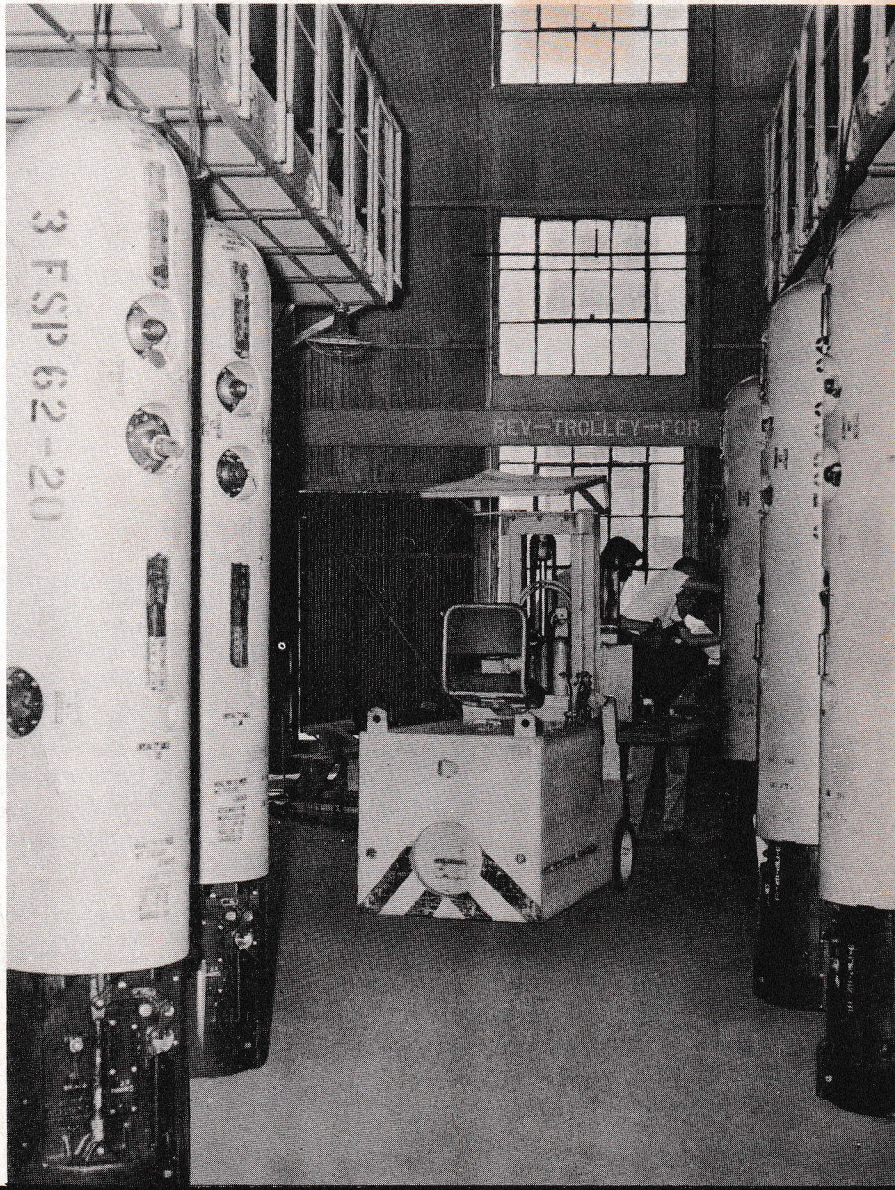


*mine and depth - charge*

# THE TROUBLESHOOTER

- ▶ New Fire Recorder
- ▶ Depth-Charge Dope
- ▶ Extender Testing Tool



**THE OFFICIAL JOURNAL OF THE RUDMINDE PROGRAM**

*in this issue . . .*

*mine and depth - charge*

# THE TROUBLESHOOTER

Published by the Naval Mine Engineering Facility, Yorktown, Virginia.

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COVER PHOTO: Mines Mark 10 are suspended by their noses in mine shop at NAD/Oahu (West Loch Branch) as crew checks marriage of cases to anchors.

Rudminde is a world-wide troubleshooting campaign designed to achieve and maintain a high level of undersea warfare readiness through the discovery and correction of material defects, through refinement of weapon design, and through encouragement of the unique knowledge and skills demanded of highly specialized segments of the U.S. Navy and Coast Guard. The basic instrument of the program is Navord Form 2776—"Report of Unsatisfactory or Defective Mines, Depth-Charges, or Associated Equipment." Anyone who encounters problems with these weapons is encouraged to report them to the Naval Mine Engineering Facility using this Form, as prescribed in NAVORD INST 8500.7.

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**THE OFFICIAL JOURNAL OF THE RUDMINDE PROGRAM**

# SOUNDINGS

## The Changing Scene In Undersea Warfare

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### PICK-ME-UPS

**NAVY SKY-HOOK:** A fixed-wing aircraft, flying at approximately 150 m.p.h., has picked a Navy enlisted man from a life raft at sea and a Navy doctor from the ground in a demonstration of the Navy's new Skyhook-Aerotriever rescue system.

Capable of rapid rescues from the sea or remote land areas, the system has been under development since 1954 and is undergoing final evaluation tests.

In the rescue operation, a specially designed packet is dropped to the man. The packet contains a harness which is donned in the same manner as a pair of overalls.

A 500-foot long braided nylon line is attached to the harness with a balloon envelope at the end of the line. A helium bottle, also included in the packet, is used to inflate the balloon.

The man releases the balloon which lifts the line to a height of 500 feet. He then waits for pickup in a seated position.

The rescue plane, equipped with a "yoke" or wide fork protruding from the nose, approaches the line just below the balloon.

As contact is made, an automatic device in the crotch of the yoke secures the line to the aircraft, and the balloon breaks away. The man is lifted vertically into the air, slowly at first, then more rapidly as he progresses in a parabolic trajectory while reaching the speed of the aircraft.

A crew, operating rescue equipment aboard the plane, hook a section of the line and pull it through a bottom hatch. There it is secured to a powered winch. The man is then reeled in through the hatch.

The entire operation takes about seven minutes.

At peak load during acceleration the stress is only an approximate one-third of that experienced in a parachute jump.

Volunteers for the recent demonstration were CPO James H. McGee, attached to UDT-21, Little Creek, Va., and Lt. Edmund Perry Jacobs, (MC), USN, head of the Aero-medical Branch of the Service Test Division of the Naval Air Test Center at Patuxent River, Md.

**FOILED AGAIN:** "Don't just sit there, do something" won't apply to users of the new "sit still," a self-service device that provides fresh water for sea-disaster survivors.

A sponge, a sheet of black plastic film, a sheet of paper towelling or cloth, a water repellent screen, and a sheet of cloth-backed aluminum foil make up the kit. In use, the five sheets, all about the size of standard type-writer paper, are dipped into the ocean. Then excess

water is drained, the aluminum foil is wiped dry, and all are reassembled and exposed to the sun. If there's no sun, the user heats it by sitting on it.

Either way the heat penetrates to the aluminum foil which is then cooled by the salt-water-cooled cloth. In the process a condensation of fresh water forms on the foil, and the survivor uses the sponge to soak up the water... maybe only a few drops but enough to keep him alive.

The efficiency of the kit can be increased by using additional sheets of towelling, screen, and foil to produce as much as one pint of water in 16 hours. It was dreamed up by the Army Engineers at Ft. Belvoir.

**NOW HEAR THIS!** The wife of an ex-Navy man wrote to a commanding Officer. Said she: "Like most men when their wives call them, it falls on deaf ears, but I have noticed that when he (her 'Old Sea Dog') hears the Boatswain's Pipe, his ears go up like a hunting dog at the crack of gunfire." She wanted a pipe of her own.

And that sweet CO sent her one of those whistles! It's enough to make any husband re-up.

### DRY TRY

**WATERLESS LEAK TEST:** NOL has a new way to find leaks in items that would be damaged by the usual vacuum-over-water test method.

The damage usually comes when water is drawn into a faulty item as the vacuum seal is broken in the water-filled test tank but the new method, dubbed the "air-pressure differential method," does not use water or even specific gases such as freon or helium for operation.

Instead it requires only that the device under test be placed inside a sealed tank subjected to air pressure. If the device leaks, air seeps inside it and causes an overall pressure drop in the test tank which is recorded by a pressure gage. By knowing the free volumes of both the device and the test tank, the leak rate of the device can be calculated.

According to Robert A. Simon of NOL's Chemical Engineering Division the procedure "is best adapted for devices with considerable internal free volume, although in principle it is adaptable to smaller devices as well."

### DIVERSE DIVERS

**"ROAD" SCHOLARS:** Piloting a submarine along a CONALOG "highway" is so simple that it can be mastered in a matter of minutes. The skipper or diving officer feeds information on the desired course, speed, and depth into a display generator. This information is then transformed into a picture on the TV-type screen, where

the "pilot" (planesman) sees a "highway" with a "floor" and a "ceiling" which simulates the proper course and the bottom and the surface of the ocean.

When a change in course is ordered, the "road" takes a turn and the pilot simply follows the curve in the road. An order to change depth causes the road to move up or down accordingly, and pilot noses the wheel over or pulls it back much in the same manner as an airplane pilot. If the pilot should happen to dive the sub below her ordered depth, the roadway flips over, giving the illusion that the sub is sailing under it.

