using T-Handles, and range in size from 10 inches to 36 inches in diameter. The clamps are actuated by worm drives or hydraulic cylinders, and are controlled using ISE's Magnum Manipulators. The DSIS system is owned and operated by Canada's Department of Defence (DND), and is used on DND's Maritime Coastal Defence Vessels (MCDVs).

ISE has also recently developed a unique jettison assembly for Shin Nippon Kaiji Company (SNK). The jettison assembly is located at the base of their ISE Magnum manipulator arms. The arms are capable of being jettisoned in emergency situations. The arms will be used on SNK's manned submarine, the *Hakuyo 300*.

ISE has also developed a series of seal installation and removal tools, ranging in size from two to 22 inches. Their large seal installation tool is attached to a "T-Handle" and operated remotely, using ISE's Magnum manipulators. These seal tools have been used on pipelines and well heads working in the Shell Mensa Project.

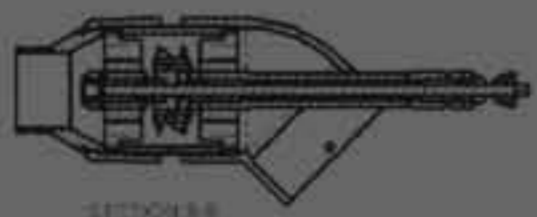
ISE has also designed and manufactured 6-inch bull's eye levels. These levels provide bank and pitch angle indication, and are used on



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