History of Navy Mine Warfare:

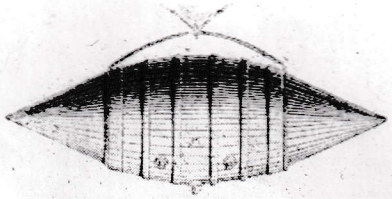
THE MAN IN THE FLEET, if asked, is just likely to tell you that mine warfare originated in World War I —but if he does say that, he "just ain't been reading the right comic books" for his next advancement exam. If his "shot in the dark" turns out to be the Civil War or the American Revolution, he's equally wrong, although they did play a part in mine warfare development.

Some authorities have concluded that the early Chinese were among the first users of naval mines since they were the first to discover and use gunpowder, but no concrete evidence of this has been found. So, perhaps as one authority states, "It is a matter of good manners rather than of technical accuracy to state that the first recorded use of mines was in 1585, when the Dutch succeeded in disposing of several hundred Spaniards at Antwerp by means of boats filled with gunpowder and exploded by clock-operated flintlocks."

Next came the "floating petard," a somewhat similar device used by the English in 1628, which might be considered a type of mine, although it did not explode under water either.

Comes the American Revolution (1775-81), and our old friend David Bushnell, of submarine *Turtle* fame, was involved in one of the earliest underwater mining attempts—by use of a submarine, naturally. In 1776, he fitted a submersible with an external charge of gunpowder in a waterproof case, this, in turn, being attached by line to a "corkscrew" which could be operated from within the underwater craft.

The idea was to sneak alongside



'Torpedo' Mine Was Bushnell's Idea

an enemy vessel, maneuver the corkscrew into her wooden hull, then head for safer waters in the 30 minutes remaining before the mine charge was set off by a clockwork mechanism which caused a hammer to strike a percussion cap. This rig was used in several attempts against British warships, but all of them were unsuccessful.

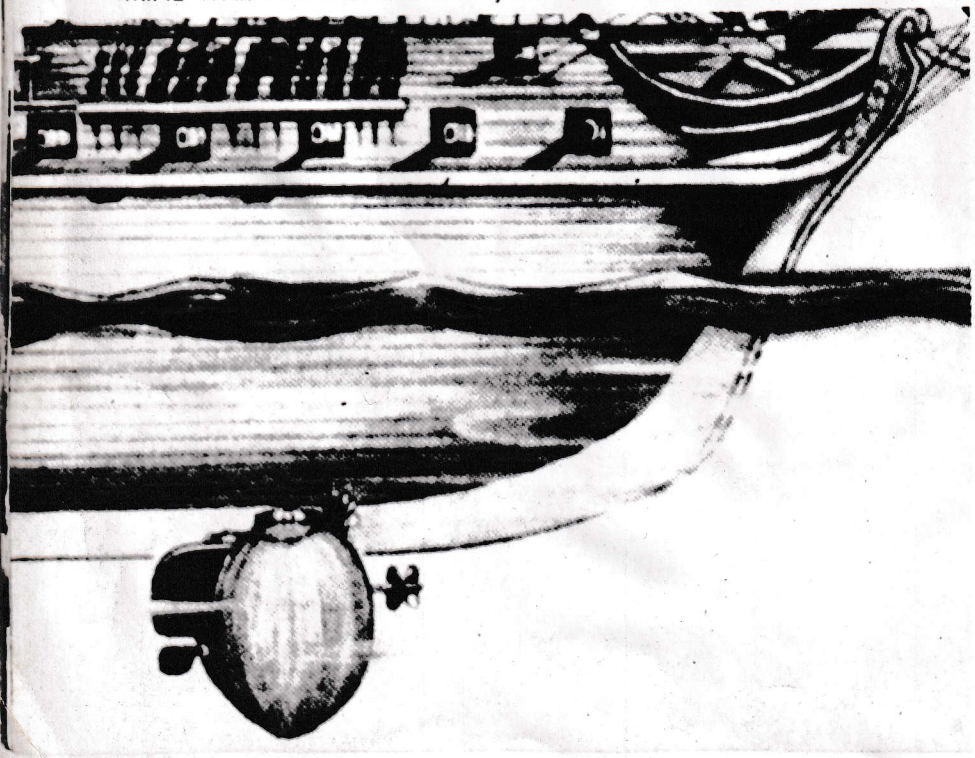
Bushnell also originated a couple of other ideas for mining ships, but they weren't very successful either. One of these resulted in the "Battle of the Kegs," an attempt to float loaded kegs down the Delaware river, trusting the kegs to come in contact with British ships anchored at Philadelphia, and eliminate at least a few of them. The kegs, each attached to a buoy which bobbed along on the surface, were designed to explode the moment they brushed against a vessel's bottom. Due to timetable upsets, however, the keg-bearing buoys came into view during daylight, thereby giving the enemy ample warning of their presence.

Several further attempts of a similar nature were made, creating little more than alarm.

Steamboater Robert Fulton also toyed with mines under French, then English, then American sponsorship. One device he tried for the French during their Revolution (1789-99) was more or less a crude locomotive torpedo which didn't turn out very well. Later he tried a submersible approach similar to Bushnell's, also without success. Yet another try with a submersible produced what has been called "the first recorded case of a vessel being destroyed in European waters by an explosive charge placed *below* the waterline." The time: 1801; the victim: an old schooner. The successful trial took place at a depth of 25 feet.

For the English in 1804 Fulton produced an oblong wooden craft, whose charge of 40 barrels of gunpowder was set off by an arrangement of clockwork, hammer and percussion cap. These rigs, connected in pairs, were used against a French fleet of Boulogne. But apparently

MINE WARFARE is hundreds of years old. In Revolution (left) Bushnell tried underwater mining with early 'sub.'



Kegs, Cabbages and Acoustics

Lady Luck agreed with the usual public opinion of the time, that any attempt to attack a water-borne enemy from beneath was morally indefensible.

Fulton conducted another experiment in 1805, successfully destroying a brig; then, tired of fighting British official and civil opposition, he returned to the United States. Between 1810 and his death in 1815, the inventor of the steamboat presented to American officials such ideas as the following:

- A "harpoon torpedo," making use of a musket to fire a harpoon which was attached by line to a torpedo and float. The idea: Once the harpoon was fired into the side of a ship, the tide could be counted on to bring the torpedo against the hull with enough force to actuate a spring lock firing mechanism.
- A moored contact mine consisting of 100 pounds of powder in a copper case, fitted with a lever which, when struck, fired a musket charge into the powder. The mine was made buoyant by adding a wooden box filled with cork. Also included was a most remarkable gadget which held the mine under water for a time, then locked the firing lever and caused the mine to rise to the surface.
- A "turtle ship," designed to carry a crew of 12 and tow five torpedoes which could be actuated from inside the vessel. Painted dirty white, drawing only six feet and traveling with her arched topside barely awash, she was supposed to foul a victim with a torpedo, then set off the explosion by means of a line leading from the torpedo gunlock down through the scuttle on top of the craft. Although successful when first tried against a 200-tonner in New York, this unfortunate craft came to grief before making any headway against the enemy.

