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# PHM



BOEING



The PHM has some extremely useful features that lend themselves to a variety of tactical applications. The first, obviously, is its speed. It's very fast. Over 40 knots is a very satisfying speed for almost any kind of tactic.

The second thing is its substantial seakeeping capability. Unlike the PT boat and the earlier PGs, it can get out in a very heavy sea and maintain almost peak speed when it's on the foil. This is a tremendous asset because it is essentially not sea limited within any practical sense of the word.

The third attractive feature is its agility. The survivability of this small ship is going to depend in large part on its speed and on its agility. It's going to be very difficult for aircraft to kill this small ship because it is so maneuverable. We have proved this repeatedly in paper exercises and, more importantly, in fleet exercises.

The fourth characteristic, which is the big one, is that it carries the load of a major combatant in the Harpoon. Although the Harpoons are transferred to the PHM can carry out a mission all against a major combatant. And, of course, it has the 76-mm Oerlikon which is a very accurate gun and part of a good defense/offensive system.

The final attraction is that PHMs are relatively inexpensive and you can build several of them for the cost of a large combatant. All these are strong points as a naval strategic plan or tactical tool for the PHM ship.

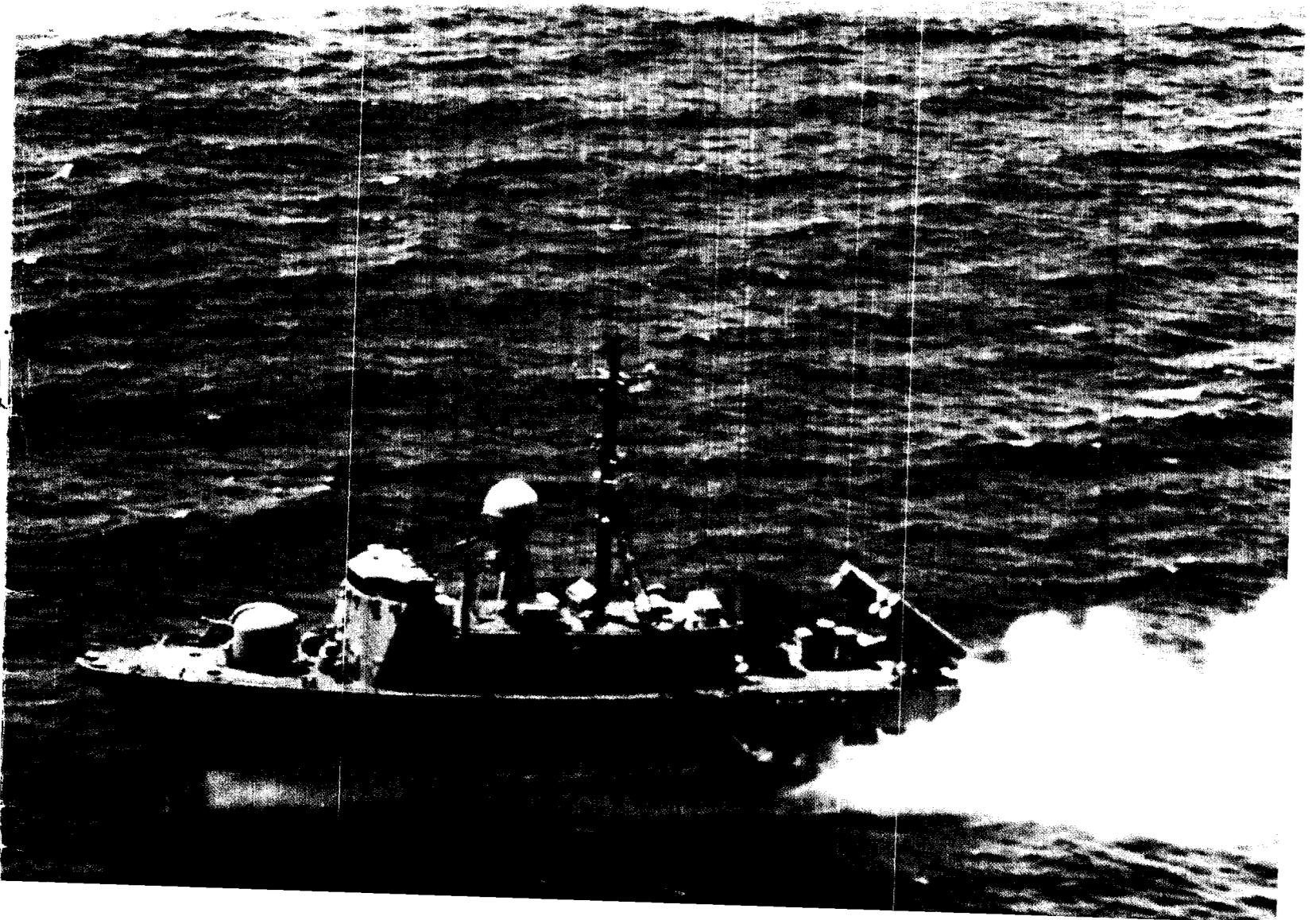
COMVAULT, USMC  
SURFACE FORCES AGENCIES

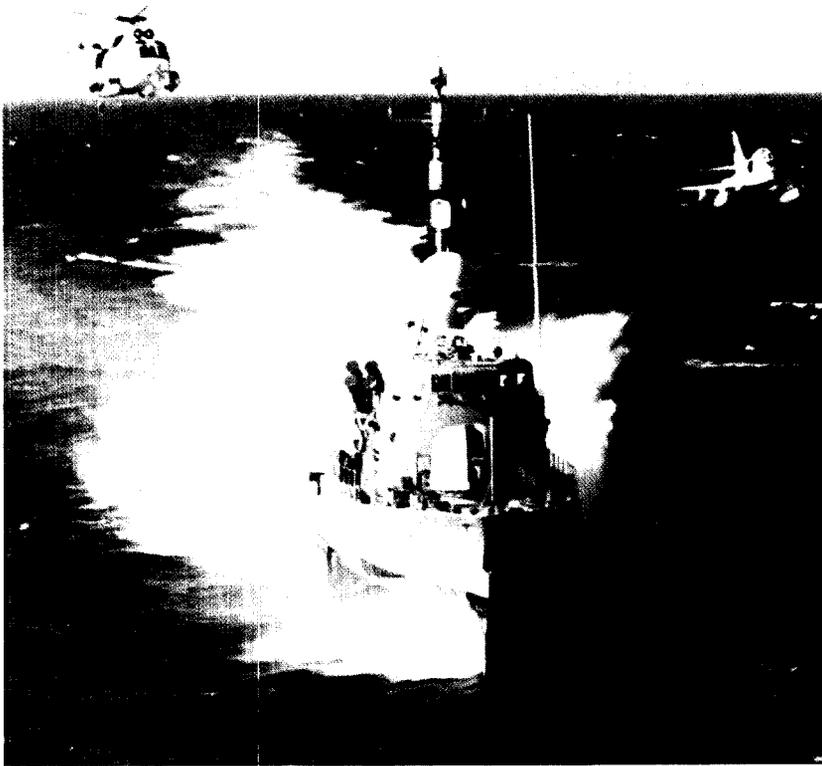
JULY 1981

An Evening Post Article

# PHM

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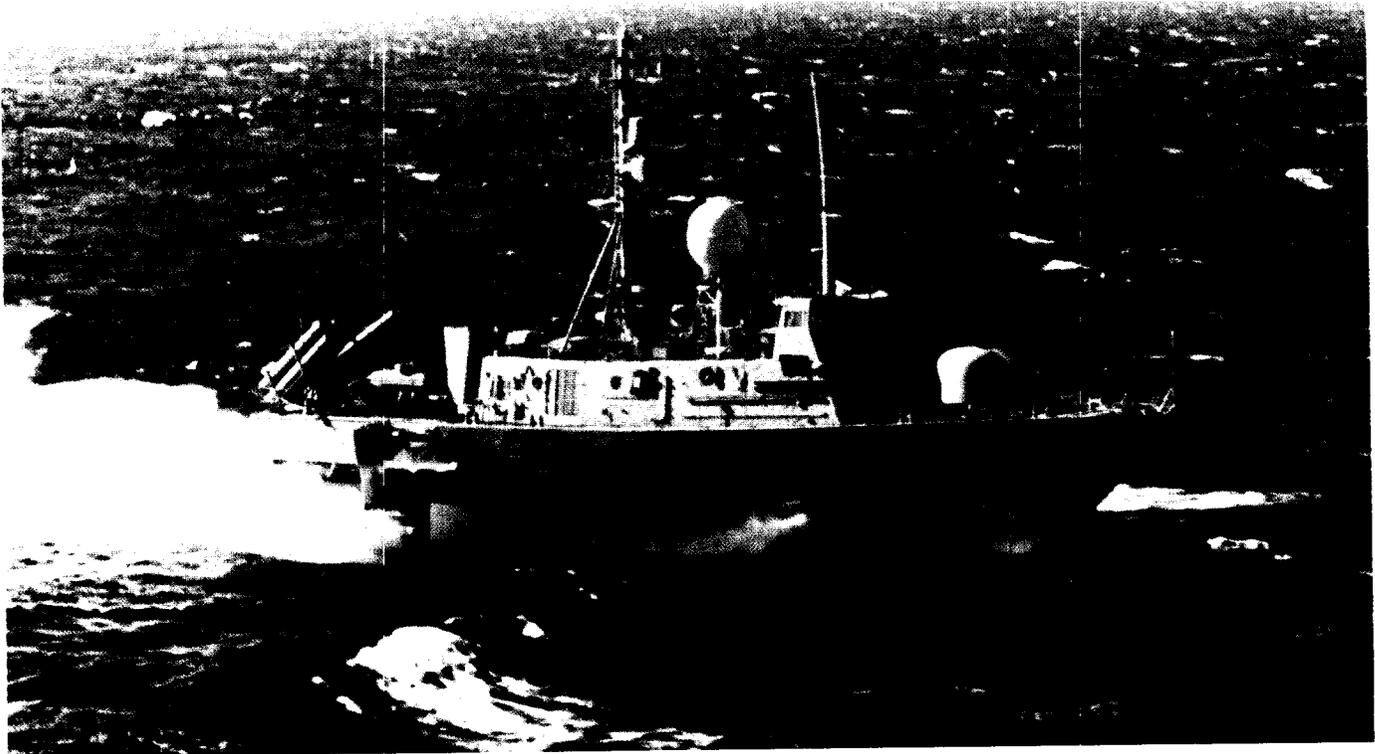


