NAVSEA 00C5 CONDUCTS FIRST OF TYPE WATERBORNE FIN STABILIZER REPAIRS

BY

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Introduction

In September 1996, NAVSEA's Supervisor of Salvage and Diving (SUPSALV) was tasked to investigate the feasibility of conducting waterborne fin stabilizer repairs. The particular problem:

> How to remove a 13.5 inch diameter, 8000lbs weight—trapezoidal and extremely top heavy—from a hull opening 14 ft below the waterline, replace the damaged bearings (expanding the hole to 19.5 inches in the process), and then replace the weight. And do all this without sinking the ship!

But this turned out to be 'no problem' for SUPSALV's Underwater Ship Husbandry (UWSH) team; this is precisely the type of task it conducts every day in support of the Fleet. By January 1997, a proposed solution had been developed and briefed to COMNAVSURFLANT, which then tasked NAVSEA—and the UWSH team—with executing the repair. The first repair was scheduled to be completed on the frigate USS *De WERT* (FFG 45) in Mayport, Florida, between 7–14 April, 1997.

The Solution

SUPSALV's solution involved using external rigging to support the finshaft and fin as the internal support components were disassembled. A temporary external seal would prevent ingress of water as the shaft gland was removed. An internal cofferdam built over the exposed finshaft would maintain the watertight integrity of the ship (FIG.1). An internal wire fed through the top of the cofferdam would control the lowering/recovery of the finshaft in and out of the ship. And an outboard aluminium patch would be used to keep the hull watertight as the outboard bearing was replaced.