Robert Fulton Advocated Harpoon Mine

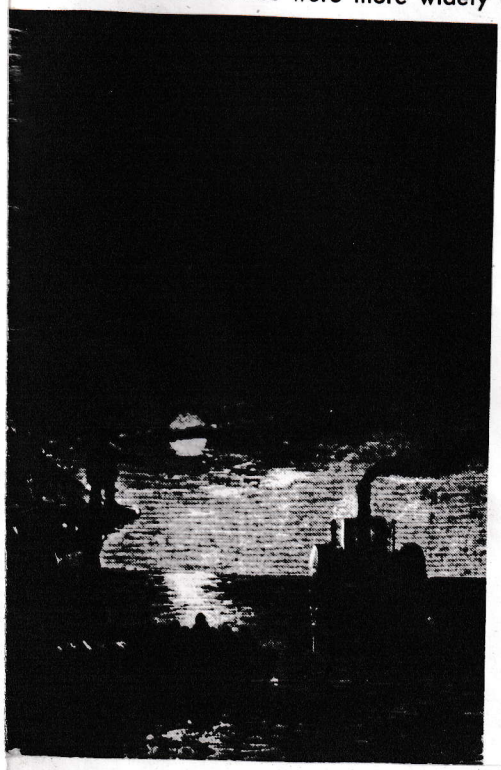
Controlled mining in the modern sense came into being in 1843, when Colonel Samuel Colt — the revolver man — succeeded in blowing up a ship which was underway approximately five miles from land. Colt, who had toyed for years with mines fired electrically from a post on the beach, achieved success by devising a method of determining the exact moment to fire a mine for effect: when a ship came in contact with one of Colt's mines, it closed an electrical circuit, signaling the shore-based observer which mine to fire.

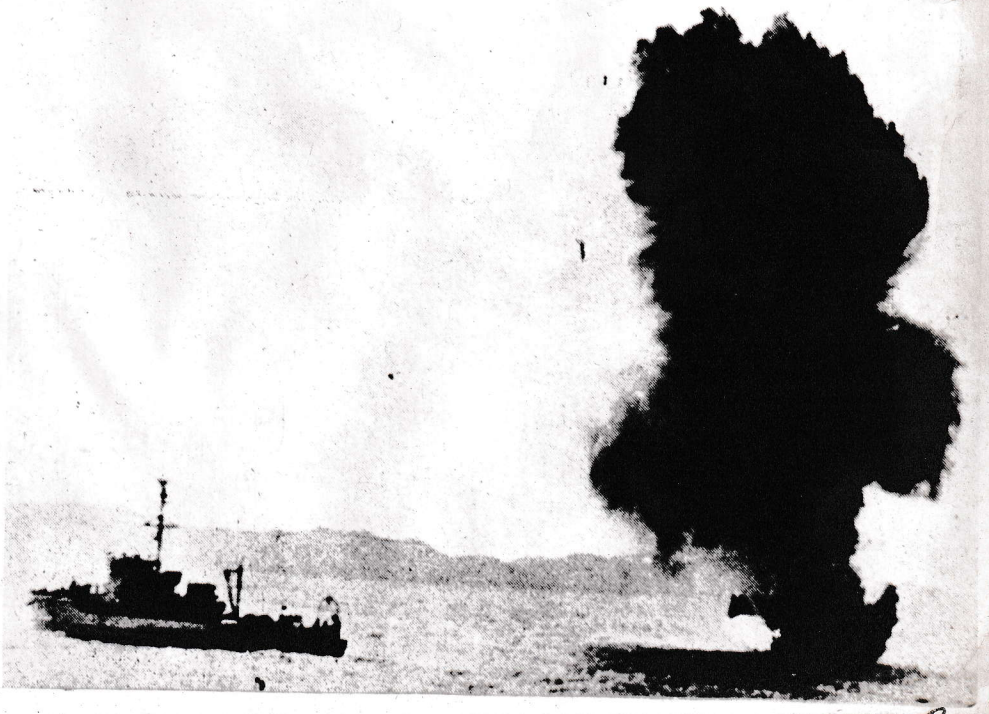
A few years later a similar mine set-up was employed in the defense of Kiel harbor during the Schleswig-Holstein emancipation fracas (1848-51). Although not particularly well planned, the very thought of this early defensive minefield kept the Danes from attempting to enter the port.

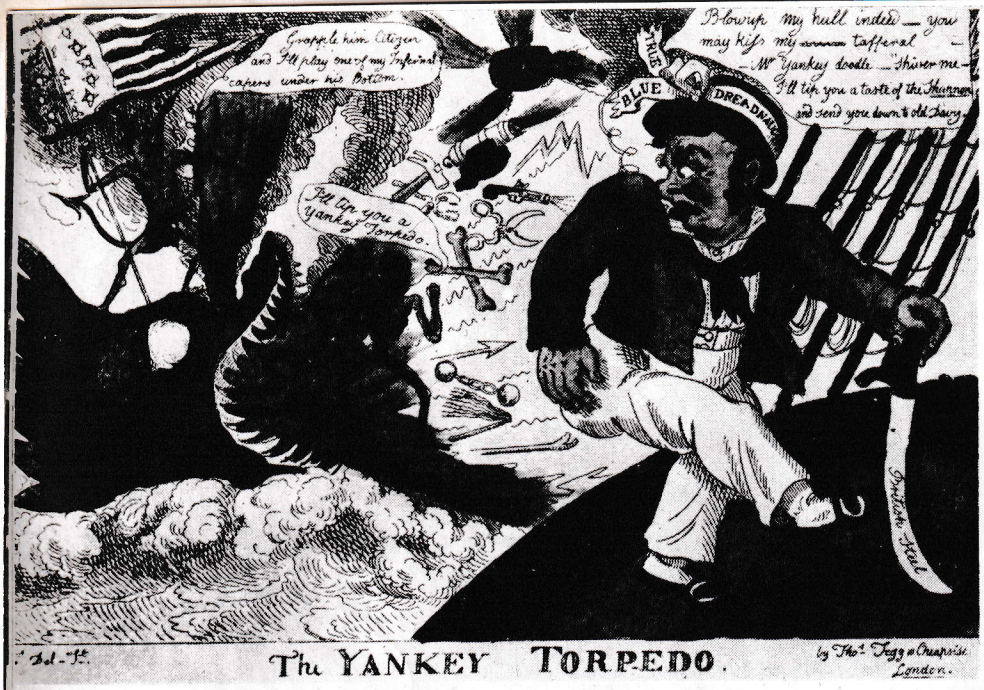
Russians, in the Crimean war (1854-56), used contact mines to protect such major ports as Sevastopol. The mines contained a 25-pound charge of powder, and had "horns" —lead finger-shaped fuses, each containing a quantity of glass-enclosed sulphuric acid surrounded by chlorate of potassium and sugar. Contact sufficient to bend the fuse and break the glass set off a chemical reaction which fired the main charge. Shore-controlled, electrically actuated ground mines were also used, but the Russians did not take advantage of Colt's method, and so had difficulty with their timing.

The Austrian armed forces partially overcame the timing problem in their 1859 war with France by using a *camera obscura* to project a ship's image onto a chart which was marked with the actual location of each mine in a field. An operator in his seaside control post could touch off a mine electrically while the shadowy ship image was directly over the mine's charted position. Haze, fog or darkness immobilized

LATER ON mines were more widely used. Moonlight minelaying in Civil War. *Right,* sweeping off Korea in 1953.







IN WAR OF 1812 British may have ridiculed American mine warfare, but they still considered it devilish and deadly, according to this old cartoon.

the whole set-up, of course.