**PHM—  
A Superior  
Warship,  
IS  
Fast**

PHM can  
conduct operations in  
rough seas at speeds  
greater than 40 knots,

**Agile** PHM can turn at a rate  
no conventional ship can match,

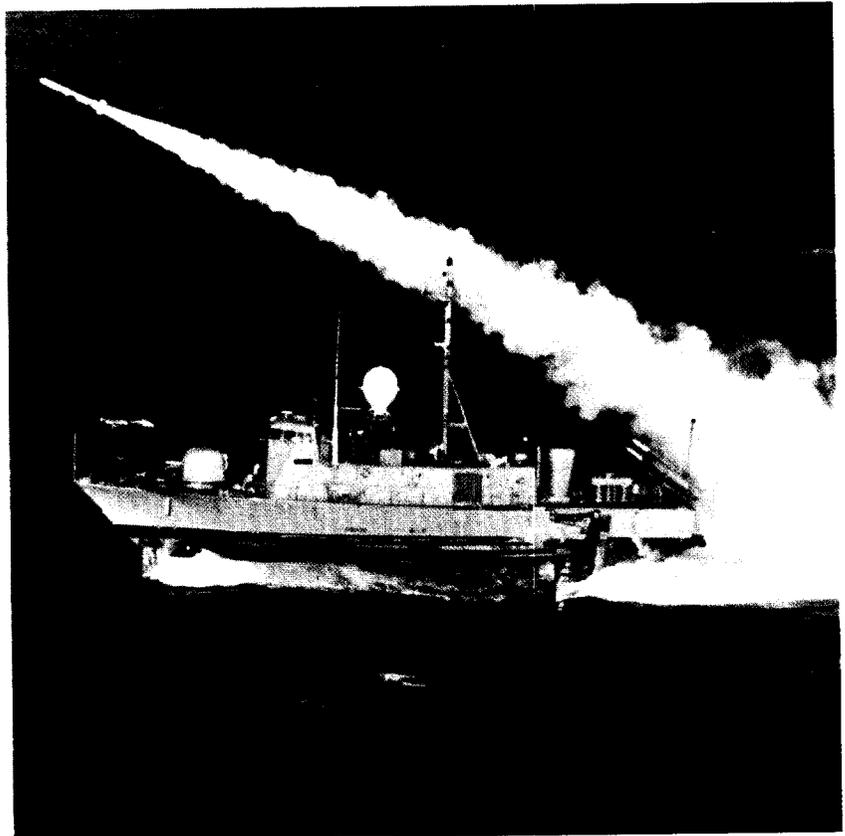




Seaworthy PHM **can** operate  
in heavy seas without ship or  
crew performance degradation,,

## Powerful

PHM carries  
the clout of a major  
combatant.





## Fast

PHM has a speed capability of more than 40 knots. This speed means mobility, the ability to cover a large area with a small number of ships. It means surprise, the ability to strike and withdraw (hit and run) before a defense can be organized. Ultimately, speed means the ability to control any engagement and to fight at a time and a place of one's own choosing.

This speed gives the hydrofoil a speed advantage over conventional ships in calm seas; in rough seas, the advantage more than doubles.

## Agile

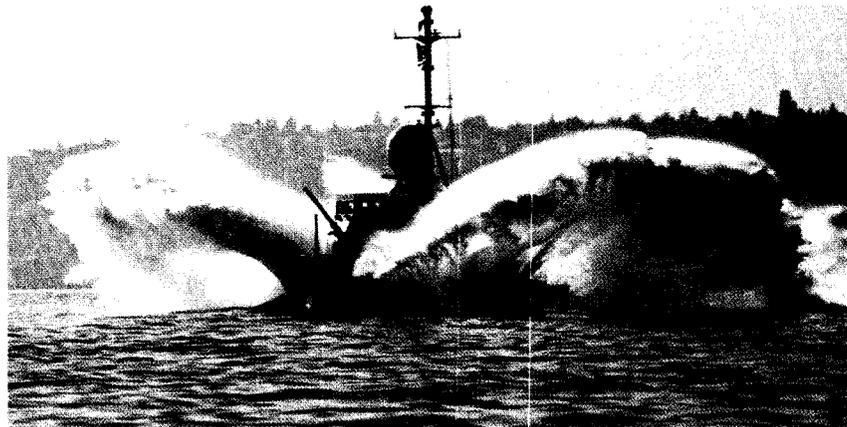


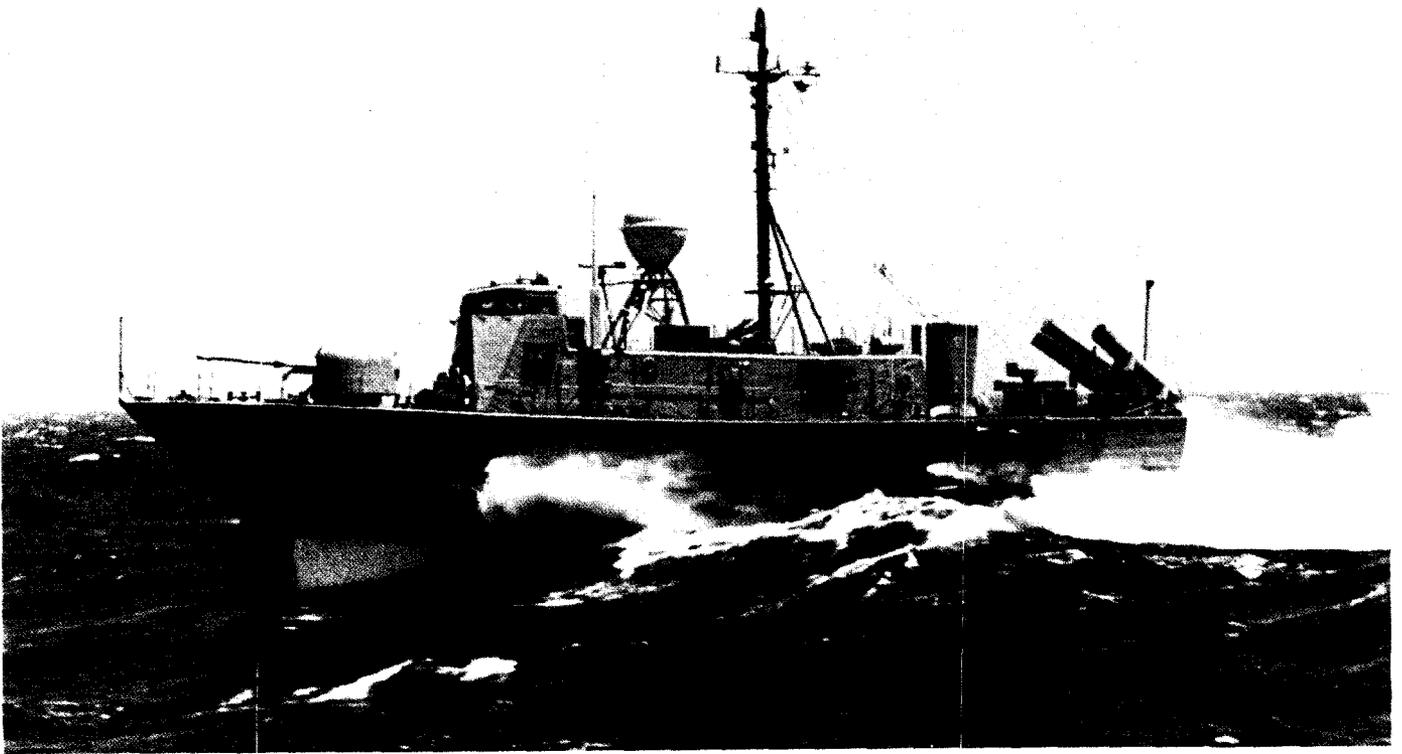
The Boeing-designed hydrofoils can turn many times faster than conventional ships.