Cross lines on the "ceiling" and "floor" show the pilot the north-south and east-west directions at all times. The three-dimensional illusion created by the device is as realistic as can be obtained with the present state of its development.

This new contact analog device, still experimental, has passed tests on the nuclear sub SHARK. It is not now a part of the SUBIC concept (submarine integrated control system).

**MECHANICAL MAMMAL:** An experimental "porpoise" to aid in Navy oceanographic studies is being constructed at Dallas, Texas, by the Aeronautics Division of Chance Vought. The simulating sea hog, 12 feet long with a girth of 21 inches, is designed to take on water ballast after being dropped overboard from its tending vessel. It will then dive at predetermined angles and resurface when desired.

One of the monster's initial chores will be the charting of water temperatures at various depths. Building is being sponsored jointly by the Office of Naval Research and the Navy Hydrographic Office.

**ALU-MINIMUM:** A 50-ft sub still in the planning stage may become the world's first underwater vessel to be built of aluminum, and the first to be capable of reaching depths of 15,000 feet. Aluminum is strong enough to provide a hull to withstand up to 9,000 pounds pressure (psi) and still light enough to have buoyancy to rise.

The proposed sub would have a cruising range of 80 miles and make 3.8 knots or about 4.3 statute m.p.h. Eight feet in diameter, it would consist of 11 one-piece sections and weigh 50,000 pounds.

## WHEELERS

**WHIRLYBAT:** "Little Nocky" the sea-going bat enrolled in the biological orientation program sponsored by the Office of Naval Research (T-Shooter 4-61) has come into his own. A natural "copter" of prehistoric origin, he now has a modern namesake, the Navy 'copter HSS-1 SEABAT. Other Navy whirlybirds recently named by the Chief BUWEPS are HUS-1 SEAHORSE, HSS-2 SEADRAGON, and HRB-1 SEA KNIGHT.

**PEDDLES PACKET:** The Army Engineers are selling the MISSISSIPPI, one of the last of the "texas deck" stern-

wheel packet boats operated on inland waterways in the United States. The stately 761-ton 3-deck 81-passenger paddlewheeler, operated as a river boat since 1927, will be replaced by a trim, more powerful modern vessel.

Sic transit gloria, Mr. Clemens.

## IN AND OUT

**GREEN TURTLE THUMB:** Navy has planted 20 to 30 thousand green turtle hatchlings in the Caribbean in an effort to solve a critical protein deficiency among the natives who, for centuries, have depended upon these reptiles as their chief source of meat. The Caribbean Conservation Commission's hatchery at Tortuguero, Costa Rica, supplied the baby amphibians. They were flown in plastic bags to British Honduras, Cartagena, Colombia, Barbados, Grenada, and St. Lucia in the Windward Islands, and to Antigua and St. Kitts in the Leeward Islands.

**SPARE THE ROD:** When PO2 Roy L. Nichols of NAS/Corpus Christi caught the biggest sawfish ever taken by rod and reel, he didn't do it "officially" according to the National Fish and Game Association. The fish—17 feet 5 inches long, 8 feet wide, and weighing 1000 pounds—was taken with a 14/0 Penn reel, 130-lb test Dacron line, and a 26-foot, 600 pound test leader. The bait was shark.

The reason Roy's catch was ruled out by NFGA: instead of boating it after his two-and-a-half-hour fight he used a line to pull it ashore.

**MUDDER'S DAY:** The column of 12 M-48 Patton tanks and other vehicles made an impressive show of armored strength as it rumbled over a tank trail on the Camp Drum Reservation.

But it was vulnerable, for just one shell—a single shell—was enough to halt it.

When the tanks—vehicles of New Jersey's 50th Armed Div. on its annual field training—shifted into neutral, rumbling impatiently, a major in a jeep at the rear of the column hurried forward to see why the lead tank was holding up the others.

He found the driver of the vehicle waiting impassively—for a mud turtle to complete its plodding passage across the tank trail.

**OFFICE HOP:** The Central Ammunition Supply and Control Office (Code 4100) U. S. Naval Ammunition Depot, Crane, Indiana, has been transferred to the Naval Ordnance Supply Office (Code AM) Mechanicsburg, Pennsylvania.

**WOW!:** Made up of the former Bureau of Aeronautics and Bureau of Ordnance, BUWEPS is now the largest single organized segment of the Navy. Expending some \$1.6 billion annually and employing 200,000 people in some 300 activities, it actually directs more than half of the total Navy procurement and manages more of the Navy's shore establishments than all the other bureaus combined.

# RUDMINDE REPORT TO THE FLEET

## What's Been Reported?

## What's Being Done?

### Don't shoot!

"Why can't you use better language so we know right away what you're talking about?" That's what one man asked on his green Like'n'gripe sheet from T-Shooter 3-60. And we would, except that only one other reader agreed with him. All the rest were pretty outspoken about keeping our litaherry style just as bad as it is.

### How to start a new year

As for a statistical rundown of the reader replies—what percentage like which features best—we're going to hold off for a while because the returns are still filtering in.

But we can report a healthy list of suggestions and comments that can make ye T-Shooter a better book in precise ratio to our ability to start cranking them in. Take Al Niederbaumer, for example. He'd like to see something on some units other than Mine Project Four! Lenny Mapp wants an item on how a man assigned out of mines can get back in. Joe McGimsex suggests some features on world-wide mine bases. George Clark and Ken Merritt want to see some minemen's retirement lists. The mine shop at NWS/Y would like some straightforward information on mine vehicles.

The Kennedy's among our readers seemed to come in "Thirds." James Kennedy III suggests we report where billets for minemen are open. Apparently one place he should not apply is aboard the submarine Queenfish where his namesake LCDR Nevin Kennedy III, says that ye mine-man's bible is of no use. That's in considerable contrast to Harry Campbell who writes that the men in his shop refer to it so much they've started compiling an index to the back issues. We'll get back to that one, Harry, before we finish this page. Meanwhile, back at the ranch...

Bob Wilson and M. K. Milne asked for more coverage on depth charges, Bob Craig wants more pix in Hot Stuff, George Russell wants bigger and better features treating

subjects in depth, Paul Hanks and Kent Kleckner want more information on the development of new mines, and Merice Nelles wants a short column on training to help officers and POs. Also popular are lists of minemens' advancements, requested by Dick Howard, George Russell, John Harrison, and Billy Owen.

And so they go, on and on, and we wish we could have incorporated every one of them into the issue you're holding in your hands. As it is the only man we're sure will be pleased is George Burch, who asked that we print more readers' names!

### Jinxed?

Next to the man who asked for Millie, those we feel sorriest for not having helped are those who've been beating our door for a T-Shooter index. This includes Duane Hutchison, Earl Roberts, Harry Campbell, Lyle Stryker... more good names than we have space to print. Frankly, we consider constant requests for a periodic index to be the best possible indication of our readers' regard.

We recognize the necessity, too. Four times in 1961 we cleared the decks and started work on it. First the character assigned got a transfer rather than go on. Next try, a documentation program vital to procurement of new mines squeezed it out. On the third try, with things really rolling, we got a rush order to produce three new technical manuals on experimental mines, on high priority. The fourth try ground to a halt just last November when the man we needed most for the stage we'd reached—the layout man—took a job with Tactical Air Command for more dough.

Together the last two events cramped our meager manpower capabilities to such an extent that we're somewhat surprised you've even received this issue of T-Shooter on time.

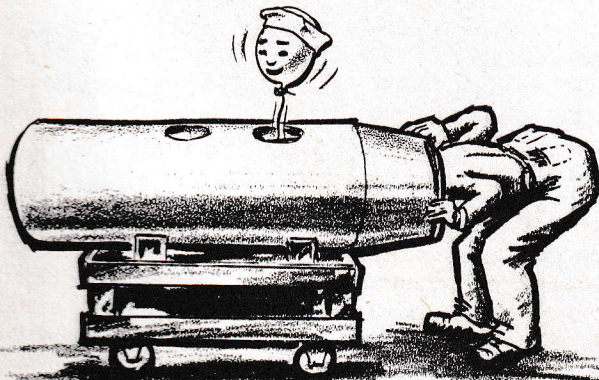
### We resolve

Writing this in December of 1961, with Christmas cheer of various kinds permeating the atmosphere and a nearly impossible deadline met, it's easy to sit back and say that 1962 will be different. But that's what we're saying. There's only one reservation.

A green sheet from the skipper of a sub calls T-Shooter "the best pub I have ever seen for sustaining interest and promulgating (technical) information," and recommends that the T-Shooter staff be put to work in a more vital field than depth charges and mines.

Words like those, misters and mates, are purest music to our editorial ears. But unless we receive a firm proposition with more moolah attached, we're going to see to it that you get your T-Shooter index.

—For the first seven issues, at least.





# HOT STUFF

by B. Arnaclebutt MNC

## Stamp problem licked

Dear B. Arnaclebutt:

We received some Mk 2-1 explosive fittings for use in Mk 10-3 and 49-0, 1, 2 drill mines but the cans are stamped DO NOT USE AFTER 1-60. I seem to recall that this restriction was lifted with regard to Mk 2-0 explosive fittings. Inasmuch as there really isn't any significant difference between the 0 and the 1, shouldn't we be able to accept these 1s?

D.E.L., MN1

Dear D.E.L.,

The answer is "concur," a word the engineers use around here when they agree with an idea. Action has been initiated to get that restrictive date removed from the Mk 2-1 fittings.