Colonel Colt's system could be used on a 24-hour basis, provided you didn't care whose ships were blown up. And the need for actual contact between mine and ship opened the possibility of damage to the mine system or to your own ship's hulls even when the mines were not exploded.

Mine warfare, or what passed for it, was fairly common during our own Civil War, and contributed a good bit to the development of the science, both in the types of mines and in methods of using them. Several different types of mines were used in the triple line of underwater booby traps which were part of Mobile's defenses, for instance. A water-tight keg, filled with powder, and fitted with coned ends and five finger-type chemical fuses was one type.

Another was an inverted cone, the lower half loaded with an explosive charge, the top supporting a weighted cast iron cover. A slight blow from a moving ship dislodged the cover, which was attached by a length of chain to a friction tube; the subsequent pull lit off the friction tube and that fired the charge.

Yet another type at Mobile (the "Brooks") was intended for use in shallow water. Made up of a water-tight gunpowder charge mounted on the upper end of a spar which was connected by means of a universal joint to a weighted "anchor," this mine was a hard one to sweep in its "natural" state. At times, however, sweeping was made even more difficult by an ingenious anti-sweeping device—a wire running from the first mine to a second "ground" mine which contained a much heavier charge. Any halfway successful attempt to move the first mine pulled the wire which set off the second mine.

Clever, them Rebels.

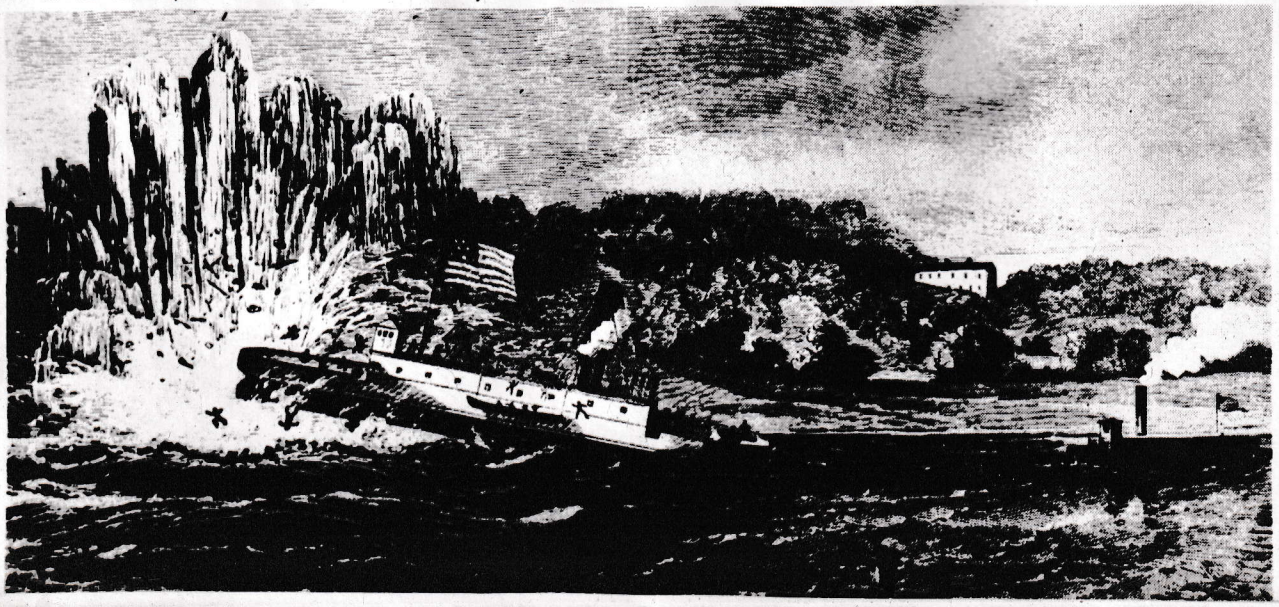
Shore-controlled ground mines, fired electrically, came into use during the later stages of the war. One "oddball" of this type: an old boiler stuffed with 1000 pounds of gunpowder and submerged in Virginia's Roanoke river. This little gem accounted for a heavily armored Federal gunboat, despite a careful Yankee search for telltale cable leading from the river bank into the water.

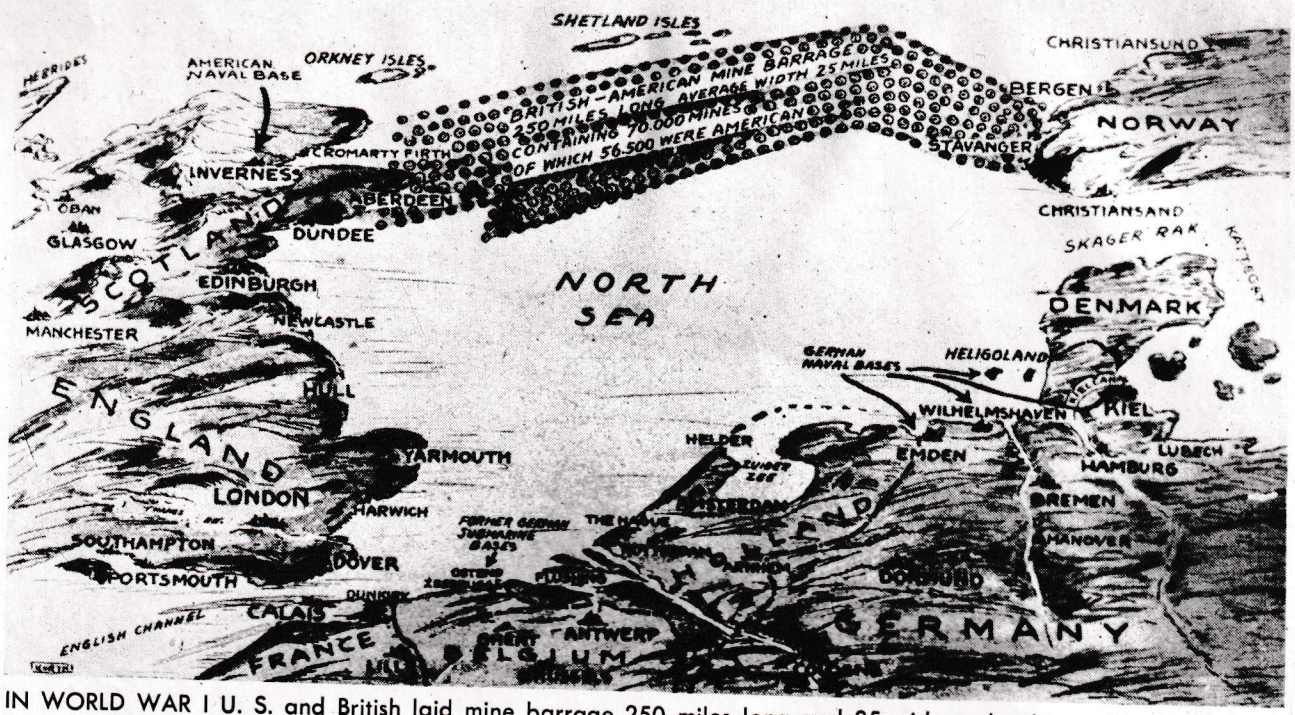
Also toward the end of the war, the Confederate *Davids* came into being, lugging their spar torpedoes with them. While neither mines nor submarines, in the modern sense, the *Davids* were similar to early attempts at mining—and they were pretty effective despite an affinity for fatal accidents. Their torpedoes (or mines) were copper-clad charges of gunpowder, fitted with contact chemical fuses. The *Davids* ran with their decks awash, much in the manner of Fulton's "turtle" minecraft.