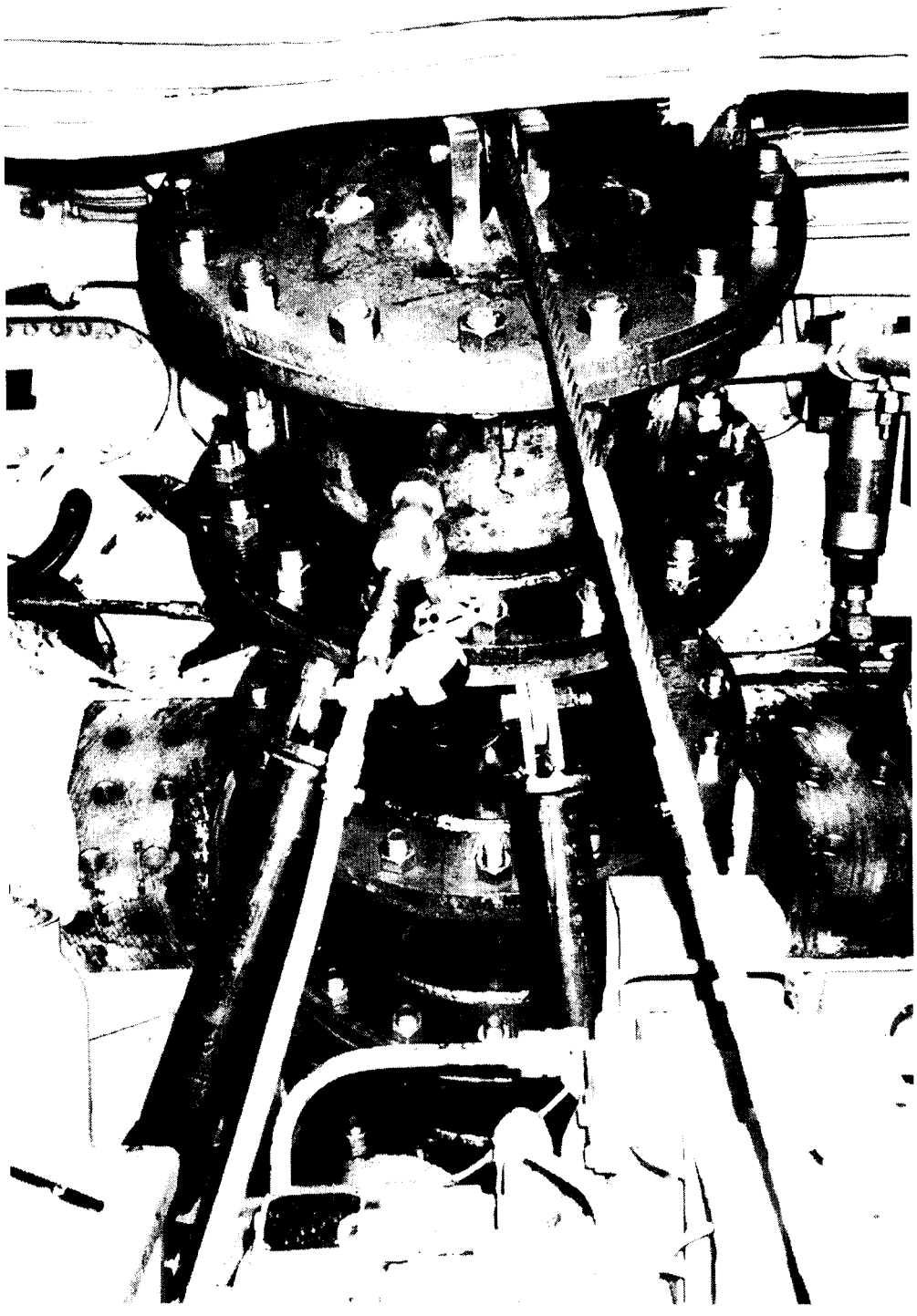

FIG. 1—THE COFFERDAM FULLY BUILT

NOTE THE SUPPORT BRACE, AIR BLOW-DOWN LINE AND GAUGE, AND MARKINGS ON INTERNAL WIRE

This was all excellent in theory, of course, but the real test was to put the theory into practice with the scheduled repair in April. Because all the necessary components existed only as sketches, a lot of work had to be done to meet the April deadline!

Engineering began immediately to complete designs and develop working drawings for delivery to the manufacturer by 15 February. The manufacturer, in turn, was to finish construction by 15 March. These tools, together with the load list for the rigging plan, then had to be assembled at Cheatham Annex for shipment in time to meet the April repair date.

The rigging plan was vital to the success of the operation. It has to be flexible enough to control the load throughout each phase of the movement. It also had to use ship's structure and fittings to avoid unnecessary welding/cutting on the ship, thereby minimizing the impact to the ship.

After numerous visits to frigates in dry dock to witness removal of the fin units using dry techniques, SUPSALV conducted a series of experiments to determine the behavior of the fin in water. The plan was engineered, rigging drawings were completed, and the much anticipated load list dispatched to Cheatham Annex just in time to meet the Mayport delivery.

The First Repair

Because this was the first repair of this type, a team of contractors assembled under the direction of a NAVSEA representative. They, in turn, joined with a representative from the manufacturers of the fin stabilizer system, Brown Brothers in the United Kingdom. This team, along with support from the crew of *De WERT*, proved the theory, and procedure using the tools that were assembled at such short notice. The port finshaft and fin assembly (FIGS. 2&3), together with the outboard bearing (FIG. 4), were replaced within 5 days. Refitting the new finshaft and fin assembly actually took just 2½ hours (FIG. 5) which compared very favorably to dry dock refitting times.