*B. Arnaclebutt*

## Shield blues

Dear Barnacles:

This may sound like small potatoes, but it seems to me that those rivets that hold the cable clips in drill-mine shields could be made of metal that would hold up better

in salt water. All it took was ten days submersion for those aluminum rivets to corrode so bad that some of the clips were lost from all of the Mk 52 and 55 mines we planted.

U.G.H., MN2

Dear U.G.H.,

To switch the old saying around, it's the life in little things that counts. So the drawings are being revised to call for more substantial rivets. This will take care of new procurement if there ever is any. But for the shields now in stock the best we can tell you is to order Rivet, Universal Head, Nickel-Copper Alloy, 3/16" diameter x 7/16" long (MS-20615-6M6) and replace the aluminum ones ad lib.

*B. Arnaclebutt*

## Put a nickel on the drum

Dear B. Butt:

The final step in testing the SE-3-2 for assemblies 02 and 04 of a Mk 49-1 mine tells me to "Reconnect the ground strap to the insulation strip securing screw and terminal A, and the black lead of CA-415 to terminal A, and tighten the respective hex nut and screw."

Wouldn't this cause the B switch in the D-12 to be shorted and foul up the det circuit test later? Seems to me that eliminating this step would be the salvation.

R.I.P., MN2

Dear Rip,

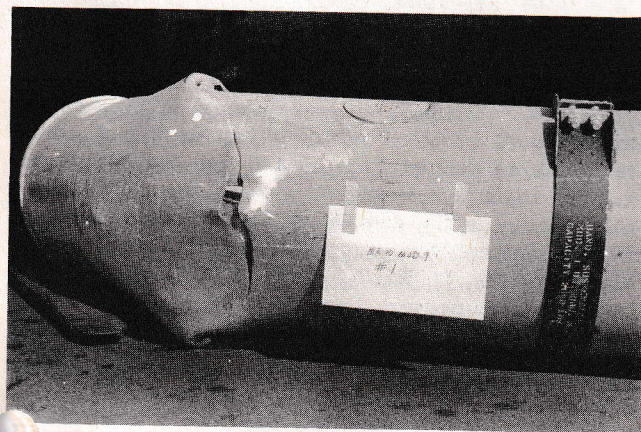
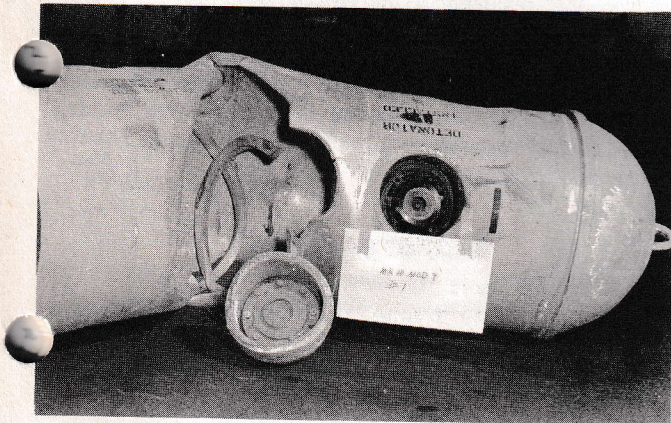
You brighten the corner where we err. But your "salvation" is too sweeping. In OP 1808, in the right-hand column of page 33, let's leave this much of step 5: "Reconnect the black lead of CA-415 to terminal A, and tighten the screw."

*B. Carnackebutt*

### Lend me your comb

Dear Butt,

The experience of using OP 1844 for operational tests of A-8-1 mechs should happen only to a private eye. Anyhow, after digging through OP 1860 for more dope on Test Set 65-1 we ignored the instructions in paragraphs 4a,b,c, and d upper left on page 32 and switched the hookup of Cable CA-904 by plugging the connector near the single lead into the control box instead of the test set, and taking the connector it says to plug into the control box and plugging it into



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the set. Maybe this sounds weird, but it worked!

K. H., MN1

Dear Stew Bailey,

You really swing. No doubt about it. But I'm convinced there's a screwball reason that your fix worked: either you've gotten hold of a CA-904 in which the leads are connected to the wrong pins, or else you've got an ancient CA-686 on which someone has stuck a CA-904 identification sleeve. (CA-686 is a cable that was supplied with your Set 65-1 back when the stuff in my bottles was milk, which has since been replaced by CA-904 which is electrically definitely not the same.)

As for your 1844, it's right if you read it right. But as written it can be confusing. So here are my solutions:

First check out your CA-904 against DWG 1227660; if they don't agree, alter the cable or get a new one. Next, clarify steps 4b, c, and d on pages 32 and 34P of OP 1844 (CA-904 hookup) by changing them to read like this—

- b. Plug the male connector (all 3 legs) into the test set's receptacle A MECH MK 6.
- c. Plug the female connector onto CA-634's male.
- d. Plug the other male (single leg) into the 5-pin receptacle on the control box.

That, I think, should do it. If it doesn't—if anyone else has the same gripe—Rudminde at will.

*B. Carnackebutt*

### Ah, 'chute!

Dear Barnacles:

I've often wondered just what happens to an air-laid mine when its para-pack fails to open. What components in particular are affected by too rapid water entry?

F.A.P., MNSN

Dear Striker,

A good question. Few such mines are ever recovered. Here's a couple of photos of one that was. Choose your own components.

And thank you Ens. A. R. Boreen of Charleston for these great graphics.

*B. Carnackebutt*

### Off limits

Dear Barnacles:

While checking out a new 26-2 test set (used for depot testing M-11 firing mechanisms) I found the shielded a-c leads shorting fuse-holder terminals. Trouble was that these shields were too long. So



I shortened them in this set and all the others we have. Seems like maybe this should be done to all 26-2s.

B.O.B., MN1

Dear B.O.B.,

Inasmuch as it was part of your job to pull that panel out and perform such surgery, okay. And I'm sure you did a fine job. Anyone not authorized to work on test sets should not, of course, attempt to make repairs.

Another way to handle the problem would have been to unsolder the shielding and install spaghetti. Simpler yet: tape.

*B. Arnaclebutt*

### Hickory, dickory, clock

Dear B. Butt:

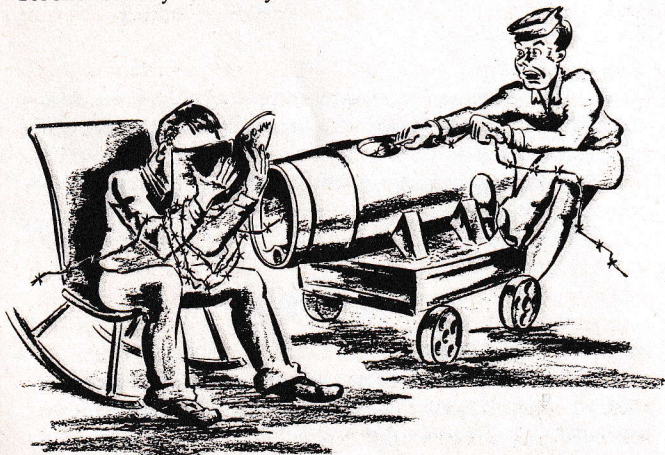
Some sharp characters say to wind CD-17 Mod 0s before storing. Other savvy blokes say it's strictly a no-wind deal. Maybe it's six of one and half dozen of the other, but I wish somebody'd call it heads or tails officially and have done with it.

H.O.W., MN2

Dear Undecided,

So wind 'em a little. Not that it won't put a wee bit of undesirable torque on the clock's main spring. But by cracking the clock switches, tension on the contacts is reduced. This tends to do away with the greater evil.

BUWEPS NOTICE 8550 of 24 May 1961 (canceled as of 31 Dec 1961 but still good dope) says that hand-wound clock-delays as specified below, when manufactured and when overhauled, shall be wound from the completely run-down position to the position listed below. Also stencil or mark exterior of final package CLOCK PARTIALLY WOUND. . .but do not broach sealed packaging of current stocks merely to verify whether the clocks are wound.



Hey Rocky! This OP says to use CA-410

CD-4s	Wind 4 turns or until Switch A opens.
CD-8s and CD-10s	Wind 11½ turns or until Switch A opens.
CD-9s	Wind 7 turns or until Switch B opens.
CD-12s and CD-17s	Wind to maximum setting.

Look for a new BUWEPSNOTE this month making this info current again.

*B. Arnaclebutt*

### Bar sinister

Dear B. Arnaclebutt:

When Clock Delays CD-12 and CD-17 are married to their clock starters their E switches don't always close even though the clocks start, even when the E switches have checked okay previously with a Mk 95 test set. Shouldn't there be some check for this possible failure?

L.B.N., MNC

Dear Chief,

Like you probably found out, sometimes the clock-starting bar has to be depressed further to close the E switch than to start the clock. As a result of your Rudminde a change to OP 1452 will call for an ohmmeter check for E-switch closure at the same time the starting bar travel is checked with the GO/NO-GO gage. Thanks.

*B. Arnaclebutt*

### Resistance movement

Dear Barnacles:

Why shouldn't the insulation resistance test for Circuit Breaks Mk 1-0 and Mk 2-1 in OPs 956, 1736, and 1807 be the same? They're not, you know.