All told, mine warfare is credited with destroying 22 combatant ships and damaging many others during the Civil War.

From 1865 to 1914, mine warfare developments in the United States were practically non-existent, although defensive mining of important harbors was maintained; other countries continued to develop mines and techniques, however. During this period guncotton was generally adopted as the explosive charge for

IN CIVIL WAR Confederates used a variety of mines. This one, despite size of explosion, killed only two Yankees.





IN WORLD WAR I U. S. and British laid mine barrage 250 miles long and 25 wide to bottle up German U-boats.

mines. The "Herz horn," a variation of the Crimean lead and glass fuse, was invented in 1868, and gained popularity as a fuse for independent mines, since each horn consisted of an independent battery which was not actuated until contact broke the sealed glass tube containing a bichromate electrolyte.

Britain developed a countermine system, which involved the laying and subsequent detonation of controlled mines in areas where enemy mines existed.

Various methods of defensive and offensive planting were also developed, a notable one being the use of open-sea mining during the Russo-Japanese War (1904).

By 1914 practically all maritime nations were in possession of at least a small amount of mine gear, and knowledge of mining potentialities for both offensive and defensive purposes. It soon became evident, however, that Germany was well ahead of other nations—at least in the beginning.

At the war's end, the tally sheet showed a different story: Germany had laid more than 43,000 mines, but Great Britain was credited with more than 128,000 and the United States had laid more than 56,000 in the North Sea Mine Barrage alone (See ALL HANDS, March 1953, page 59, and May 1956, page 59).

This spectacular mining operation, covering approximately 240 of the 250 miles between the coasts of Scotland and Norway, was designed to keep German U-boats in the North Sea. The only other outlet through which submarines could pass was the English Channel—already well patrolled. Although the North Sea barrage was proposed long before the U. S. entered the war, current British mines were not plentiful, and were not suitable for planting in waters which averaged 600 feet in depth. To be successful the barrier required mines at various depths throughout the 240-mile length—an estimated 400,000 mines in all, and an impossibility.

The U. S. Navy, however, soon after our entry into the war devised a replacement mine that solved both problems. To replace the older mines, which required actual contact between mine and victim, the Navy Bureau of Ordnance came up with one which could be planted at any depth, since it was set off by means of an "antenna" which reached to within a few feet of the surface. Thus, instead of planting mines at various depths in order to make a tight barrier, it was only necessary to plant them near the bottom. Any craft attempting to pass through the barrier regardless of its draft or depth would be likely to contact one of the antennas and blow itself to bits. These new mines cut the total number required for the barrage to approximately 100,000—just about one-fourth of the original figure.

Once the barrage was laid it was not completely effective, but it did account for a number of submarines and its effect on German morale was terrific. Ranging as it did from 12 to 35 miles in width, and requiring from one to six hours for passage, the barrage placed a terrible strain on the crews of submarines which did attempt to leave the North Sea via that route.

The mines used in the U. S. portion of the North Sea barrage were of the Mark VI type—which continued in use right on through post-WW II days, with modifications, of course.

During the period between the first and second world wars, Navy authorities paid little attention to mine warfare. Although a minute staff continued to develop mines and firing mechanisms, few of them were carried beyond the design stage. Mines of the three common types—drifting, moored and ground—were designed with mechanical, chemical, galvanic and magnetic firing devices, and a few of them were actually manufactured in small lots for use in testing and drills. An acoustic firing mechanism was also conceived, but not developed.

According to the *History of the Bureau of Ordnance during World War II*, mine warfare remained in this dormant state until September 1939 when German magnetic types

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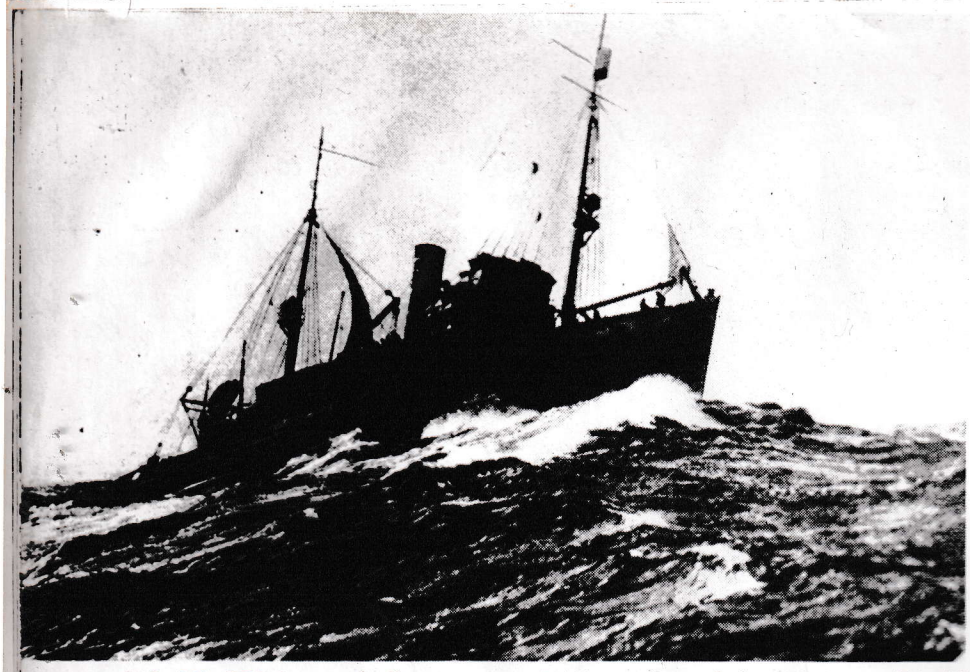


'AS YE SOW, so shall ye sweep.' Mines planted by Navy in World War I left monumental cleanup afterward, but ships like this got it done.

were planted in British shipping lanes, causing alarmingly high losses before countermeasures were perfected.

"Between September 1939 and 1942, the 20,000 German ground mines laid in the harbors and channels of the United Kingdom took a toll of over a million tons of Allied shipping. German mines also were used effectively in American waters; ships were sunk and several harbors were closed for short periods.

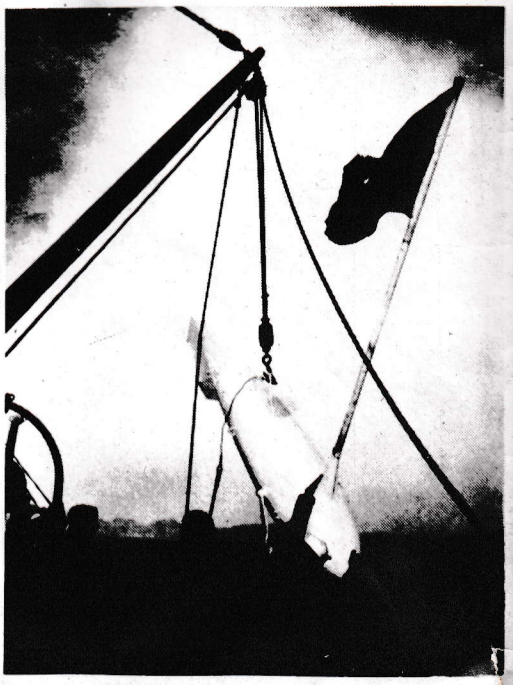
"On the other hand, British mines during World War II sank approximately 1050 Axis warships and merchantmen, and the American offensive mining campaign in Japanese home waters, initiated in the spring of 1945, virtually strangled the domestic and military economy of the islands."