The submerged foil hydrofoil ship maneuvers by banking in turns. This turn coordination enhances crew comfort during turns by eliminating lateral acceleration. In rough water, fully coordinated turns are relatively steady, regardless of wave height. This is a marked contrast to conventional ships or surface-piercing hydrofoils, which suffer a degraded stability and ride quality in rough seas.

PHM's agility at speed also provides a quantitative tactical advantage that enhances its survivability as well as its effectiveness when engaging hostile entities. A fast, elusive ship is a very difficult target.

The photograph below shows PHM performing an emergency stop. When necessary, the ship can be stopped by chopping the throttle and commanding the ship to land through the **automatic** height control setting. This maneuver is just another example of PHM's agility.





## Seaworthy

Mission effectiveness of the PHM is a direct result of the hydrofoil's high-speed maneuverability and all-weather capability. The hydrofoil can maintain these attributes in very heavy seas, while simultaneously providing a stable weapon platform and a comfortable, safe working environment for the crew.

Although some fast attackcraft can attain the speed of PHM, **most** cannot sustain that speed in even modest seas. Hullborne, with the struts and foils extended, PHM exhibits a ride quality approximating that of a destroyer-sized ship.

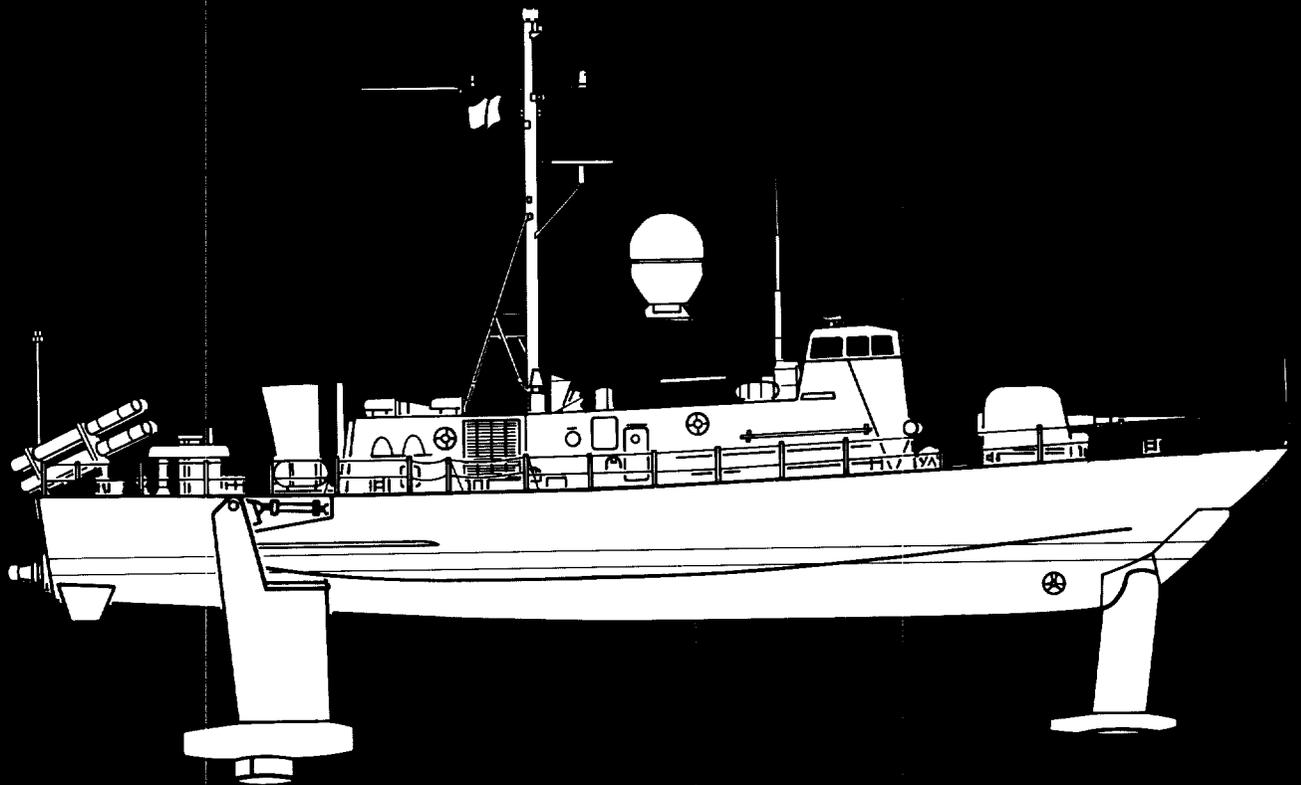
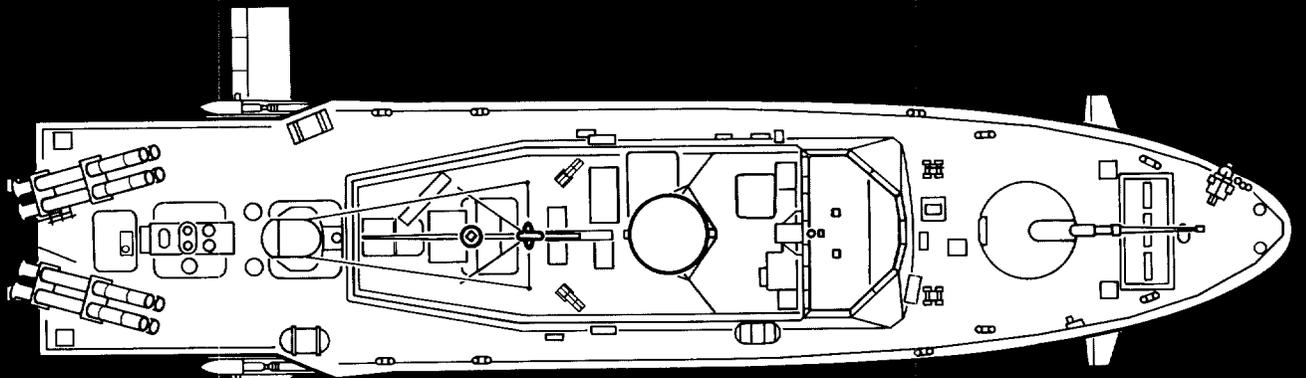
PHM is powerful beyond its size. Presently armed with eight surface-to-surface missiles and a modern, fully automatic, multipurpose 76-mm gun, it carries a punch that approaches the destructive capability of a frigate or small destroyer. The missiles are capable of engaging and inflicting a mission kill on cruiser-sized ships. The gun is capable of effective antiship and anti-air employment.