A.S.D., MN2

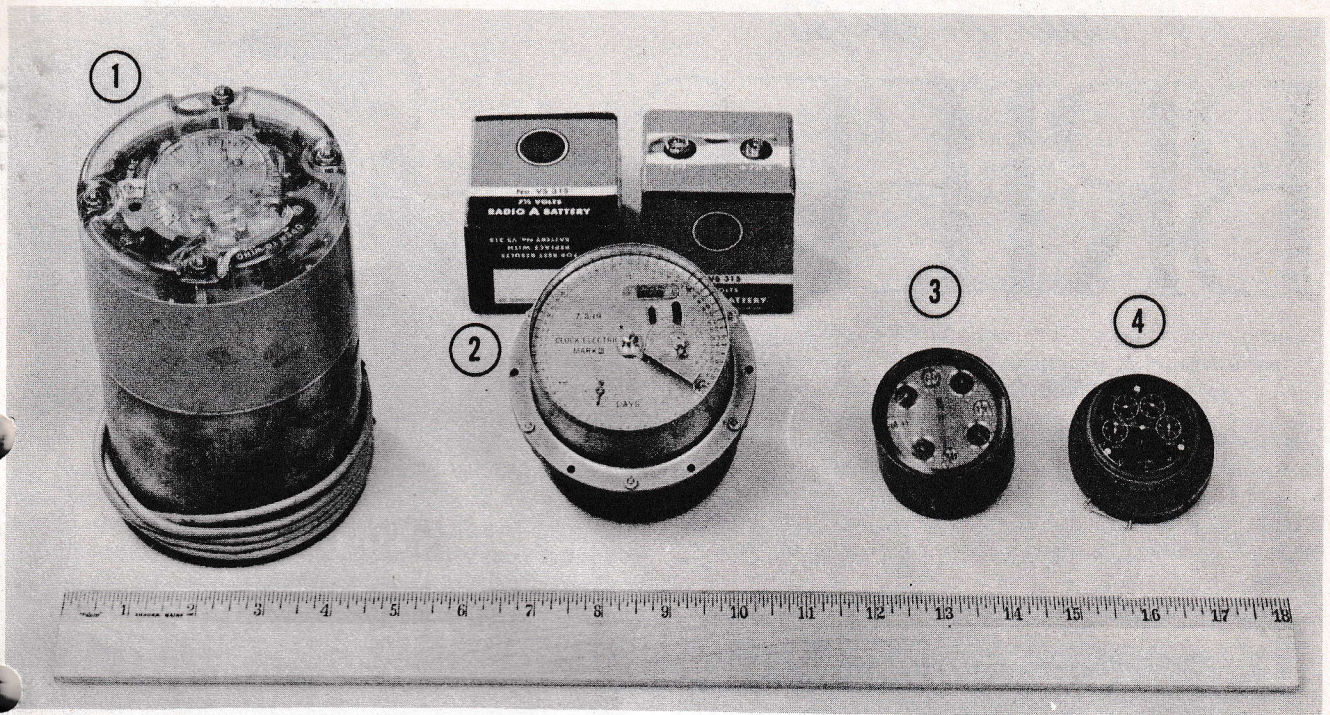
Dear A.S.D.,

But they are all the same in one respect: failure to check for grounded relay circuits. Be that as it may, these tests will be deleted from the OPs you list because insulation resistance is rightly a pre-issue business that will show up in the new OP 2567 (for all firing mechs). What it will call for is to check between each circuit-break lead (J1, J2, N1, N2, A, B, C, D, and E) and the housing with a megger. Less than 100 megs at 500 volts will be your cue to tag it for rework, natch.

*B. Arnaclebutt*



# COMING: A NEW MINE FIRE RECORDER



Progress from bulky 10-day jury-rigged CD-12 to compact two-year time-of-fire recorder: 1) adapted CD-12; 2) British Mk III clock — actually two were used in tandem for best reliability; 3) prototype of new model; 4) preproduction sample of recorder described here.

AS LONG AS anyone can remember, the lack of an accurate, compact, dependable, long-range time-of-fire recorder has seriously restricted the value of data gathered from mine tests. Both the NMEF-modified CD-12s and British Mk III clocks, the recorders presently in use, leave much to be desired. What has been needed is something better than a makeshift adaptation—an instrument designed specifically for the purpose.

BUWEPS authorized the development of such a recorder in mid-1959. NMEF's Instrumentation Division then designed a prototype to meet a broad range of test requirements and a contract was let for the detail design work and product engineering necessary before the recorders can be manufactured in quantity.

The new recorder shown here is a preproduction model of the final result. Measuring a mere 2 x 1-1/4 inches, it weighs only three ounces including a self-contained 1 1/2-volt cell! The cell powers a jeweled movement that drives a gear train terminated by five calibrated read-out dials that indicate from 1/100 to 9,999.99 hours elapsed time per cycle. The cycle repeats automatically—the only time-limiting factor is the life span of the

battery, which is expected to be good for two years. Accuracy, too, is expected to be excellent. At the time of this writing a preprod has been running NMEF's laboratory for 367 days with a total error of only 2 hours in spite of the fact that the recorder was not adjusted before or during the test!

In other laboratory tests the new recorder has proved capable of withstanding two-phase water-entry shocks, a first phase of 6000 Gs for .02 to .04 milliseconds, and a second phase of 450 Gs for 15 to 20 milliseconds. This covers the most severe conditions expected to be encountered in mine-warfare exercises.

The next step? Fifty recorders from a regular production lot will be ready for final pre-production tests in January. Some are scheduled for further tests in the laboratory. The remainder will be used in a regular Fleet Service-Mine Test, CNAL 3-62, later in the month. If these tests prove the new recorders to be satisfactory—and stringent laboratory tests give every indication that they will—procurement will proceed at once.

As we see it, the new recorders should be available for all FSMTs before the end of this year.

# Millie Amps' BRIEFS

## *Attractive measurements*

If you're concerned with testing magnets for K-4 firing mechanisms, you should have a copy of BUWEPS NOTICE 8554 of 13 Sep 1961. And be sure to advise BUWEPS (FWAM-3) with copy to NMEF, of any difficulties. Include all pertinent data and a clear explanation of each failure.

## *Ground maneuvers*

When Carl Sundy at Yorktown came across Mk 61-2 test sets that gave out with so much noise voltage at the electrical output that test results were inaccurate and unreliable, he reduced it to an acceptable level by grounding the negative side of the ELECTRICAL CALIBRATE potentiometer R47.

A more effective method would be to ground the test set's pilot lamp directly to the test-set chassis. This removes the 60-cycle lamp circuit from the 15-cycle test circuit. Like this:

- ▶ Unsolder the pilot lamp's ground lead from Resistor R-48 (variable pot) and solder a number 6 terminal lug onto the lead.
- ▶ Connect the lug to the bolt above the pilot lamp, the one that secures the voltmeter to the panel.
- ▶ Unsolder the common ground lead at the pilot lamp and solder it to R-48's ground lug.

BUWEPS is not distributing any current instructions on this. Inasmuch as additional procurement of Mk 61-2 test sets isn't likely, no drawing changes will be made.

Happy noise abatement, mates!

## *Tough on tenders*

According to J. R. Bruce MN1, COMINLANT, there's been an oversight in allowances for mine test sets, tools, and equipment. Seems that Auxillary Submarine tenders didn't get a berth on NAVORD LIST 22501 Rev F. This



we had to see for ourselves—and we saw! So NMEF has asked that subtenders be put on that list. Anytime you need something, J.R., you can get it right here!

### Try for happy

My article "Heaven knows I try" in T-Shooter 3-61 sure is snowballing. Since it appeared I've been asked whether the high prices of some mine gear isn't primarily the business of the Value Engineering program, and others have suggested that it's really a deal for Benny Sugg. The answer to both of these questions is "maybe."

Now I don't have to tell you what a Benny Sugg is. If you think your idea is Benny Sugg stuff, more power to you and rots of ruck.

Value Engineering, of course, has lately been cropping up all over the defense establishment and industry too. But the VE program I'm referring to here is one at OSO, concerned with savings through studying "areas of questionable value." Other VE signposts are: "Does it seem to cost too much for the job it's doing?" and "Is anyone else buying it for less?"

In "Santa Claus cometh" last issue, I've told how L. M. Stryker, Mines Officer at Navy 3867, got some concrete results to these questions by writing directly to OSO, as I was pretty sure he would. VE is a good program. If you want further details, write to OSO at Mechanicsburg, Pa. for their VE pamphlet.

But when the problem concerns mine or depth-charge gear, Rudminde is still your best deal. Not only does a Rudminde get your idea considered from the VE angle,

it also gets it design-engineering and maintenance-engineering considerations too.

Bargains like that are right hard to beat!

### Plug spelled backwards

Rework activities have been told not to bother replacing those ducky little plugs that were originally provided with new mine cases to protect the British suspension-lug mounting holes. These lugs are not required in current mine assemblies. What's to be used instead of plugs is Grease MIL-G-16908. Applied to the mounting-hole threads it efficiently retards rust and corrosion.