When German use of a highly effective magnetic mine began to make headlines in 1939, our Navy had plenty of mines of WW I vintage which could be modernized, and the paper results of much basic research; otherwise 7 Dec 1941 found us with plenty of nothing—and not the least bit happy about the situation. The mines on hand included thousands of modernized Mark VI mines, originally designed for anti-submarine operations; limited quantities of Mark V (a drifter) and Mark VII (a moored, chemical horn rig); Marks X and XI, of the moored contact type, were available for submarine laying—but only uss *Argonaut* (APS 1) was equipped to handle them. Mark XIIs, a revised version of the German 1920-vintage magnetic mine, were in existence for both aircraft and surface minelaying, but most of those already manufactured were in Manila and had to be dumped in deep water to prevent capture.

A couple of random quotes from BuOrd's history reflect a change in the picture, however: "The advent of war soon quickened the interest of operational groups in this form of warfare; by the summer of 1942 there was a real demand for the development of new offensive mines." "American naval mines soon underwent radical change, emerging as potent, versatile, and decidedly offensive instruments of warfare, with little resemblance to their predecessors in either appearance or operational principles." By the end of the war the Bureau had "assigned mark and modification numbers to 65 mine designs, 39 of which were released for service use. Production emphasis, however, was confined in the main to seven mines."

The Navy's minelaying program in the Pacific is credited with sinking or damaging tonnage amounting to nearly one-fourth of Japan's pre-WW II merchant marine—some 2,000,000 tons, including two battleships, two escort carriers, eight cruisers, 46 destroyer types, seven submarines and 81 other naval craft. The mines which accomplished this feat included 21,389 aircraft-type mines, and 25,000 planted by surface craft and submarines. This mine campaign ran in two phases, an "outer zone" period beginning in October 1942 and running until the end of the war,

IN KOREAN conflict MinPac sweepers saved ships and lives. Left, LCVP on sweeping job. Right, 'pig' comes aboard.



and an "inner zone" phase which covered approximately the last five months of hostilities.

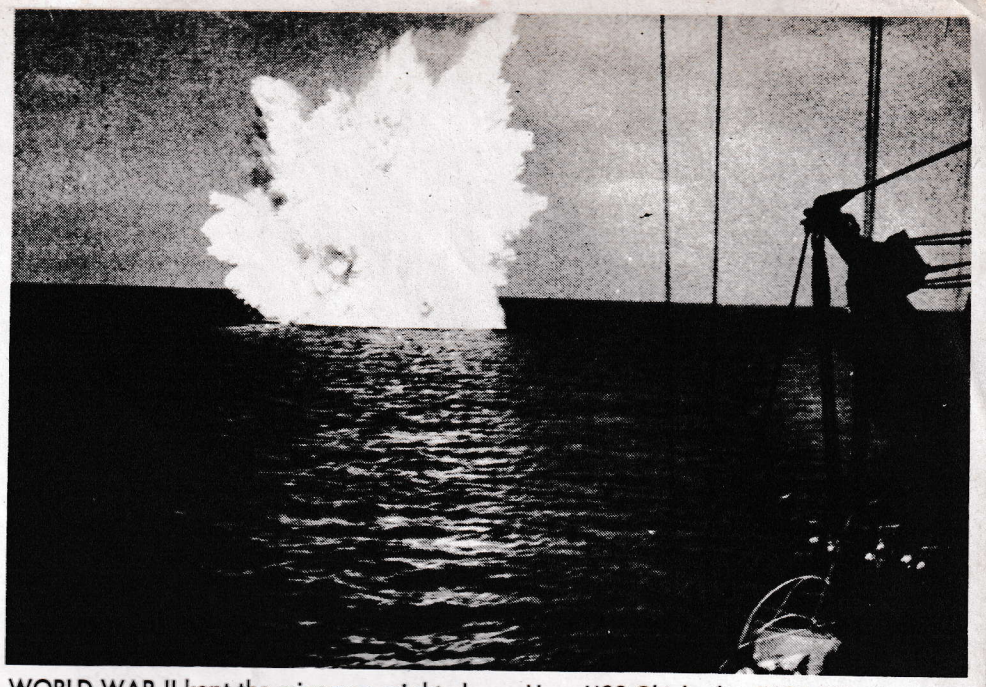
In the first phase, the mining of enemy-held harbors and shipping lanes effectively fouled up shipments of raw materials to the homeland, while cutting down on outgoing troop supplies. Representing one of the most concentrated mining offensives in history, the "inner zone" mining of Japan's home waters was carried out by the Army's Tinian-based B-29s using naval aerial mines. Among the mines used in this operation were two magnetic types, which had been previously used in the outer zone, and:

- An audio-frequency acoustic variety, fired by the sounds of a passing ship—but the Japanese accidentally discovered that noisemakers used in the training of their sonar operators were effective in sweeping these.
- A subsonic "unsweepable" mine, actuated by ship sounds too low for the human ear.
- Another "unsweepable," a type of pressure mine.

These basic types were varied by a Mine Modification Unit, being tailored to fit the desired target and situation. The twin goals of this unit: defeat known enemy sweeping methods; and change firing characteristics so that only larger ships would actuate the mines.

The unit's work has been credited with doubling the tonnage sunk.

From 1945 until the outbreak of fighting in Korea, the Navy's mine force personnel were kept busy sweeping up the mess left by World War II, and in training and maintenance tasks. Simultaneously, the men responsible for developing new mines and techniques—the men who were assigned the job of insuring that our mine warfare organization remained "in the van" of the new Navy—moved steadily along their secret research trails, producing, testing and storing for possible future use a whole bag full of new tricks.



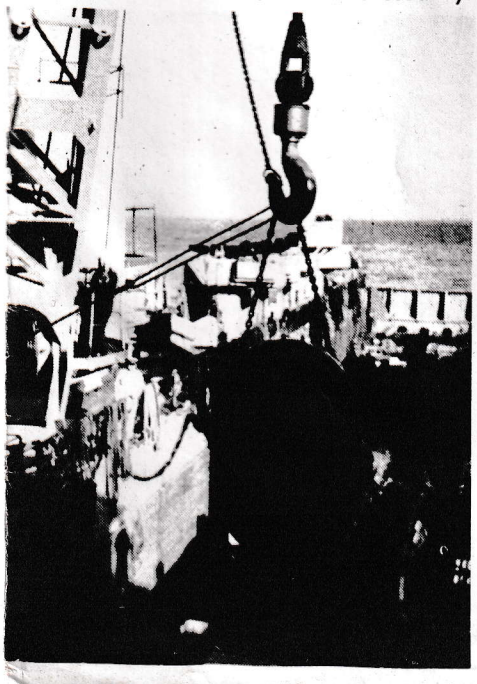
WORLD WAR II kept the minemen mighty busy. Here *USS Chickadee* (MSF 59) detonates a German moored magnetic mine north of Cap Corse, Corsica.