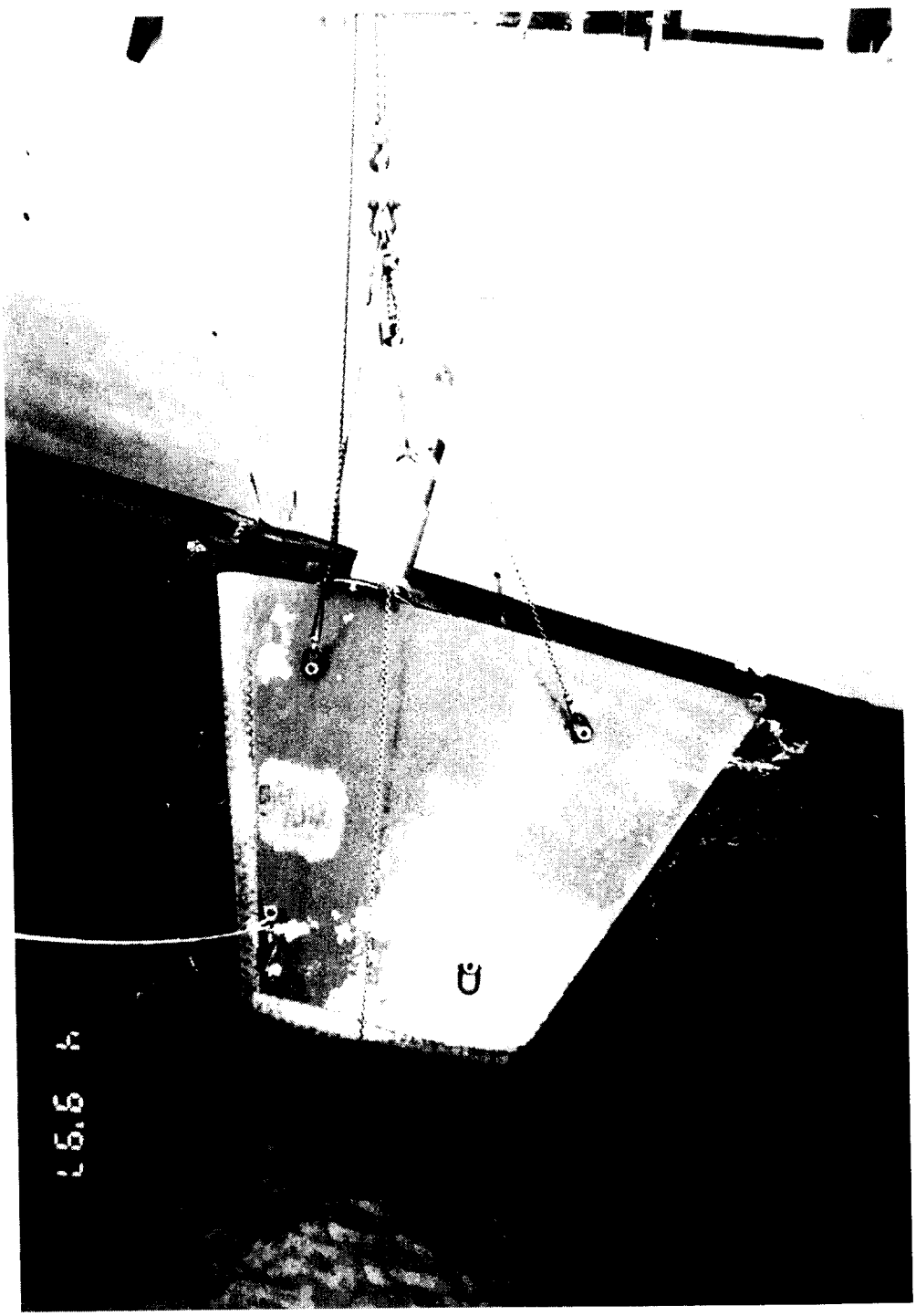

FIG. 2—OLD FIN SHAFT SHOWING EXTERNAL RIGGING

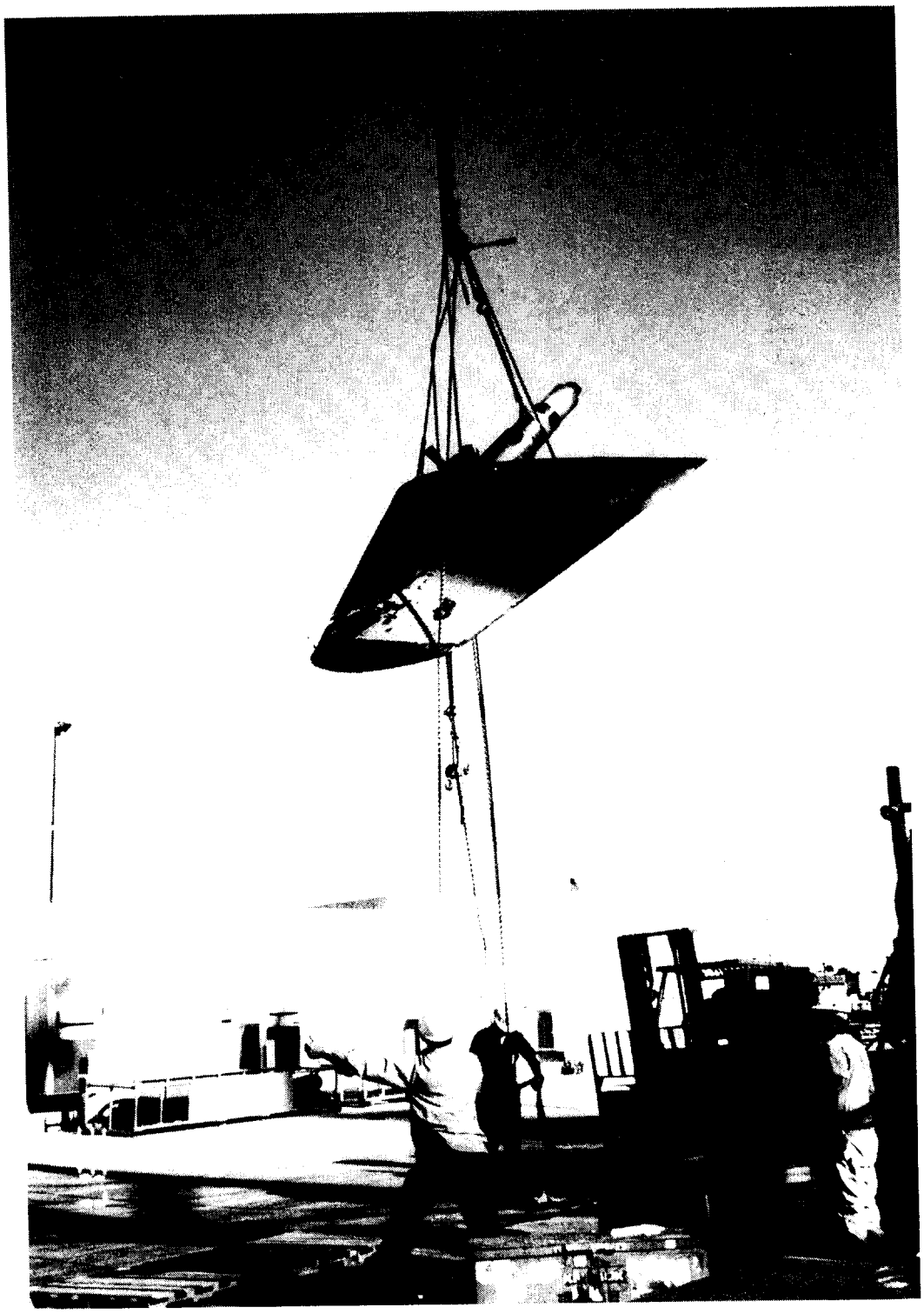

FIG. 3—OLD FIN SHAFT IS TRANSPORTED TO THE JETTY AFTER REPAIRS ARE MADE TO THE USS 'DE WERT'