PHM was designed and equipped primarily to conduct surface warfare tasks for the NATO countries. Examples of typical surface warfare missions are: countering surface forces, shadowing major combatants, defending minefields, and surface search and barrier operations. Mission kills on a surface task group can be achieved with a relatively small number of effective hydrofoil surface combatants. Prior to hostilities, shadowing of major combatants is essential in determining intent and magnitude of the buildup, acting as a tripwire, positioning to counterstrike the high-value targets, and transmitting an attackwarning if hostilities begin.

## Powerful



MOTION PICTURE PRINT—US NAVY



## Pegasus **Class**—General Characteristics and Principal Subsystems

**Dimensions**

Length overall, foils down	40.5 meters
Beam, main deck	8.6 meters
Overall aft foil span	14.5 meters
Draft, foils up	1.9 meters
Draft, foils down	7.1 meters
Height of bridge, hullborne	6.8 meters
Height of bridge, foilborne	11.1 meters
Full-load displacement	241.3 metric tons

**Foilborne propulsion**

- 1 General Electric LM2500 gas turbine engine
- 1 Aerojet Liquid Rocket Company waterjet propulsor

**Foilborne speed** In excess of 40 knots

**Hullborne propulsion**

- 2 Motoren-und Turbinen-Union (MTU) 8V331TC81 diesel engines
- 2 Aerojet Liquid Rocket Company waterjet propulsors with nozzle steering and reverser assemblies

**Hullborne speed (diesels only)** 11 knots

**Electrical** 2 AiResearch ME831-800 gas turbine engines, each driving a 450V ac, 250-kVA (200 kW), 400-Hz, 3-phase generator

**Fuel** Diesel oil per MIL-F-16884 (NATO F-76) or JP-5 per MIL-T-5624 (NATO F-44).

**Hull** Welded 5456 aluminum

**Foils and struts** Welded 17-4PH corrosion-resistant steel

**Accommodations** 24 berths

**Complement** 23 officers and enlisted men

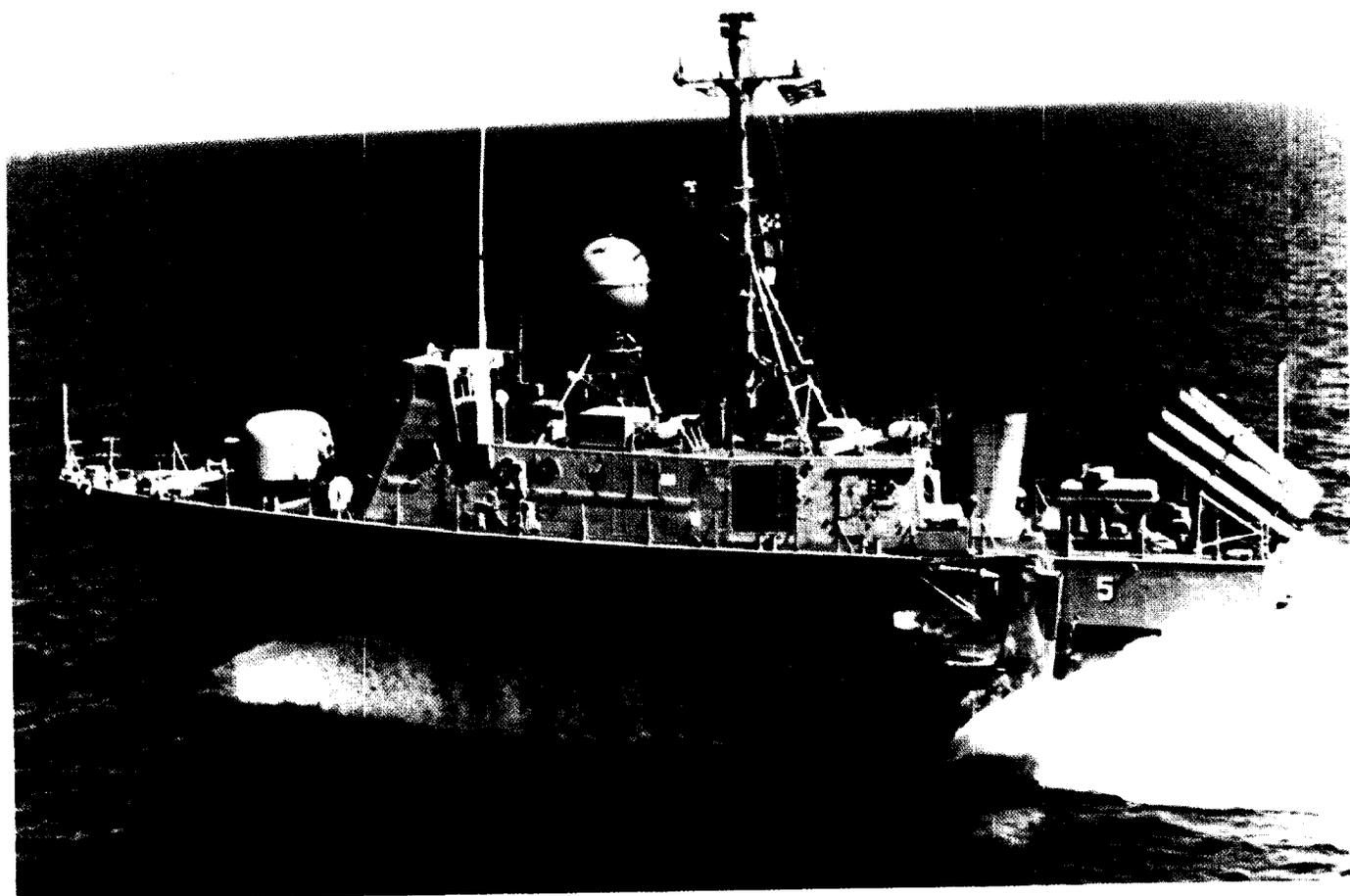
**Provisions** 5 days (nominal)