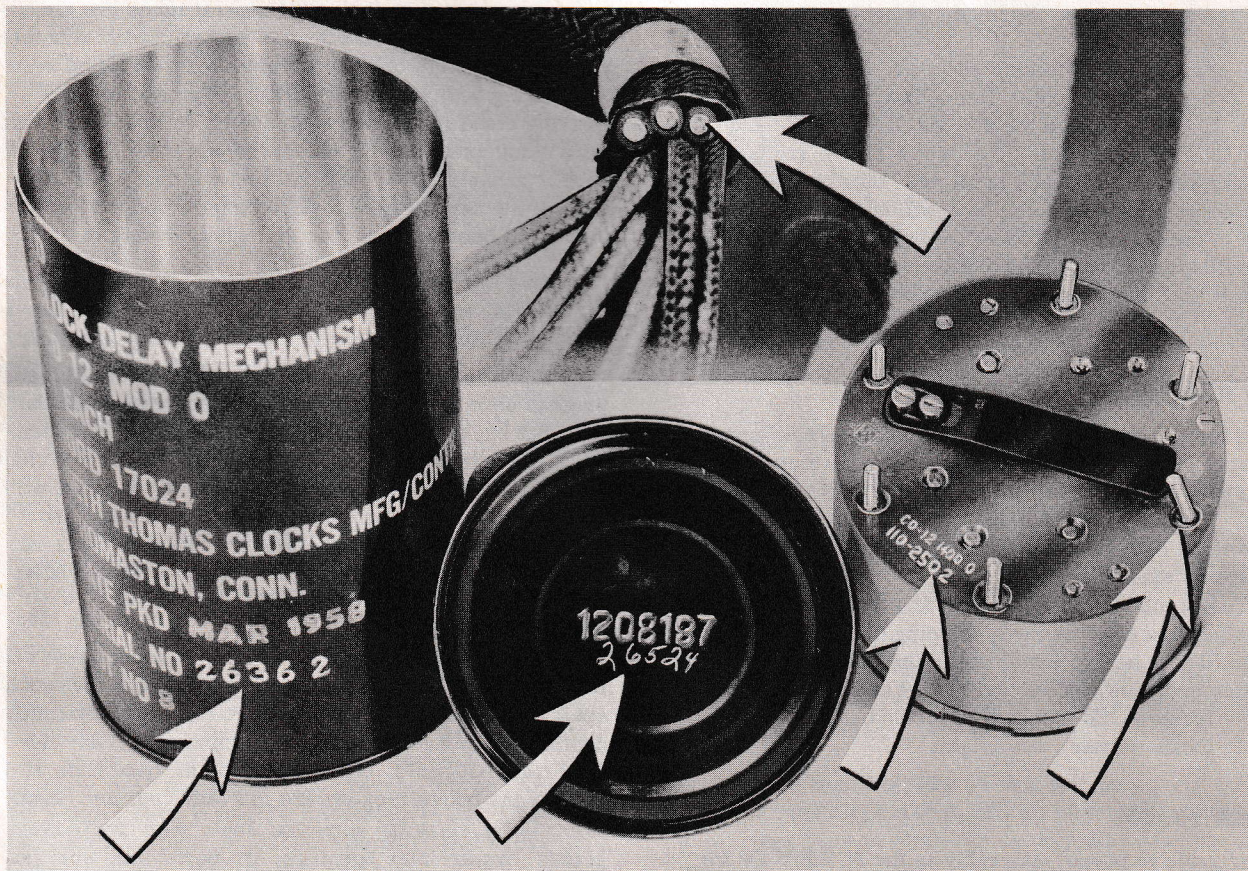
W9150-184-9159 will get this (gulp) grease.

### Can-can number

W. T. Kibe, MN2 of Navy 3867, sent us these photos showing a CD 12-0 that's plenty long on numbers but mighty short on leads. That bent stud's cute too. We harp a lot about this sort of slip-shod shipping because it represents an area where mine readiness can be improved quick and easy.

Most Navy men take pride in looking 'em over, but a few jokers are still giving junk the nod. 'Course this isn't deliberate sabotage. But it's close.

*millie amps*



Let's talk about . . .



# Ready Depth Charges

**B**ACK IN T-Shooter 2-59 we wrote about an extensive ship-and-shore investigation of Mk 6 and Mk 9 depth-charge failures. Finding that the charges came up smelling like roses, we figured that the bind was in the printed instructions. So we included a few plain-spoken pointers and the rash of depth-charge Rudmindes subsided.

But not enough. The fact is that Rudmindes are again reporting what we think are avoidable failures, and we're forever receiving questions about shipboard handling and maintenance. So here, we hope, are some answers.

The charges we're talking about are those that use Mark 6 firing components: Depth Charge Mk 6 Mods 0, 1, and 2, Depth Charge Mk 8 Mods 3, 4, and 5, and Depth Charge Mk 9 Mods 2, 3, and 4. None are nuclear glamour weapons but each is simple, durable, and dependable as all get out. All have killed more than their share of enemy subs in close "in-fighting," where they will still excel if you who are responsible for them will see to it that they're made ready, kept ready, and used right.

## Begin at the beginning

The time to begin is when you're taking a new supply of charges aboard. Check the cases for serious dents, and keep a sharp eye peeled for cracks and defective welds. Vibration of a ship underway can cause TNT exude to leak out and this will mean trouble later on. So accept only sound cases.

Store acceptable charges, boosters, and detonators in magazines and don't remove shipping plates from case ends until just before installing firing components. Some firing components will of course be carried in ready-service lockers. So inspect 'em periodically. Ready-service lockers aren't watertight.

## Assemble 'em right

Your guide to proper assembly is the BUWEPS OP for

the charge in question. Within the year you'll be receiving new manuals on each of the charges we're talking about here, but meantime here are some hints to keep in mind when using the older books.

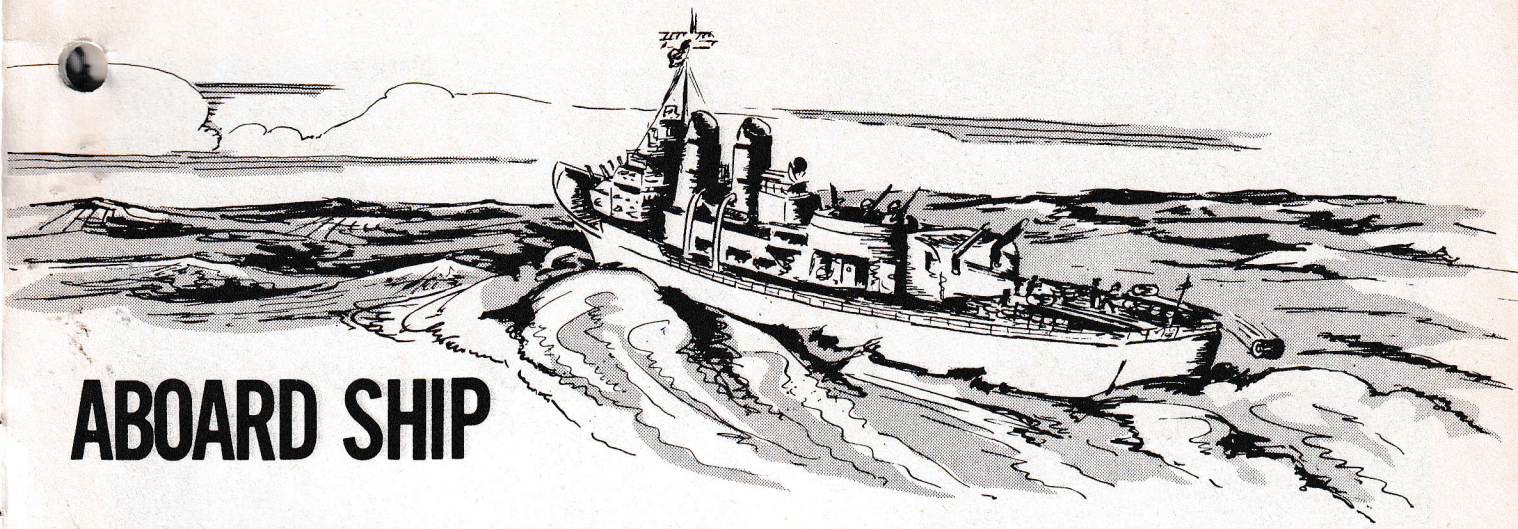
First comes the case, for which we offer one "don't" and a "do" that could save your life: Don't ever fuss with filling-hole-cover fastenings. Do use only wooden scrapers, anti-spark wire brushes, or air jet when cleaning central tubes, flange surfaces, or any part of those explosive-loaded cases.

In any case see to it that all central tubes are clean and dry and gasket surfaces are in A-1 condition before you install pistols or booster-extendors. Also be sure your firing components are clean, dry, and in good working condition (we've seen some pretty salty-looking gear being used) and be sure when you install to use new rubber gaskets Z5330-286-9093 on the flanges at the ends of the central tubes. Also be sure you torque the pistol and booster-extender fastenings evenly to 16-20 lb-ft.

## Tender loving care

So much for that. Repeated tests have shown the components used in these charges to be so dependable that we'd bet bucks on reliability right after careful assembly. The trick is to keep 'em reliable as time marches on . . . reliable and safe to be around. To this end we'll give you a brief run-down on the daily, weekly, and monthly maintenance necessary for ready charges on deck. First, though, here are three conditions you've got to be on the lookout for at all times:

**The Red Peril.** No self-respecting gunnery crew will let rust accumulate on vital parts of weapons that could spell life or death for the ship. The answer is frequent application of Rust-Preventive Compound W8030-244-1297 (MIL-C-16173, Grade 2) on the exposed ends of the pistols and booster-extendors in ready charges. Apply it carefully, making sure you don't gum up packing glands, water-inlet openings, or parts that work at



# ABOARD SHIP

close tolerance—such as the locking balls. The compound has to dry completely, so if you use it below decks: ventilate! Be especially careful to keep it off the rubber gaskets. It rots them.