Korea, to the UN mine forces involved, was primarily a matter of spotting and sweeping. The mines, although of Russian manufacture, were conventional types common to both sides during World War II: moored, floating and ground mines, with contact, magnetic, pressure or acoustic detonating devices—or possibly a combination of these. Mine spotting was successfully carried out by helicopters; but an aerial countermining attempt, using planes and bombs, was not so successful.

Today, the men who man our minecraft spend a good part of their time in the familiar drills, study and constant maintenance routine needed to keep a mine organization and its equipment in topnotch order. Some of the stuff they work with is classified, but much of it is straight out of World War II. Meanwhile, back at headquarters the "masterminds" are steaming ahead, dropping in their wake figurative "Dan buoys" to mark the cleared channel into an age of nucleonic navies—and untold possibilities for mine warfare.

—Barney Baugh, JO1, USN.

RUSSIAN-BUILT mines were used by foe in Korea. *USS Osprey* (rt), MinPac sweeper, was hit three times by Red fire.



Yorktown, Va. —

Mineman's Alma Mater

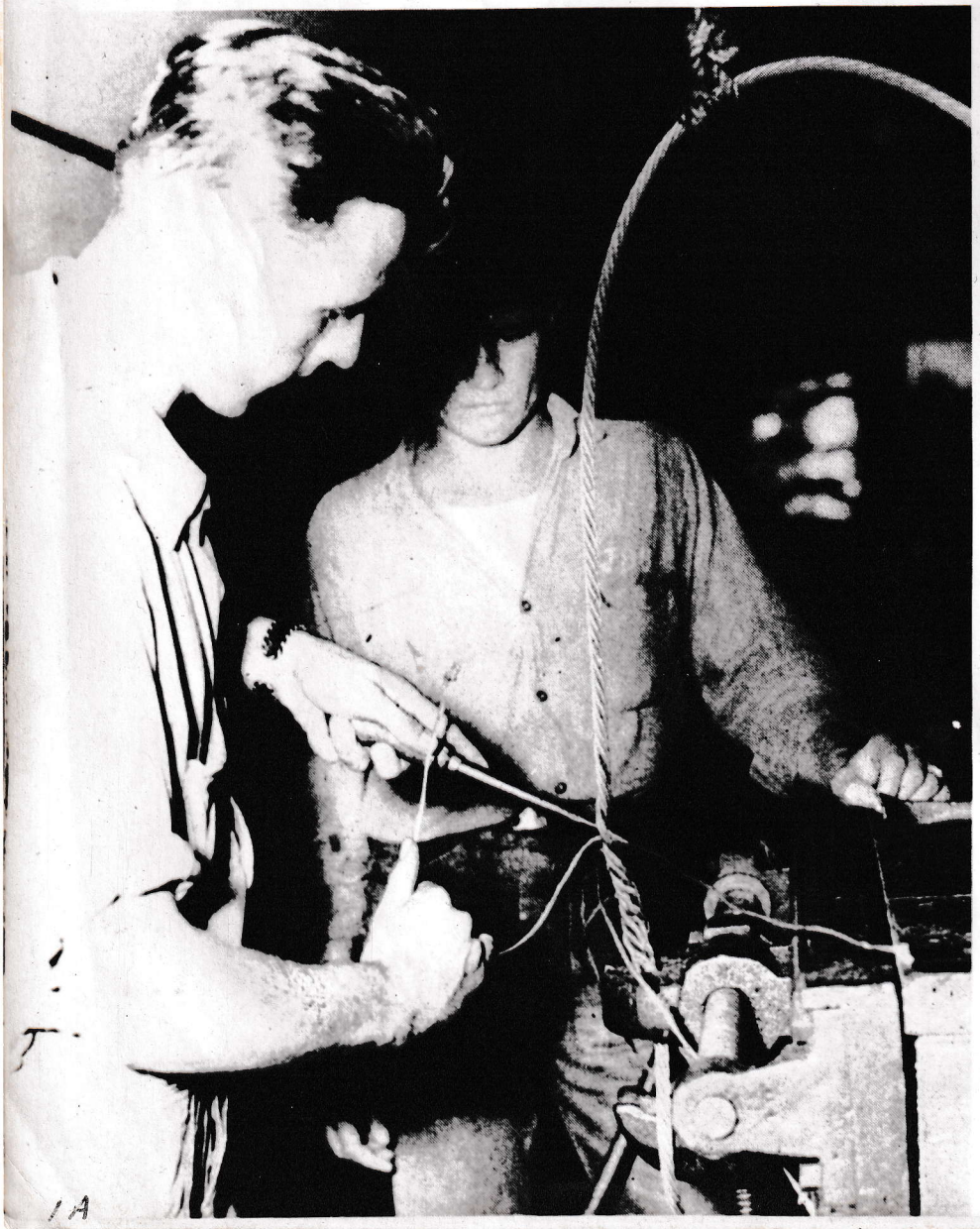
ALMOST EVERYONE HAS HEARD of Yorktown, Va. In grade school history, we learned it was where Lord Cornwallis surrendered the British Army to end the American Revolutionary War. There's a big national shrine there, visited every year by hundreds of tourists. Yorktown played a big role in early American history.

Another important role is performed in that area today. It is the work of the Naval Schools, Mine Warfare—the only school of its kind in the United States and one of the least publicized schools in the Navy.

On the 209-acre tract of land which adjoins the Yorktown Battlefield Park, the Naval Schools, Mine Warfare, trains officers and enlisted men in all phases of offensive and defensive mine warfare. During 1956 alone, the Schools graduated 339 officers and 834 enlisted men who had completed one of the 24 courses offered at Yorktown. Their studies ranged from the basic course in the Class A Mineman School to the course in Minesweeping and Minelaying.

In addition to the men from the U. S. Navy and a few from the U. S. Air Force, selected officers and enlisted men from friendly navies of the free world are also students at Yorktown. A number of selected U. S. Navy-employed civilians also attend courses here every year.

PROFICIENCY with hand tools is a mineman 'must.' Here, Yorktown instructor demonstrates art of wire splicing to student at the Navy's mine warfare school.



The courses of instruction at Yorktown range from the 20-week Mine Warfare Staff Officers' course and the 13-week Mines Maintenance Officers' course to the Classes A and B Mineman courses to the six-week Minesweeping Boatswain's Mates' Class C course.

The Mine Warfare Schools in Yorktown were commissioned on 31 Dec 1940 and the first class convened a week later with a student body of 50 officers and 175 enlisted men. During the following 16 years of operation, the school has trained more than 20,000 officers and enlisted men in all the intricacies of mine warfare.

One of the most important aspects of the Yorktown curriculum is practical experience. Each of the students is taught by doing. A good example of the training offered at Yorktown is the Class A Mineman School.