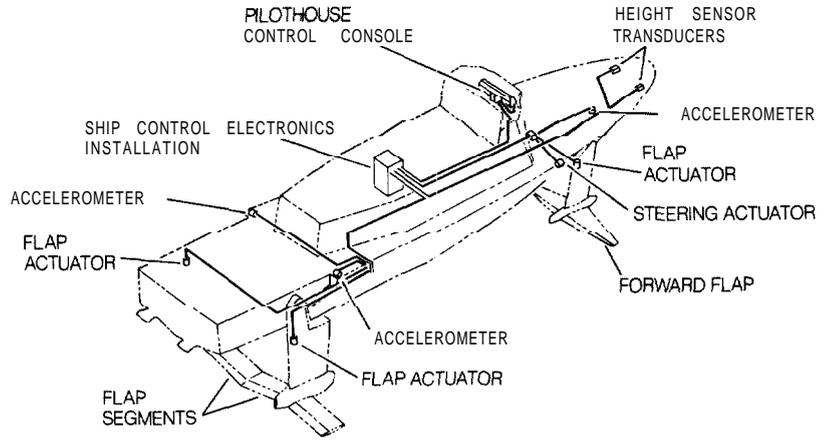
**Total Payload\*** 36.3 metric tons

**Mission Load\*\*** 87.9 metric tons

\*Includes payload portion of Command Surveillance, Armament, and Military Loads.

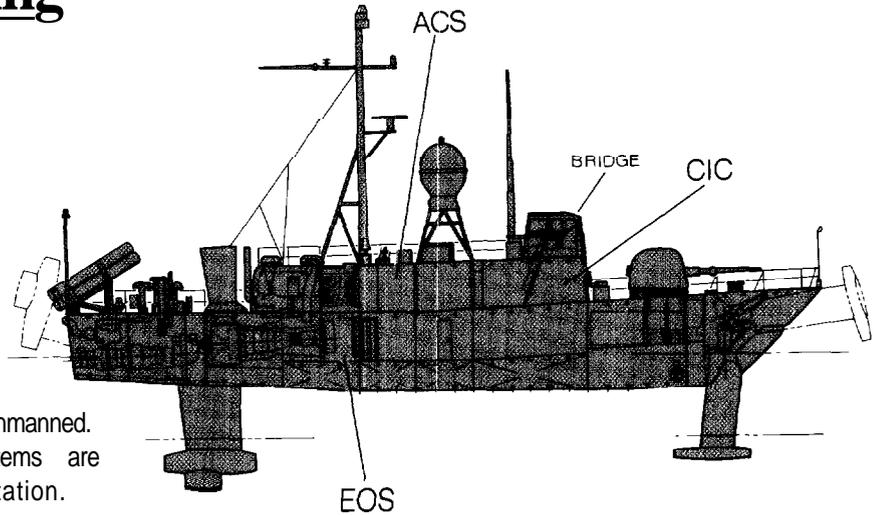
\*\*Includes Total Payload plus crew, provisions, water, and fuel.