**Baby, If It's Cold Outside!** Tropical cruises are great, even if they do promote rust on depth charges. But the only thing that's permanent is change, so you can be pretty sure that sooner or later some ice will figure in your life.

Ice makes ready depth charges inoperative. Internally it makes it impossible for pistols and booster-extenders to react to the changes in water pressure that make them go bang. A layer of ice on the outside of these vital components will keep sea water from entering their small water-entry passages with the same result. The answer, friends, is the judicious use of a mixture of 2/3 glycerine and 1/3 alcohol.

When making a run in freezing weather, flush the pistol ends with the antifreeze solution through the inlet valve or through the orifice in the valve-seat head. Do not flood the pistols with antifreeze. It could cause a dashpot effect and retard firing-pin motion. Coating of pistol parts with polar-type rust-preventive compound is sufficient protection for this mechanism against any possible freezing or corrosion that would interfere with their movements. Replace any broken or cracked inlet valve covers.

To protect booster-extenderns, remove them from the charges (or turn the charges on end) pull off the safety forks, then pour 2-3 ounces of the solution around the spindle ends. If the solution does not run in readily, use the extender-testing tool to push the spindles in slightly—never more than 3/4-inch if the extenders are installed in the charges. Replace the safety forks, making sure their pronged ends point downward when the charges are in the racks. Putty over the end of the extender will effectively seal out water and prevent the antifreeze from seeping out. It may be necessary to use masking tape to hold the putty in place. The putty will break off cleanly when the safety fork is removed.

Remember, sheet ice that forms on the outside of these components must be flushed off just before firing with steam at very low pressure, or hot water.

**Wham!** A lot of the cases you'll have aboard will have been explosive-loaded before 1942 with Grade-B TNT. This often forms a very corrosive exudate that can generate enough pressure to open the case at a weak weld, especially when subjected to the vibration you get on the after deck at high-speed or during long runs in foul weather.

The stuff that leaks out of those cases is highly flammable. When mixed with wood chips, saw dust, cotton waste, or other combustible material it can explode. So always be on the lookout for leaking exudate under these conditions. Clean it up right away. If possible, use clean hot water but in any case never use soap or other alkaline solutions. They usually contain chemicals which can make the TNT extra sensitive.

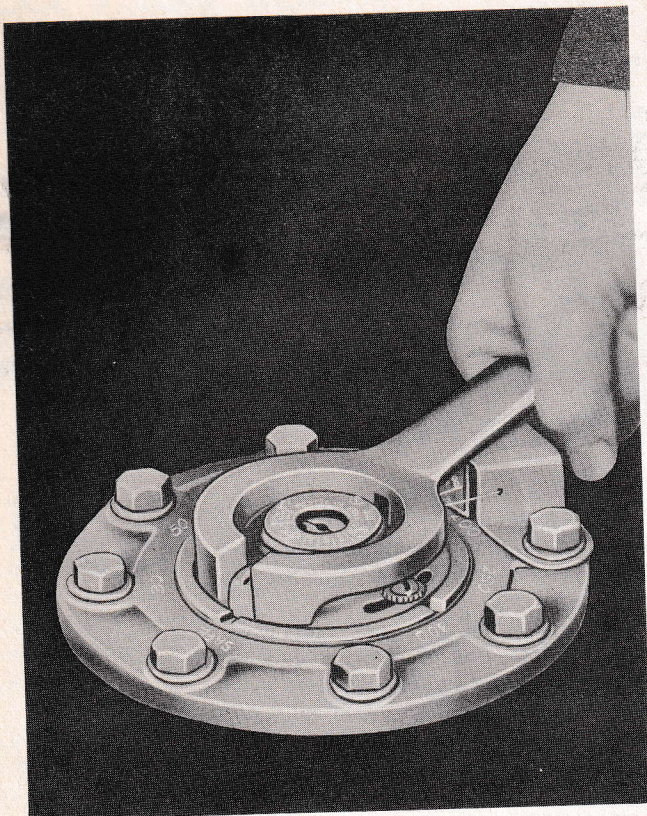
You can use acetone or alcohol if you make sure there is plenty of ventilation. Dispose of leaking cases per NAVORD INST 8026.9 fast. And now to the regular maintenance procedures we promised.

## Daily deck check

Any ship that carries ready charges should detail a man to make these brief checks daily. Not only will they insure that the ready gear is ready, but they will also insure that all hands will be familiar enough with the weapons to use 'em right if the time comes. Why not?

**Pistols.** Check all pistols that have safe-setting locks installed to be sure they are set on SAFE. If the gunner has specified some pistols to be installed without safe-setting locks, check them as follows:

▶ Using the depth-setting wrench we show here, turn the index pointer clockwise to SAFE, then counterclockwise to 30, then back to whatever setting has been specified by the gunner. ➤

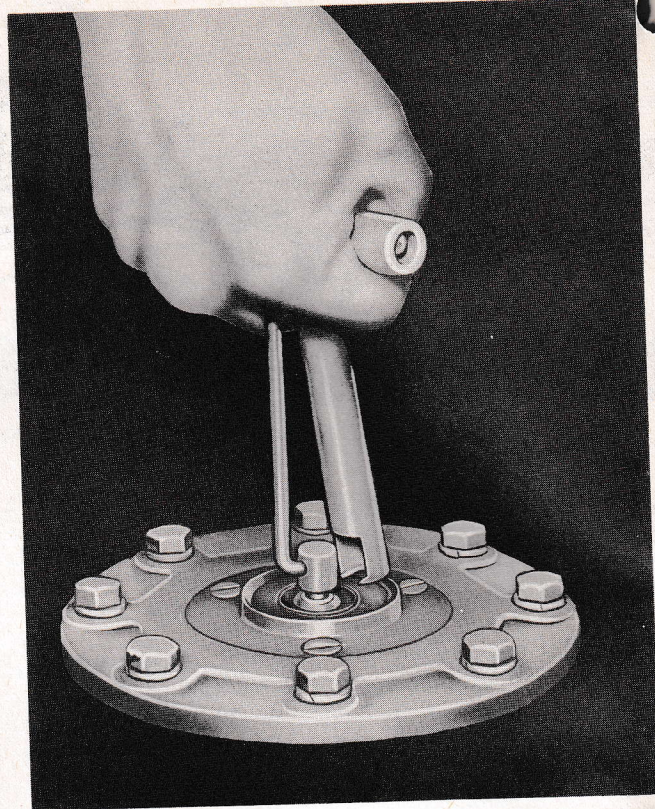


DEPTH-SETTING WRENCH Z1360-381-0745 (DWG 180387) used to flex pistols' outer dials in periodic checks as recommended here, also to set outer dials for firing depth.

- ▶ Remove the safety cover and turn the deep-firing pointer to 0-300 (use screwdriver), then to 1000 if a Mod 2 or to 600 if a Mod 1, then back to the prescribed setting.
- ▶ Put the safety cover back in place. Note that performing the above steps will acquaint you with the trouble you'd have in setting the Mk 6 Mod 2 Pistols at night under blackout conditions. It will help to notice how you can set for depths up to 300 feet by counting the clicks when you move the pointer.

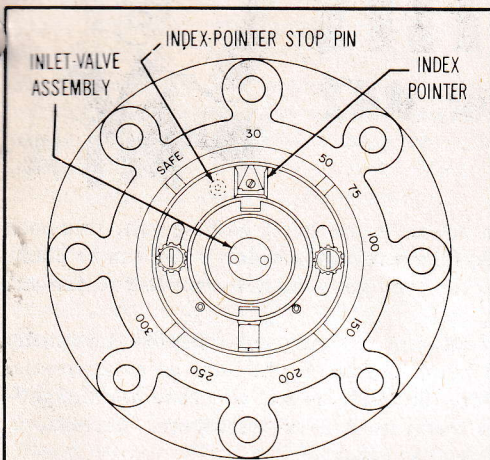
**Booster-Extenders.** Using the extender-testing tool shown here, check each booster-extender as follows:

- ▶ With the tool's hook, pull the extender's safety fork off, noting whether the extender's spindle moves in about a quarter of an inch. If the extender is a Mk 6 Mod 1 and its spindle does not move in, back the gland nut off about a quarter turn to free it. (NOTE: Don't loosen the gland more than you have to . . . its purpose is to keep the extender's water chamber dry while the safety fork is in place. Other mods do not have packing glands.)
- ▶ Put the tool's hook in the hole in the spindle, pull out,

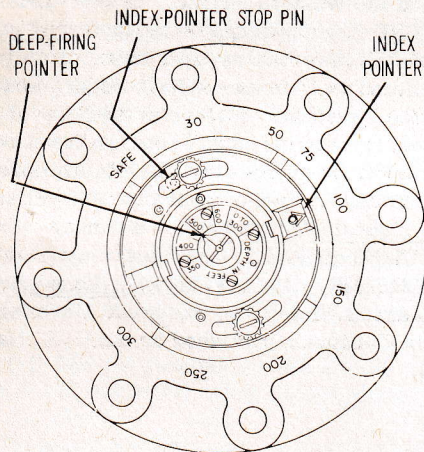


EXTENDER TESTING TOOL Z1360-513-6972 (DWG 18037-1-5): hook engages spindle, withdraws it to permit tool's end to engage groove for periodic flexing as recommended below.