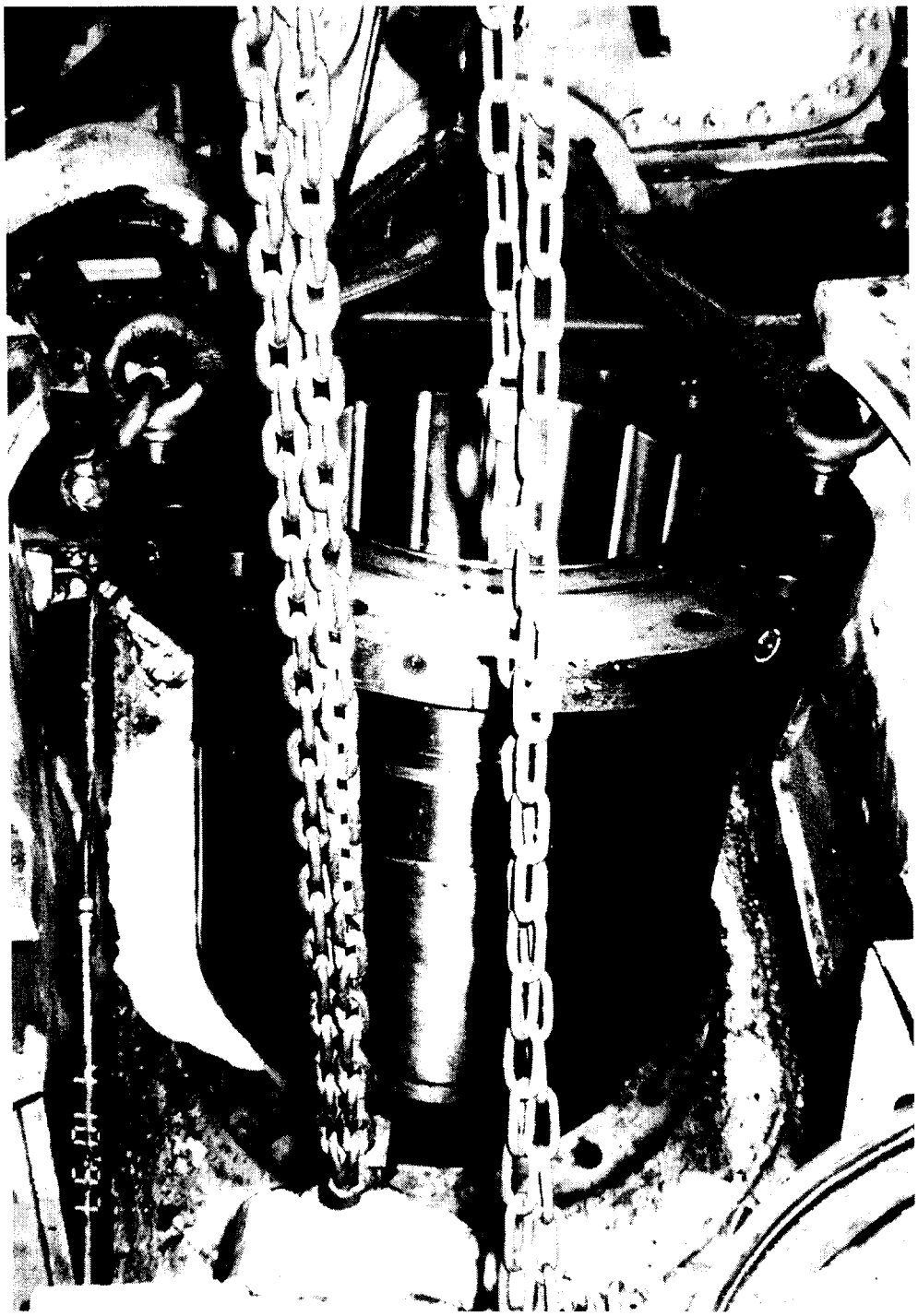

FIG. 4—THE NEW OUTBOARD BEARING IS POSITIONED FOR INSTALLATION

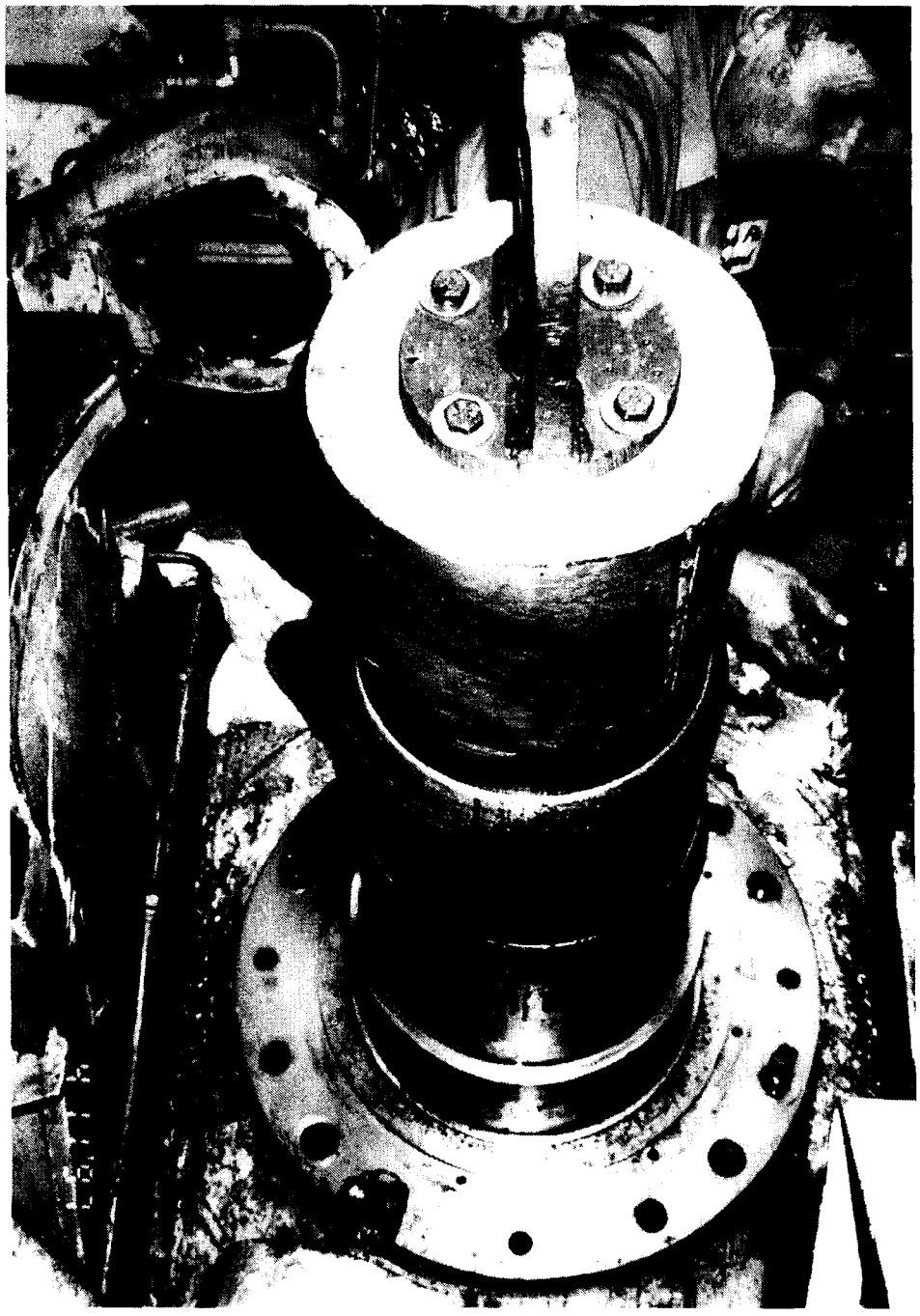

FIG. 5—NEW FINSHAFT IN POSITION INSIDE SHIP, WITH COFFERDAM REMOVED AND SHAFT HELD IN PLACE BY EXTERNAL SUPPORT RIGGING
NOTE THE GREASE SMEARS ON THE SHAFT

The Second Repair

Flushed with success, a much—modified team reassembled in Mayport, Florida, on. 10 June to conduct the second repair of this type. This time the task was to replace both outboard bearings on USS *Doyle* (FFG 39). The previous operation had proved the theory and the procedure; it was now necessary to prove repeatability on the port side, and to prove the experimental procedure and rigging plan for the starboard side. Another success would finalize both the procedure and rigging plans for publication as a chapter in the Underwater Ship Husbandry Manual. This time, Regional Support Group (RSG)/Shore Intermediate Maintenance Activity (SIMA) Mayport personnel would undertake the diving, rigging and mechanical support services for the repair.

The repair had been scheduled for 10–24 June, but *Doyle*, an operational ship, had a training commitment to keep and needed to be at sea by 23 June. The RSG/SIMA team worked well—and hard—under the direction of the subject experts: both fin systems were complete and operationally tested by 20 June. In fact, the port finshaft was refitted in less than 2 hours! Particular credit goes to the members of Red Dive Team, Flexhose Shop, and the Rigging section of SIMA Mayport (FIG. 6). Their dedication and adaptability in successfully conducting an experimental procedure, was not just a creditable example of the professionalism of the U.S. Sailor—it saved the American taxpayer a great deal of money! SIMA personnel brought about even more savings by refurbishing both fins on the jetty and then refitting them, rather than unnecessarily replacing the fins with new assemblies. And thanks to their efforts *Doyle* was able to sail on 23 June to honour her scheduled commitments and remain mission ready.