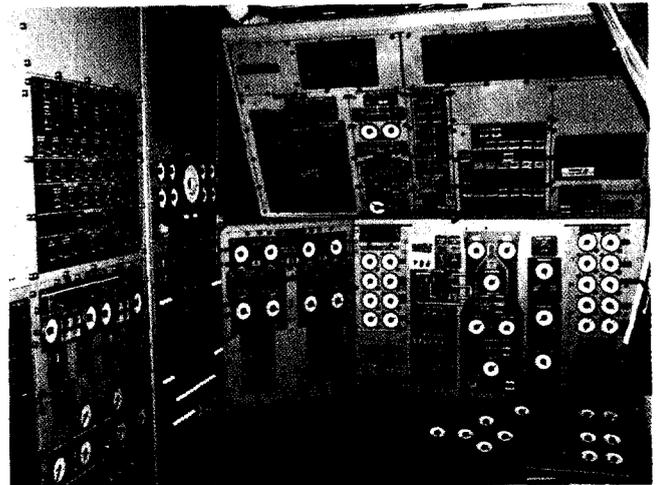
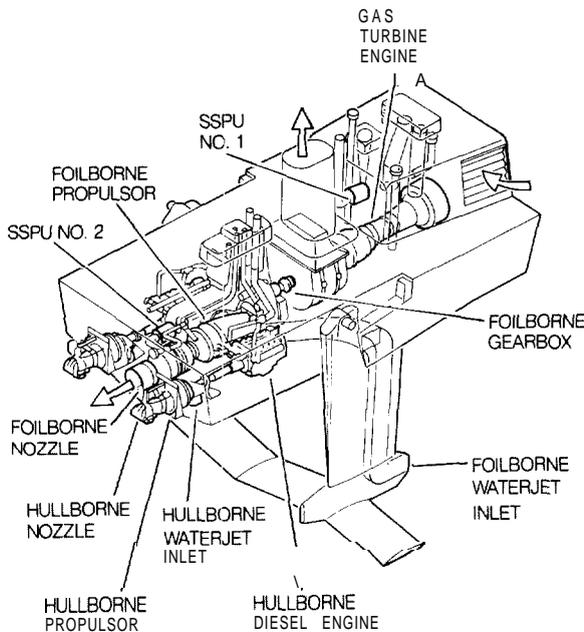
The automatic control system (ACS) provides **continuous computerized** dynamic control of the ship during takeoff, landing, and all foilborne operations. The only inputs required are mode selection, foil depth setting, foilborne throttle setting, and steering.

## Configured for Minimal Manning



The machinery spaces are normally unmanned. Both hullborne and foilborne propulsion systems are controlled from the Engineer's Operating Station.

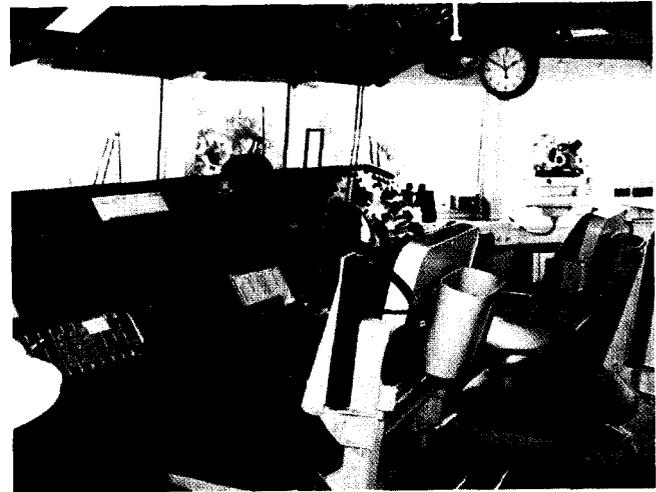
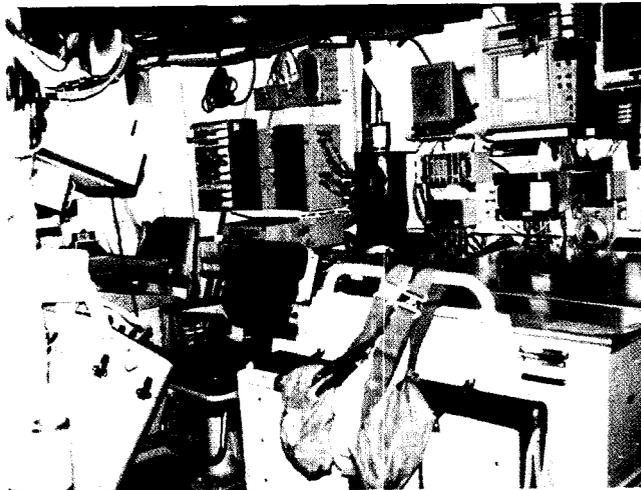
In the Engineer's Operating Station (EOS), a single operator controls the ship's main and auxiliary machinery.





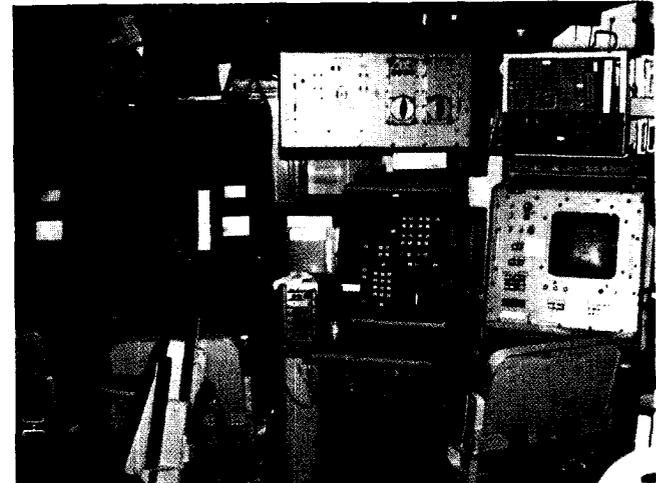
On the bridge, controls for both hullborne and foilborne conditions are concentrated on the right at the helmsman's station. The officer of the deck sits on the left. He has a radar repeater and a gyro compass repeater.

The compact Combat Information Center (CIC), as currently configured, accommodates displays and data transfer equipment needed to operate weapons systems, sensors, and navigation equipment.