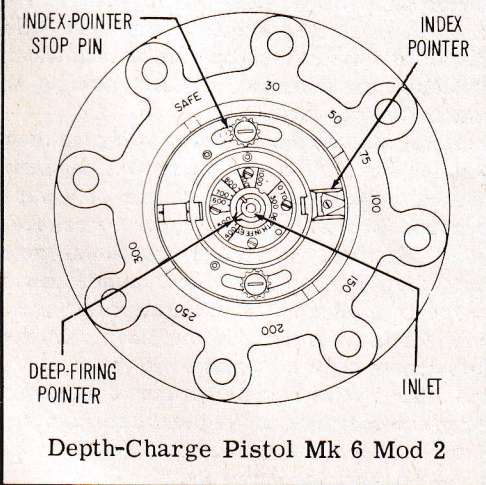
- and swing the tool so its recessed end engages the groove in the spindle. Make sure the tool is well centered (otherwise it will mutilate the moisture seal) then let the bellows pull the spindle and tool into the extender. The hook will now be free; swing it out of the way.
- ▶ Check freedom of spindle and booster movement by pushing the spindle in about 3/4-inch and letting it spring out a few times. But be careful: This check is as safe as prescribed, even with a detonator installed, but to exceed the specified 3/4-inch inward travel would momentarily complete the firing train (detonator to booster to main charge)! In any case if movement isn't free install a new booster-extender, but remember that spring reaction and locking-ball friction naturally produce a certain amount of resistance to spindle travel, especially on Mod 2 extenders. It's when you feel a stronger resistance that you should replace. After doing a few you quickly get the feel.
- ▶ When spindle travel is satisfactory swing the tool's hook back into the spindle's hole, pull the spindle out and disengage the tool's shank, then install the safety fork and disengage the tool's hook. It's a good idea to turn the safety fork's knob UP when you're through. It helps shield the water-entry port from rain and spray.



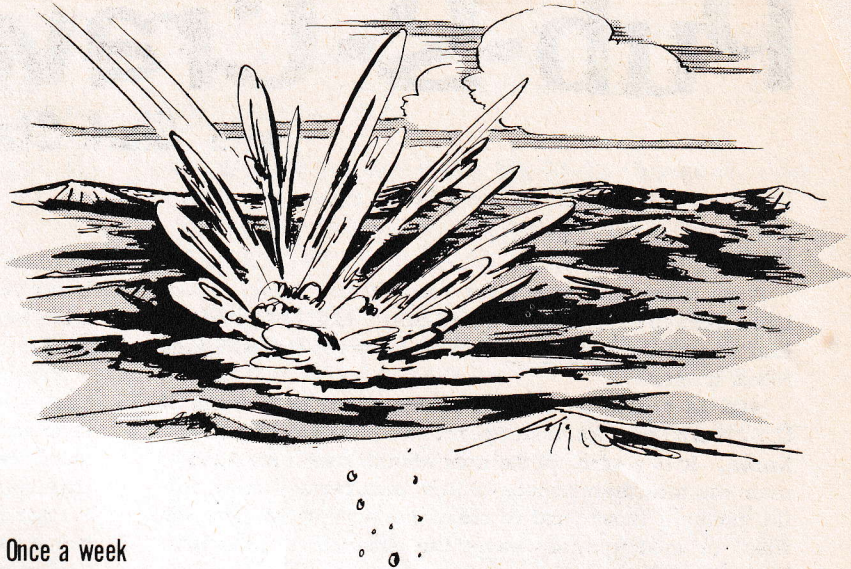
Depth-Charge Pistol Mk 6 Mod 0



Depth-Charge Pistol Mk 6 Mod 1



Depth-Charge Pistol Mk 6 Mod 2



**Once a week**

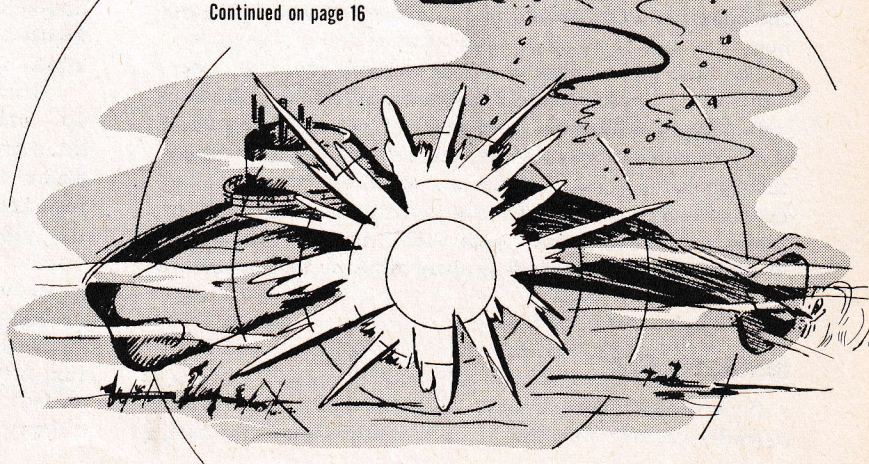
Weekly, the pistol's safe-setting locks should be freed up and lubed as follows:

- ▶ Work a few drops of light machine oil between the indexpointer and dial plate, and around the pointer's plunger.
- ▶ Loosen the safe-setting lock's capscrew, lift the lock off the pointer, and swing it out of the way.
- ▶ Perform a pistol check exactly as detailed in the daily inspection above for pistols without safe-setting locks, setting the deep-firing pointer at 0 to 300 if another setting has not been specified.
- ▶ Tighten the safe-setting lock back in place.

**Once a month**

This one is short and sweet but extremely important, not only as a matter of reliability but for the preservation of your own skin. At monthly intervals during prolonged periods at sea or whenever you make port, remove all booster-extenders and carefully check

Continued on page 16



# Pub-S-Crawlin'

with Clark Starter, MN2



## The Mine Warfare Book

Many minemen haven't yet read "their" book. Most I've talked to haven't even heard of it: LCDR Arnold S. Lott's Most Dangerous Sea published by the United States Naval Institute.

MDS is a history of Mine Warfare and an account of U.S. Navy Mine Warfare Operations in World War II and Korea. It is a story of the men who planted mines and men who took their wooden-hulled, underarmed ships into the enemy's front yard to clear the way for the invasion fleet, or monotonously swept the channels to principal United States ports.

To many, the Mine Warfare Service might seem a dreary, dull business. But as LCDR Lott takes us through operation after operation ranging from Pearl Harbor to Okinawa and Korea, its history is far from dull reading. The constant awareness of death, the sights and sounds of battle leap from the pages of MDS to hold us through many tales of bravery and dedication to duty.

## Japanese, Germans, and Yanks

Friend and foe alike sail through these pages—Japanese minelaying submarines off the Australian coast before December 7, 1941; German minelaying merchant raiders off New Zealand a year earlier; German submarines laying mines within sight of U. S. shores in 1942; and United States submarines laying mines off Japanese shores a few months later. Here, for the first time, is a graphic account of how Japan was literally starved out of the war with thousands of Navy mines laid by Air Force bombers.

Some of the officers who helped win the war are named in this book, but with fine regard for the usually unnamed E.M.s, LCDR Lott also names plenty of sailors who sweated their way to the final victory. Counting friend and foe, the book names 1216 ships, 431 men, 4 women, and a dog.

The best way to read this book is from cover to cover. But if you go to the index in the back you'll soon find yourself hopping excitedly from page to page chasing down familiar names: men, ships, places. Or you may thumb through for a look at the many excellent photographs, charts, and such. At the end is a list of ships sunk by mines from 1862 up to August 1950. There's also a list of other books and references about mine warfare to explore.

## Beer Kegs to Bikini

If you want to know what a Civil War "beer keg" mine looked like, or when the Mine Warfare School started,

or when Bikini meant more than a bathing suit, this book is for you. You'll never know how savvy you can be about mine warfare until you get your nose into this mineman's book.

Arnold S. Lott, who put this book together (admittedly with a lot of help) enlisted in the Navy as an apprentice seaman in 1931. By 1940, he had advanced to chief yeoman. He has seen service in destroyers, tenders, a light cruiser, and a tugboat.

Upon being commissioned an ensign in 1943 he was detailed as a Personnel Officer in Seventh Service Force. During the last of World War II he served in the transport USS WHARTON in the Western Pacific. In 1947-1948 he was exec aboard LST-1146 operating in the Northern Pacific and Arctic Ocean. He has had several tours of duty in Public Information and the Defense and Navy Departments, and once served as Personnel Adviser to the Navy of the Republic of Korea. During his naval career he has served in sixteen ships and at shore bases in Australia and Korea.

Commander Lott has written extensively on naval subjects for the Encyclopedia Britannica, did a Sunday column for the Vallejo TIMES-HERALD, and feature articles for the OAKLAND TRIBUNE. His first book, A Long Line of Ships, is a centennial history of the great Mare Island Naval Shipyard in California published by the U. S. Naval Institute in 1954.

## Nimitz knew

In a foreword to MOST DANGEROUS SEA Fleet Admiral C. W. Nimitz has this to say: "Twice in ten years the United States Navy crossed the seas to distant wars. Back from those wars have come the tales of battle, the exploits of adventurous submariners, brave marines, courageous sailors, and daring airmen. It is most fitting that such accounts of war above and beneath the sea should finally be followed by the story of that least known of all kinds of war at sea—mine warfare.