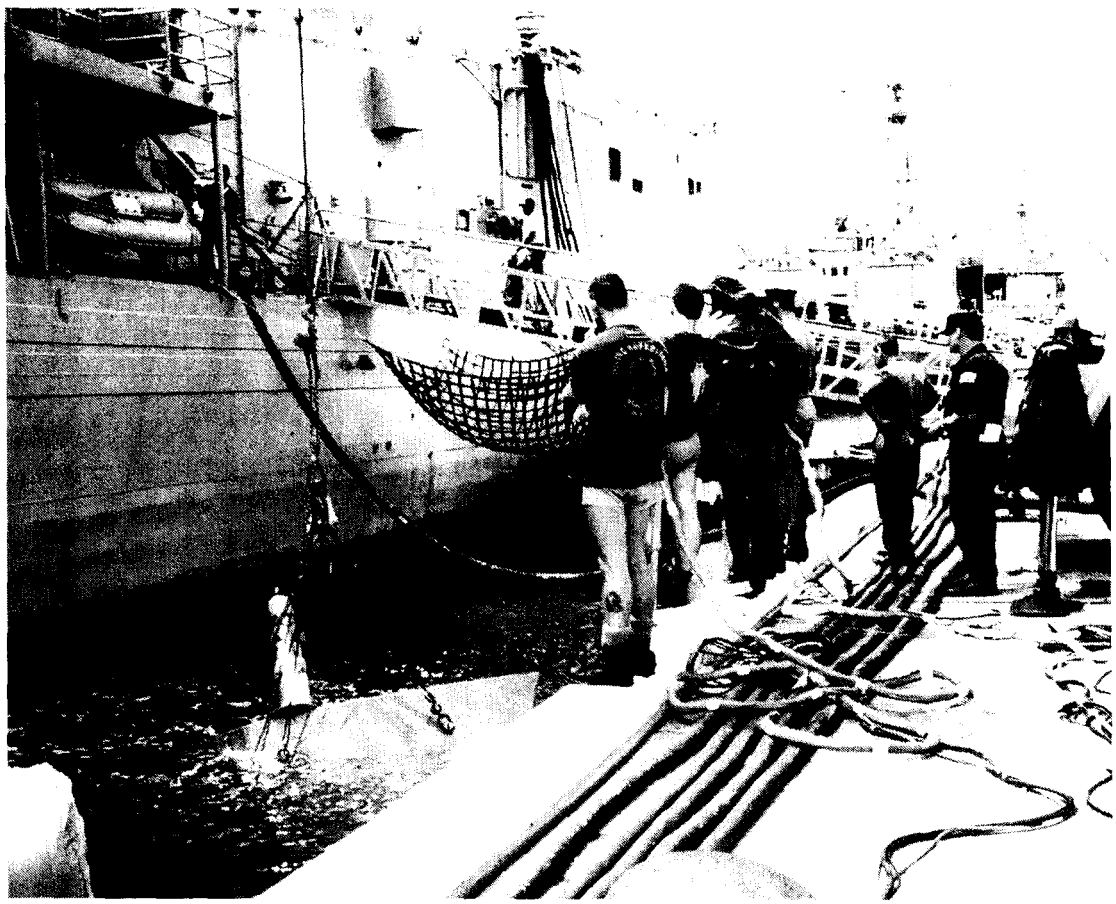

FIG. 6—RED TEAM SUPERVISE THE REMOVAL OF USS 'DOYLE'S' PORT FIN STABILIZER

The next steps: to publish the procedure as a chapter in the Underwater Ship's Husbandry Manual, and to finalize the load list as a repair kit to be maintained in the UWSH Equipment Pool at Cheatham Annex. This kit will be available for dispatch wherever and whenever required.

Advantages

So what are the advantages of waterborne fin stabilizer repairs? Fleet vessels will still receive planned maintenance on their fin stabilizer systems during scheduled docking periods. However, the development of this technique means that those responsible for vessel maintenance will no longer have to incur the expense of an emergency docking solely to repair one system. Current cost estimates for placing an OLIVER HAZARD PERRY (FFG) class frigate in dry dock are approximately $400,000, even before repair materials and personnel costs are considered. Using the NAVSEA repair kit and navy divers, riggers and mechanics, that bill can be cut to less than $30,000. Since the repair kit can be used wherever there is a suitable depth of water, a ship does not have to be re-routed to a dry dock for the repair. This means that repair dates are dependent only upon the availability of the ship.

Waterborne fin stabilizer repairs are just one example of the cost effective support provided to the Fleet by SUPSALV's use of UWSH waterborne repair techniques.