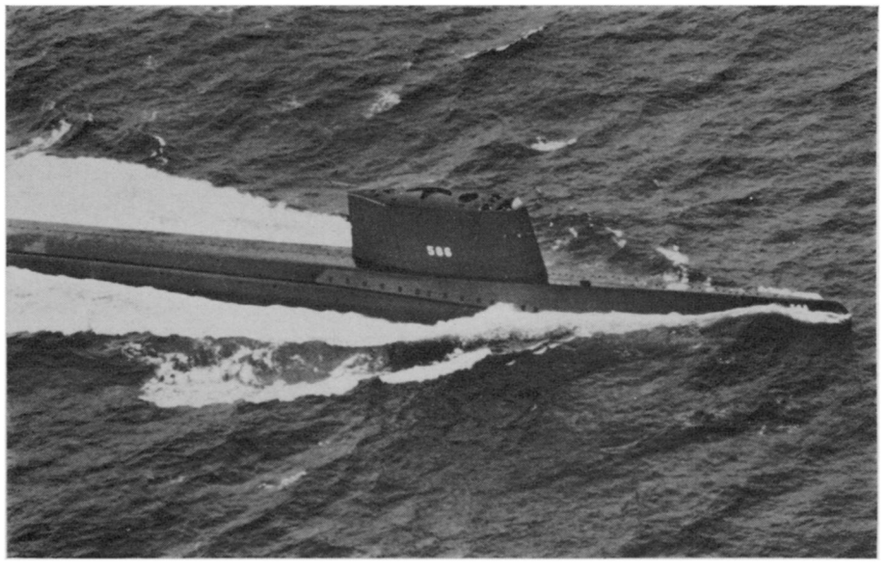
Deeper, quieter and deadlier

The technology for silent subs is developing, if Rickover can convince his chiefs to build them



General Dynamics

Attack submarine Triton: Navy wants more quiet deep down.

Since the nuclear submarine Nautilus was launched in 1954, the United States has built its fleet to 74, ranging from the 268-foot Skate, the first submarine to surface at the North Pole, to the 447-foot Triton, the world's longest.

The Navy has plans for two future nuclear generations, but the dispute that has sprung up around them leaves a question mark ahead for one of the most influential weapon systems in the world's deterrent arsenals.

On one side are Vice Admiral Hyman G. Rickover, who has long waged the battle for a nuclear Navy, and a sizable number of Congressmen, notably including most of the Senate Armed Services Committee's Preparedness Investigation Subcommittee.

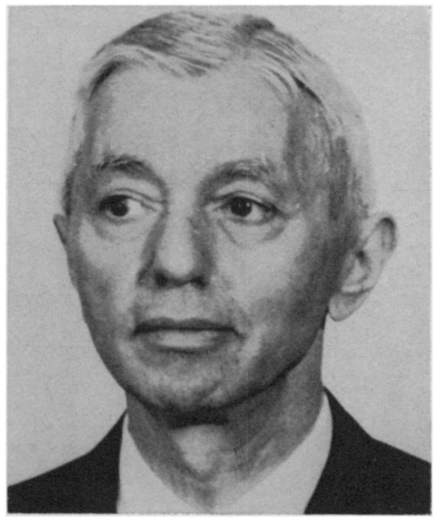
On the other is the upper echelon of the Department of Defense, which the nuclear proponents believe will bog the whole plan down in an infinity of studies, analyses and paperwork.

Admiral Rickover has fired salvo after salvo at DOD researchers. There is so much analysis going on, he says, that new weapons now take an entire decade instead of five or six years to get into production. "In all the years I have been in the nuclear field," he recently told a House subcommittee, "I know of no study that has been made in my field by the Department of Defense which has not caused delay, or which has added one iota to our national defense—not one."

The admiral is not alone. So time-consuming have the Defense Department's cautious studies become, that Chairman L. Mendel Rivers of the powerful House Armed Services Committee has in the past threatened to back legislation abolishing the post of Assistant Secretary of Defense for Systems Analysis.

This week, therefore, the Joint Committee on Atomic Energy is out to see whether Defense Secretary Clark Clifford was serious when he announced last week that the Navy is getting the go-ahead on the first of its new subs—a super-craft, to be faster, deeper-diving and better-armed than any now in the fleet. Clifford's announcement was informal, so until they hear it in more detail, backers of the new submarine fear that the plan, once approved, might then be allowed to suffocate beneath an avalanche of studies. Admiral Rickover says that it has already been four years since he proposed the super-sub's development, and that the Defense Department has yet to release $26.5 million he needs for improved propulsion equipment that must be ordered well ahead of the rest of the hardware.

The status of the submarine class beyond the super-sub—a new breed of silent hunter-killer—is even less clear. A year ago, say Navy aides, Rickover began circulating the word that the discussion of ways to make submarines quieter was taboo. The censorship has since become progressively tighter. Three months ago the relatively innocuous (and formerly public) NAVAL SHIP SYSTEMS COMMAND NEWS, which has had perhaps one silence-related piece a year since 1964, was declared restricted, meaning that it will henceforth be kept inside the Navy. Even that decision was kept quiet.



Wide World Photos

Rickover: another naval engagement

The Defense Department, says Secretary Clifford, will not make its decision on the quiet sub public for several weeks. Early this month there were unofficial reports that the word was "sink it." An angry Rickover, however, backed by his Congressional allies, is a formidable opponent.

Although under myriad wraps, the quiet sub is taking shape on paper. The Navy's technology of quiet is a deep,

dark secret, but there are the inevitable hints, clues and interpolations, many from civilian applications, to give an idea of what is going on.