This equipment, which provides a significant capability to a ship the size of PHM, includes-

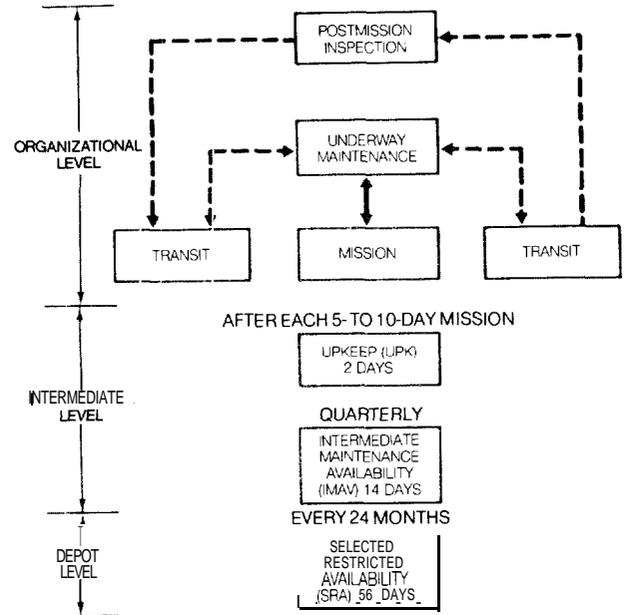
- Truemotion navigation radar
- Omega navigation
- Gyrocompass
- Dead-reckoning tracer
- HYCATS (Hydrofoil Collision Avoidance and Tracking System)
- Speed log
- Depth sounder/recorder
- Radar repeater consoles (2)
- Integrated intercom/announcing/exterior communications access system
- HF, UHF, and VHF communications (teletype and voice)
- IFF (identification friend or foe) system
- ESM (electronic support measures) system
- Integrated shipboard communications system
- Fire control system
- Weapons control console



Organizational-level maintenance is performed by the ship's crew and consists of underway corrective maintenance and postmission preventive maintenance inspections. These actions are accomplished using built-in test equipment, hand tools, and support equipment. Simple remove-and-replace actions correct 90 percent of equipment failures in 2 hours or less. Intermediate-level maintenance is performed by a shore activity-in the U.S. Navy, the Mobile Logistics Support Group (MLSG). The MLSG assists in preventive maintenance and in corrective maintenance that was deferred while the vessel was underway. The MLSG also performs quarterly maintenance, during which major deferred corrective maintenance and scheduled preventive maintenance are accomplished. Depot-level maintenance, consisting of major repairs or ship alterations, is conducted in a shipyard.

Procedures for all onboard maintenance actions are described in detail in the System Operation and Onboard Maintenance Manual. Preventive maintenance requirements are incorporated in the Planned Maintenance Subsystem of the Navy's Maintenance and Material Management system.

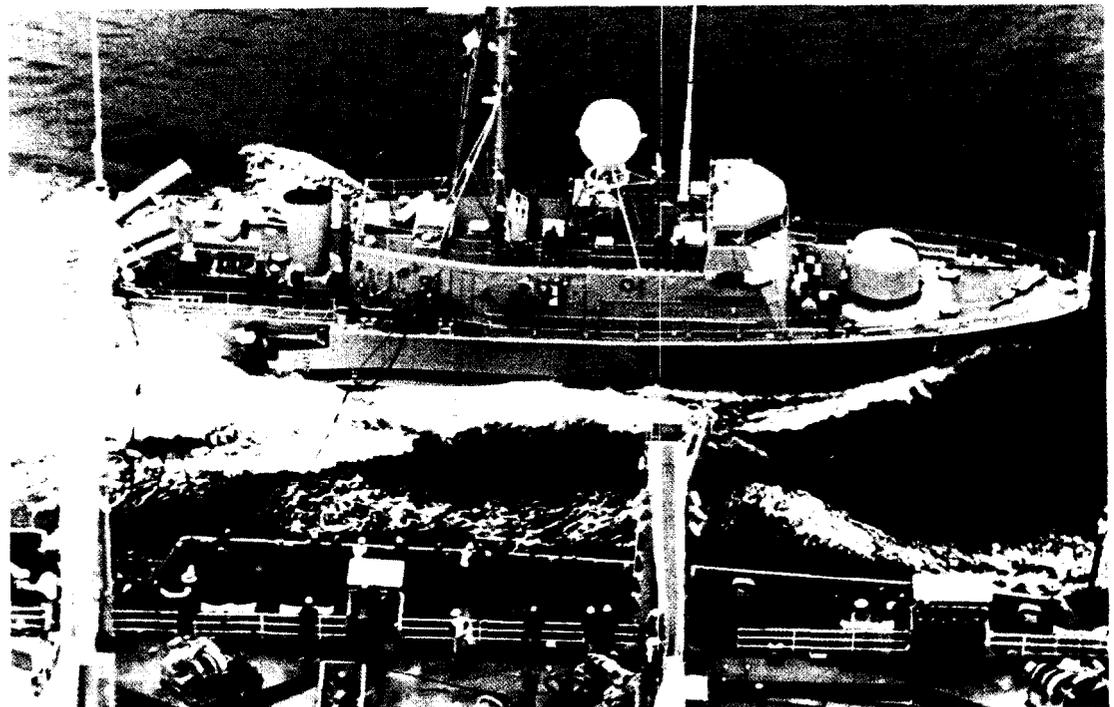
PHM routinely accomplishes replenishment at sea. Dedicated stations are provided for fuel replenishment, highline transfer, and for replenishment by helicopter at high hover. These provisions allow PHM to accompany the fleet throughout the world.



Typical Support Cycle

## Support

### Underway Replenishment



**Fast** — speed in excess of 40 knots

**Agile** -exceptional turn rate

**Seaworthy-** smooth, stable ride in heavy seas

**Powerful** — delivers up-to-date weaponry

**Force multiplier** — a relatively low-cost, capable, and reliable warship that can reinforce existing forces or relieve those forces for missions in other critical areas

## **A Superior Warship for Any Navy**



### **PHM Mission Capabilities**

In the present ASUW configuration, PHM has a flexible mission capability and can perform many surface warfare roles. Additional mission capabilities for PHM are possible in the areas of ASW, AA defense, MW, and EW. Ship configurations can be developed to provide multimission capabilities.



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