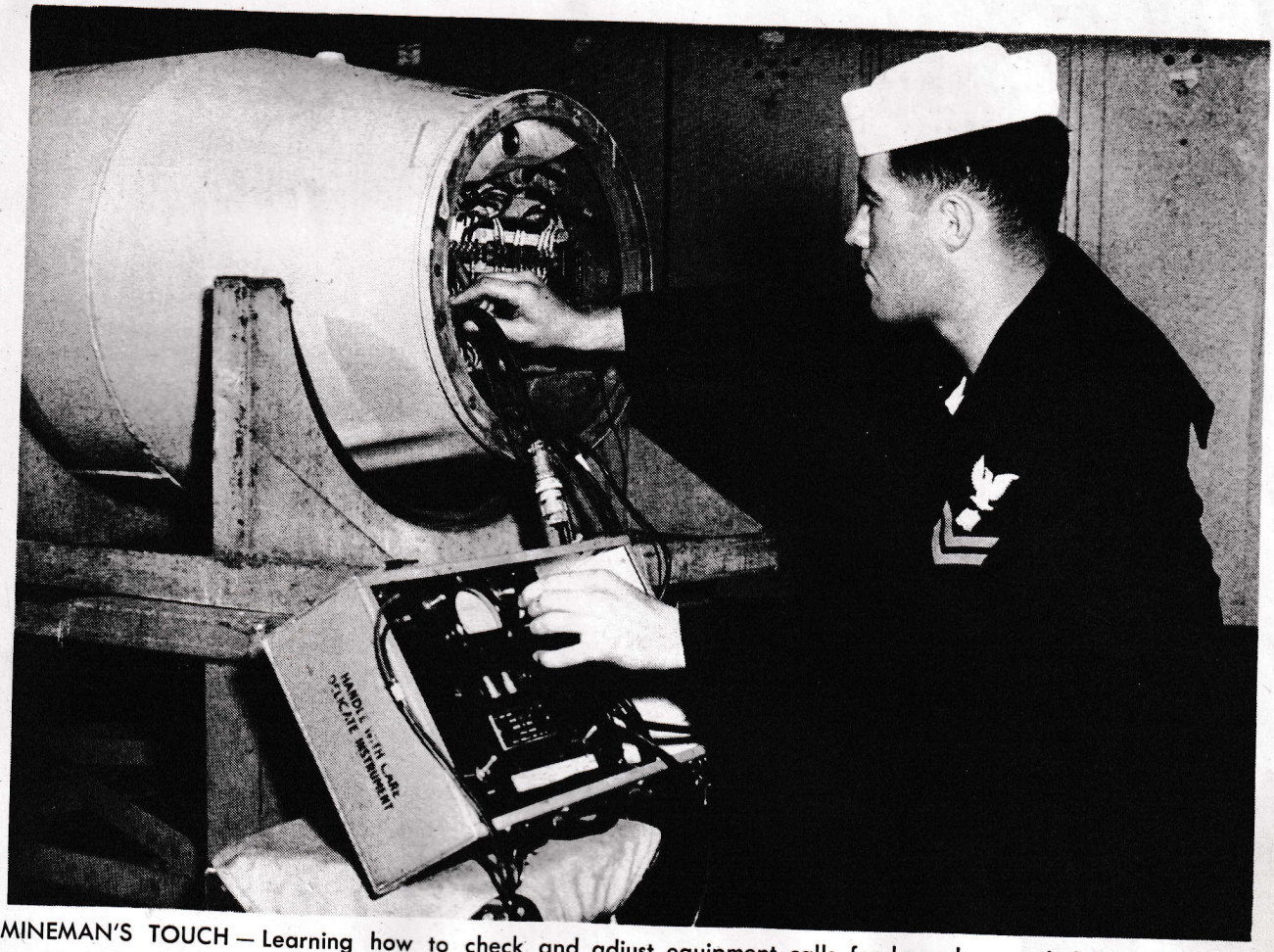
The embryo Mineman attending the 14-week school is given first a course in basic electricity and mine accessories. Mines used in today's Navy are highly complicated items of machinery and electronic circuits.

The advanced student must learn as much as he can in the few weeks of basic electronics since his work will revolve around this medium. In addition, he must be able to read blueprints, drawings, and schematics —which are in a language all their own—and must be adept in the use of the various types of hand tools.

As one veteran Mineman put it, "You've got to have the nerves of a tightrope walker, the delicate touch of a sculptor, and the training and ingenuity of a scientist-inventor."

Besides the training in basic electricity and electronics, the student in the "A" school learns about power supplies, amplifiers, fundamentals of mine warfare, special circuits and other devices, mine vehicular equipment, mine equipment catalogs and mine operation procedures.

Under the subject of "mine vehicular equipment," the student is taught the features, functions, and operations of the basic types of all mines. Except for specialized features for specific jobs, most mines fall into two or three basic categories. Once the Mineman has these down pat, he can easily learn "special features" of other particular-mission weapons.



MINEMAN'S TOUCH — Learning how to check and adjust equipment calls for know-how and delicate handling.

In effect, this mine "vehicular" equipment takes a trainee from a knowledge of fundamentals up the road toward the ability to work with any mine equipment of the same general type. The student gains experience by actually seeing the mines operate, maintaining them and solving practical troubleshooting problems on them. This work is invaluable since these vehicular mines are either so typical, or contain so many of the circuits and features of all the others, that the Minemen can work with any mines of the same general type in only a short time.

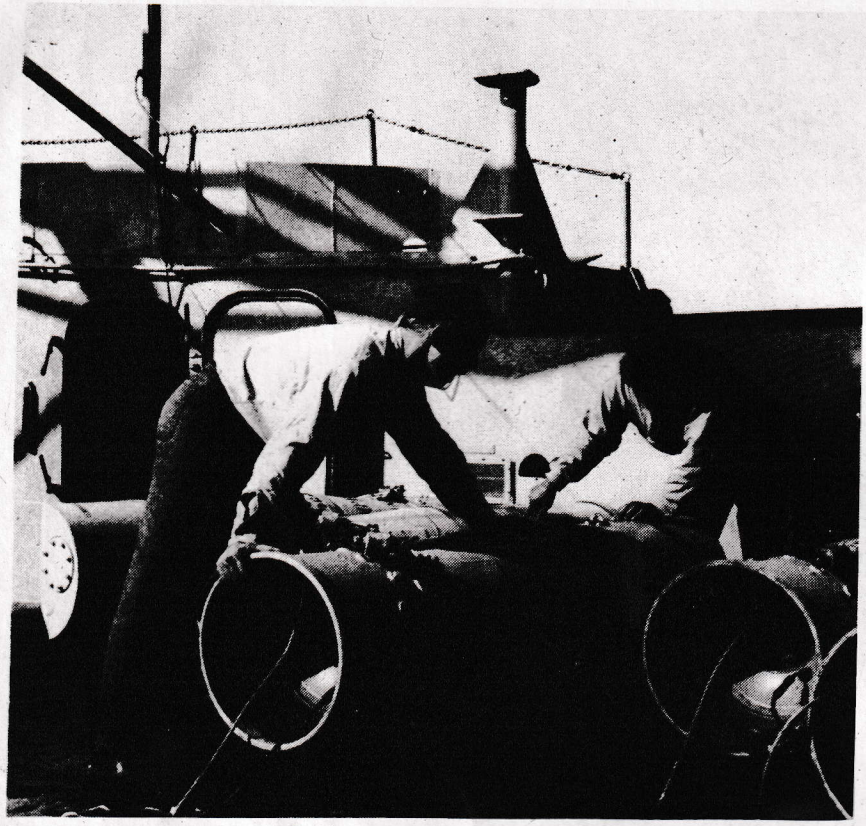
When the Mineman reaches the Fleet, he will deal in several distinct types of mine duty, depending upon whether he's assigned to a surface minelayer, a submarine minelayer, a shore base for test and assembly, or a tender of an aviation activity. The routine procedures of his job will vary with his assignment. In any case, the Mineman trainee is given some preparation in basic procedures which makes it easy for him to adapt himself to the special requirements of any branch of the Mineman service.