The biggest problem is engine noise. Steam created from the reactor's heat turns a turbine connected through a rumbling, clattering gearbox to the propeller drive shafts. The quiet sub will eliminate the gears by using the turbine to create electricity to drive a variable-speed electric motor.

Anything with moving parts makes some noise, however (including the sub itself slipping through the water), and most of it is detectable by sonar.

One way of cutting down vibration from machinery is to isolate it from its surroundings. Recording studios and test chambers requiring complete silence have already been built by suspending them from their outer structures by springs, or by floating them in trays of oil. Both techniques, Navy researchers reluctantly agree, could be applied to keeping vibration in, as well as out. Floors and walkways, even whole rooms, could be isolated in similar fashion.

Other isolation techniques involve balancing equipment on a cushion of air or in a magnetic field. So far, these methods have been applied largely to minimize friction in bearings, but they could also serve to filter out certain frequencies of noise. There are instruments capable of detecting both whooshing air and magnetic fields, but the elimination of the larger machine sounds may outweigh that disadvantage.

To reduce the quiet sub's self-noise (it roars its way through the water even when gliding on momentum alone), researchers are studying coatings to make the hull slip more easily along. A highly active Navy program that may give them a boost is one aimed at reducing the drag of torpedoes, using a plastic-like coating that simply dissolves away instead of offering resistance.

Another protective coating believed to be under study would absorb part of the energy from an enemy's probing sonar beacon, reducing the strength of the returning signal.

Active sonar, however, which sends out its own signal and listens for the echo, is not the main problem. "It's passive sonar that is really the enemy of the submarine," says one investigator. One passive sonar operator recently identified a particular Russian submarine by name just from listening to its noise signature, because he knew the sound of its broken ice-cream-making machine.

A boon to the quiet submarine's designers may well be a technique called thermoelectric cooling, in which electric current causes a sandwich of dissimilar materials to grow hot on one side and cold on the other. "A submarine is a natural candidate for cooling by thermoelectricity," says an engineer with a major Navy contractor. "The whole outer hull could act as a heat sink, and there would be no recirculating pumps or moving parts at all." The same method could replace countless cooling fans and blowers in various pieces of electronic and other equipment. Such a system is already being designed for the military for use in surface vans.

The designers agree, however, that it is impossible to make a submarine that is completely silent. Instead, the craft's noises must be made to blend in with the acoustic scenery. Almost everything underwater makes noise, much of it audible to passive sonar. Shrimp click their claws, lobsters rasp, rocks rattle, waves roar, and fish grunt, drum, whistle and even gnash their teeth. In addition, many marine denizens make sonar-like beeps, clicks and toots when looking for food, companionship or—like the human sonar operator—the enemy.

The problem in trying to make a sub sound like a local resident, says a high official in the Navy's sound-investigation program, is that living creatures make noises that are essentially random—a characteristic that is hard to duplicate with, for example, a smoothly whirring air conditioner.

BLACKSTONE RANGERS

Gang or emerging social order

The Blackstone Rangers is a gang on the South Side of Chicago with a membership ranging from 2,500 to 3,000, aged 12 to 23. Since 1959, when it first emerged as an identifiable group, the Rangers have been building spontaneously a political structure that intrigues social scientists.

Although an illegitimate group, existing outside established authority, the Rangers have been evolving an internal organization, a power base and community concern that seems to represent an emerging indigenous political leadership.

Ghettos are usually described as leaderless and socially disorganized. The process by which human groups create social order from disorder is not well understood, but those working in community mental health and acquainted with the Rangers believe this group may have begun such a process.

The Blackstone Rangers are currently under fire from Senator John McClellan's investigating subcommittee of the Senate Government Operations Committee. They are being charged with extortion and misuse of Government money, are labeled a Black Mafia, and accused of throwing marijuana parties and hiding an arsenal in the church used as a training center.

Their backers in the Office of Economic Opportunity have yet to have their day in court. That comes this week.

There has already been testimony before the committee on attempts by the gangs unit of the Chicago police to entrap the Rangers.

McClellan, an Arkansas Democrat, is a critic of OEO-type programs. A source of McClellan's outrage at this time, is a Federal grant of nearly a million dollars for a training program in the South Side, using Rangers in its planning and execution.

Only now and then have there been hints as to why the OEO chose to risk this kind of money in a venture with the Rangers.

Such grants are usually explained in terms of a social experiment. As the reasoning goes, no one has ever found a way to turn gangs around—an establishment term for making them constructive—except by destroying them. Possibly an effort involving their active participation would succeed where head banging had not.

Actually the situation is more complicated. For reasons no one understands, the Blackstone Rangers began turning around before the Government ever came in. While they continued active warfare with a rival gang, the Disciples, up to the time of the Federal grant in 1967, when a mutual pledge ended the war, the Rangers were at the same time working for some community improvement.

Twice they kept the South Side quiet while other parts of Chicago rioted. During the 1966 riots, Ranger leaders held a dance every night, with mandatory attendance from the rank and file. The dances lasted until curfew, which the Rangers enforced. Last April, following Dr. Martin Luther King's assassination, 1,000 Rangers manned the streets, keeping the peace (SN: 4/20, p. 389).

They can and do act in the community interest. The Rangers have been weeding out prostitution from the South Side, cutting down on hard narcotics traffic and organizing clean-up campaigns. When the hearings broke, the Rangers were negotiating with the Public Health Service to run a campaign against venereal disease; negotiations have come to a halt.

Dr. Richard Davis, dean of the school of education at the University of Wisconsin in Milwaukee has known the