Instruction in this category is presented to the Mineman at school in "operational procedures" and includes such fundamental routines as:

- Handling and stowing underwater equipment.
- Testing of mine components and assembly of mines.
- Overhaul, test and adjustment of depth charges and preparation for firing.
- Supervision of storage and preservation of stores and spare parts.
- Operation, construction and routine maintenance and inspection of mines, mine-handling gear and controlled devices.
- Safety precautions related to explosives, magazines, mines and mechanisms.

Another subject in the course which stays with the Mineman throughout his career is "Equipment Catalogs." These catalogs list and describe all types of underwater ordnance, particularly with respect to their electrical and electronic components. Ability to read these catalogs helps the Mineman to extend his knowledge beyond what he has actually learned in the other subjects. The devices and equipment listed are described in terms of the "vehicular equipment" which he has already studied. Thus, if the Mineman is required to handle a mine or depth charge which has electrical or electronic characteristics he hasn't seen before, he can look up the part in the reference catalog and get a good description of it.

The Mineman trainee also gets thorough training in the use of the various types of hand tools. Since he will use many of these tools in assembling and servicing the mines, he must have "the touch of a sculptor" when, for example, he buttons up a mine case—closing and sealing all openings — before planting. A little awkwardness or possibly too much pressure on tightening a nut could cause the mine case to crack. On the other hand, too little pressure might keep the mine from being watertight and turn it into a dud.



ALUMNI — Mine schools have trained more than 20,000 Navymen. Those above with practice mines and below with pig are serving with MinPac.

The fourteen-week Class A Mineman course covers the practical work an MN would be required to perform regardless of the type of duty he will eventually be assigned. Basically, there are three major types of duty he might get.

First, on shore, he may work in mine assembly, which includes loading the mine with a charge of high explosive and then installing various mechanisms which "arm and fire" the mine, once it gets into the water. This is like loading and beginning to fire this strange weapon while still hundreds of miles away from the prospective victim.

Second, afloat, the MN might get duty in a minelayer, where he completes the process by actually launching various types of mines.

Finally, and equally important, various types of craft equipped for minesweeping have the job of clearing the waters of enemy mines for the protection of our own ships. Although Minemen are not normally assigned to this type of duty, they must know something about it.

Perhaps the most characteristic action for the Mineman consists of minelaying. But in dealing with mines every action must take place

in a very precise sequence and it is hard to regard any one portion—even the minelaying operation—as separate from the whole process. For instance, "firing" this weapon really begins on shore, since it is loaded with a huge charge of high explosive, in the earliest stage of its assembly. On the other hand, unlike any piece of machinery which is normally completely assembled in a factory, "assembling" has to be finished aboard ship. Actually, the mineman makes his final adjustments at the very last minute before the releasing gear drops the mine over the side.

These last minute adjustments by the MN are a part of "minelaying." And though they are performed almost with split-second timing, they demand great skill and, above all, utmost accuracy. These last-minute operations include activating certain mechanisms, previously installed but left in non-service condition, now set so that once the mine is in the water, they will become self-operating and will "arm" and eventually fire the mine. Also, various safety devices which have kept the mine in its non-service or safe condition, must be removed so that the firing mechanisms can operate as designed.

Finally, the releasing gear is operated and the "sea monster" takes up its position in the water, there to lurk silently until the enemy ship approaches and meets its fate. Often, this kind of minelaying action takes place at night, under uncommonly difficult conditions.

This basic training is thoroughly ground into the embryo Mineman at Yorktown. In brief, when the Mineman completes Class A school he:

- Knows the operating procedures for all types of mines and depth charges and associated equipment.
- Can maintain, test, adjust and troubleshoot mines.
- Conducts periodic cleaning, lubrication and performance testing.
- Can use all mechanical and electrical instruments and tools associated with the work he's doing.
- Reads and uses mechanical drawings, blueprints, schematics and wiring layout diagrams.
- Can locate troubles and make minor repairs.
- Knows the proper methods for handling and stowing.
- Can install equipment and accessories.
- Maintains mine warfare records.

It sounds tough, but mine warfare is a mighty tricky business.

Very rarely will the Mineman see the results of his work—and it's quite unlikely that you and I will hear of the results of his work until long after the battle. Unlike combat in the ordinary sense, by the time the "kill" is made the Minemen are far off, engaged in other duties. They seem to share little of the glory. But like their predecessors in the Battle of Yorktown during the American Revolutionary War, they too are playing a big part in forming the destinies of the United States.

—Rudy C. Garcia, JOC, USN.

TRAINED in Minesweeping Boatswain's Mates course at Yorktown, many BMs go on to become skippers of MSBs like these nested together in harbor.

Courses for EMs at Naval Schools, Mine Warfare

Ten of the 24 Naval Schools, Mine Warfare, at Yorktown, Va., are open to enlisted men in certain ratings. Here's a rundown on the schools available to EMs and what rates are eligible:

- ***Mineman,*** Class "A"—A 14-week course which trains the student in the fundamentals of mine assembly testing and maintenance, storage, and mine warfare. Open to SA, SN, and MN3.
- ***Mineman,*** Class "B" —A 13-week course of advanced instruction for MN2 rating and above in maintenance of all mines and mine mechanisms in service use.
- ***Aviation Mine Assembly,*** Class "C"—Four weeks of training for AO2 and above in the test, adjustment and assembly of all aircraft-laid mines.
- ***Submarine Mine Assembly,*** Class "C"—A six-week course for GM3, MN3, and TM3 and above in the test, adjustment and assembly of submarine-laid mines.
- ***Minesweeping Boatswain's Mates,*** Class "C"—This six-week course gives the student an understanding of minesweeping gear and is open to BM3 and above and also to designated BM strikers.
- ***Minesweeping Electrician's Mate,*** Class "C"—This course, open to EM3 and above and also to designated EM strikers who are graduates of the EM "A" School, provides the student with a knowledge of influence minesweeping (electrical components) and teaches him to operate, adjust, repair and maintain electrical equipment aboard a minesweeper.
- ***Minesweeping Automatic Degaussing,*** Class "C"—Rates eligible for this five-week course are EM3 and above and designated EM strikers who are graduates of Minesweeping EM, Class "C" course. This course teaches the student to operate, maintain and repair the automatic degaussing equipment aboard minesweepers.
- ***Submarine Automatic Degaussing,*** Class "C"—A four-week course for EM3 (SS) and above, which teaches the EMs to repair, operate and maintain automatic degaussing gear aboard submarines.
- ***Electrician's Mates, Ranging and Deperming,*** Class "C"—This course is open to EM2 and above. The seven-week course gives the students an understanding of the purpose and principles of degaussing and deperming and also qualifies him for duty at degaussing and/or deperming activities.
- ***Mine Assembly Refresher***—Officer and Enlisted — This three-week course is for officers and enlisted men who are qualified firing mechanism technicians to requalify them in testing, adjusting, assembling and repairing firing mechanisms on all service mines.

Quotas for these schools may be obtained from Service Force Commanders by Fleet activities and from the Bureau for shore activities. The convening dates and other information on these schools is contained in BuPers Inst. 1500.25A.

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