"Whether the task was laying mines or sweeping them up, mine warfare was a far from glamorous business. Mine craft worked in bad weather and dangerous waters, under enemy attack, with little publicity and few rewards for daring deeds well done. No matter what job was given the mine craft, they did it. Those are commendatory words, for a large proportion of the mine craft crews were Reserves. Their services in the Navy centered around one mission—to fight a war and help win it.

"Here is the story, perhaps grim but certainly inspiring, of the Navy's minelayers and minesweepers as they sailed to victory. Their story, I am proud to say, has a happy ending—'Mission accomplished!'"



► **NAVORD OSTD 600** was canceled as of 1 July last year. Items for new design are no longer selected from this document. There will be no further distribution of the complete 600, but page-by-page distribution will be made for maintenance procurement purposes where MS and AN items have not superseded items in the 600. Superseded items are indicated in the index of the 600, so if you have one, keep it for reference.

► **OP 902 2d Rev (Mine Mk 18-0):** On page 14, under Search Coil SC-4 Mod 1, the last line of paragraph 4 should refer to G5120-494-1988 (2½" c to c)(MS16151-7) not BuOrd Dwg 369087.

► **OP 902 (Change 1 to 2d Rev):** On page 25, under Search Coil Subassembly, the first line of paragraph 1 should refer to spanner G5120-494-1988 (2½" c to c) (MS 16151-7) not BuOrd Dwg 369087.

► **OP 948 1st Rev (Mine Mk 10-3, 7, 9):** Page 51, paragraph 24j(4) should read: Close the toggle switch and throw the TD OPERATE switch to ON. Adjust the variable resistor until the multimeter reads  $7 \pm 0.1$  volts. Open toggle switch.

Paragraph 24j(6) should read only: Close the toggle switch.

Page 59, paragraph 43b should read: Connect the ohmmeter leads to TB-7 terminals CD (purple) and CD (yellow). This puts the ohmmeter across Switch D and the operate coil of TD 16 which are in parallel. If Switch D is open, the ohmmeter should read 6 ohms. Wind the clock until the ohmmeter indicates switch operations.

► **OP 956 3d Rev (Mine Mk 25-0):** In figures 3 and 4 the call out in the upper center should read TB-19 Mod 0, not Mod 1.

On page 55 in column 2 the last line of paragraph 52r should state 6 minutes, not 5.

► **OP 1684 2d Rev (Mine Mk 36-1):** On page 24, the following should appear after subparagraph 24e: CAUTION: Excessive tightening of the screws will crush batteries enough to cause internal shorts.

► **OP 1797 2d Rev (Mine Mk 25-1):** On page 55, after paragraph 46d2, the following should be added: Make sure the terminal lug is not grounded to the SE-3's grounding plate.

► **OP 1798 2d Rev (Mine Mk 36-2):** On page 54, after paragraph 48c2, the following should be added: Make sure the terminal lug is not grounded to the SE-3's grounding plate.

► **OP 1807 1st Rev (Mine Mk 49-0):** On page 35, and in Item 16 in the back of the book, the last line of step 3 should read: the spacers toward the top of the firing mechanism.

On page 50 the last line of step 17 at the top of the left

column should read 6 minutes, not 5. This applies also to Item 40 in the back of the book.

On page 70 in step 16 the reference should be to BA-239/U, not BA-249/U.

► **OP 1808 1st Rev (Mine Mk 49-1):** On page 43, under cable connections for Assemblies 02 and 04, paragraph 16 should be followed by: Make sure the terminal lug is not grounded on the SE-3's grounding plate.

► **OP 1811 (Mine Mk 50 Mod 0):** All references to Firing Mechanism Mk 19 Mod 0 should now be to Mod 1, except that table 3 on page 5 should list Mod 0 as the alternate mech.

On page 7 in the center of figure 5 the call-out and connections for R-36 should be crossed out.

► **OP 1878 1st Rev (Drill Mine Mk 10-3):** Instruction Sheet C-6, page 3, step 11d should read: Close the toggle switch and throw the TD OPERATE switch to ON. Adjust the variable resistor until the multimeter reads  $7 \pm 0.1$  volts. Open the toggle switch.

Step 11f on page 4 should read only: Close the toggle switch.

► **OP 2129 (Mine Mk 6-14):** Page 11, step 10, line 2 should read brake, not break.

► **OP 2352 (Firing Mech Mk 19-0):** A note containing the following information should be inserted in the front of this OP: "Firing Mechanism Mk 19 Mod 1 is identical to Mod 0 except that the 2.7-ohm resistor that shunts the SE-3 Mod 3 when the firing mechanism is installed in Mine Mk 50 Mod 0 has been removed to assure reliable operation of the SE.

Firing Mechanism Mk 19 Mod 1 operates and is tested the same as the Mod 0, and all instructions in this OP apply to both mods."

► **OP 2370 (Mine Mk 53-0):** On page 15, under Anchor Preparation, paragraph 7b should read: Remove the two shipping bands from the anchor but do not discard them.

On page 22, under Securing Anchor to Case (starts on page 20) add a paragraph 11ae: Install the shipping bands removed in step 7b under Anchor Preparation.

► **OP 2608 Vol 1 (Mine Mk 52-0 thru 6):** If you have a copy of this preliminary OP the following changes should be made to figure 5-5: 1) Pressure Detector Mk 1 Mod 0's P18 should be renumbered P12. 2) F(SE) of Pressure Detector Mk 1 Mod 0's P12 (formerly P18) should connect to Firing Mechanism Mk 22 Mod 1's J502-P13 terminal 6 instead of 7. 3) B of Depth Compensator Mk 3 Mod 0's P18 (from S3) should terminate at terminal 7 of Firing Mechanism Mk 22 Mod 1's J502-P13 instead of at 6.

Figure 6-5 should also have Pressure Detector Mk 1 Mod 0's P18 renumbered P12. If you're confused, compare figures 5-5 and 6-5 with figures 2-4 and 8-5. Figures 2-4 and 8-5 are right; 5-5 and 6-5 are wrong.

## Depth Charges ABOARD SHIP

Continued from page 13

the physical condition of all installed boosters as prescribed in your OPs. If you find one that's corroded or has been leaking, pay special attention to the safety precautions in cleaning out the central tube of the case. Whatever you do don't install a new booster in a tube that has any explosive stuck to its walls.

### Ready, aim, fire

You may remember that our earlier investigations into the causes of reported duds revealed improper firing-depth setting as the most likely cause. So until you get your new OPs in which the instructions are perhaps a bit more clear than in those you have now, let's review the procedure.

First, remember to use very low pressure steam or hot water to flush off any ice if that's how things are, and also to remove any tape or putty.

Next remember that the setup is slightly different depending on whether you're going to launch from release tracks or from a projector. For tracks, make sure knobbed-type safety forks are on the booster extenders. Also make sure the pistols' plain safety covers are replaced by ones with knobs like those on the knobbed forks, and see that the pistols' safe-setting locks are either freed or removed.

For projectors, make sure you've got the specified saddle (check your OP) and make sure you understand how to install the charge in it to compensate for any eccentric weights. Lanyard-type safety forks (no knobs) are used on the booster-extendors (you jerk them off just before firing, natch) and the pistols' safety covers must be removed by hand just before launching.

These things being taken care of, success depends only on correct setting of the pistols' firing depth. The procedure differs depending on whether the gunner calls for a deep setting or a shallow setting. Here's how:

► **Shallow Settings.** If the pistol is a Mod 0 (see illustration) set the dial directly at the gunner's prescribed depth using a depth-setting wrench. For Mods 1 or 2 first set inner dial at 0 to 300 (use screwdriver), then set the prescribed firing depth on the outer dial. This applies only to settings of 300 feet or less.

► **Deep Settings.** First set the outer dial at 100, then set the prescribed firing depth on the inner dial. This, of course, applies only to Mods 1 and 2. Whatever you do, never leave the inner dial pointing at the sector marked "depth in feet."

### It's a blast

If after all this your charges don't rattle your taffrail we don't know what to tell you to do. Maybe send Rudminde to the Padre. Seriously, though, we hope this run down will help. If not, let us know.

First to respond to our request for sample check-off sheets for component testing or mine assembly (Pub-S-Crawlin' 4-61) was the Lyle Stryker's crew out at Navy 3867, shown here.

In case you don't recognize all the faces, the names are (back row, left to right): Stryker, Davis, Terry, Martin, Spoon, Shoote, Mackey, Arnett, Kibe, Percival, Silker, and Ellis. Front row, left to right, are: Mace (MINPACREP), E. M. Horne, R. F. Smith with "Black Dog," Gilroy, Moulton with pup Nuga, and Miller.

When picture was taken back in April 1961 Gilroy was scheduled to make chief, Moulton and Davis to make MN1, Terry and Arnett to make MN2, Shoote to make MN3, and Stryker to make jg. Not shown but also members of the crew are Chuhay, Studebaker, and Stucker.

And this brings us back to the problem at hand. Are you satisfied with the check-off sheets in use in the corner



where you are? Whether your answer is yes or no we'd like to see some samples or listen to any gripes you may have. . . all with an eye to providing standardized sheets for all mines and mine components, for use by all mine activities.

How about it, chums? Now is your chance to sound off.

# Do You do this Job Right?

**M**ANY MK 14-0, 1 and 2 extenders have been rejected because they failed to extend fully when tested within the air-pressure limit (7.5 psi) specified by OP 1452. Recently however, we've found that complete extension is not necessary for initiation of the explosive train. In short, many rejected extenders would operate satisfactorily in a mine.

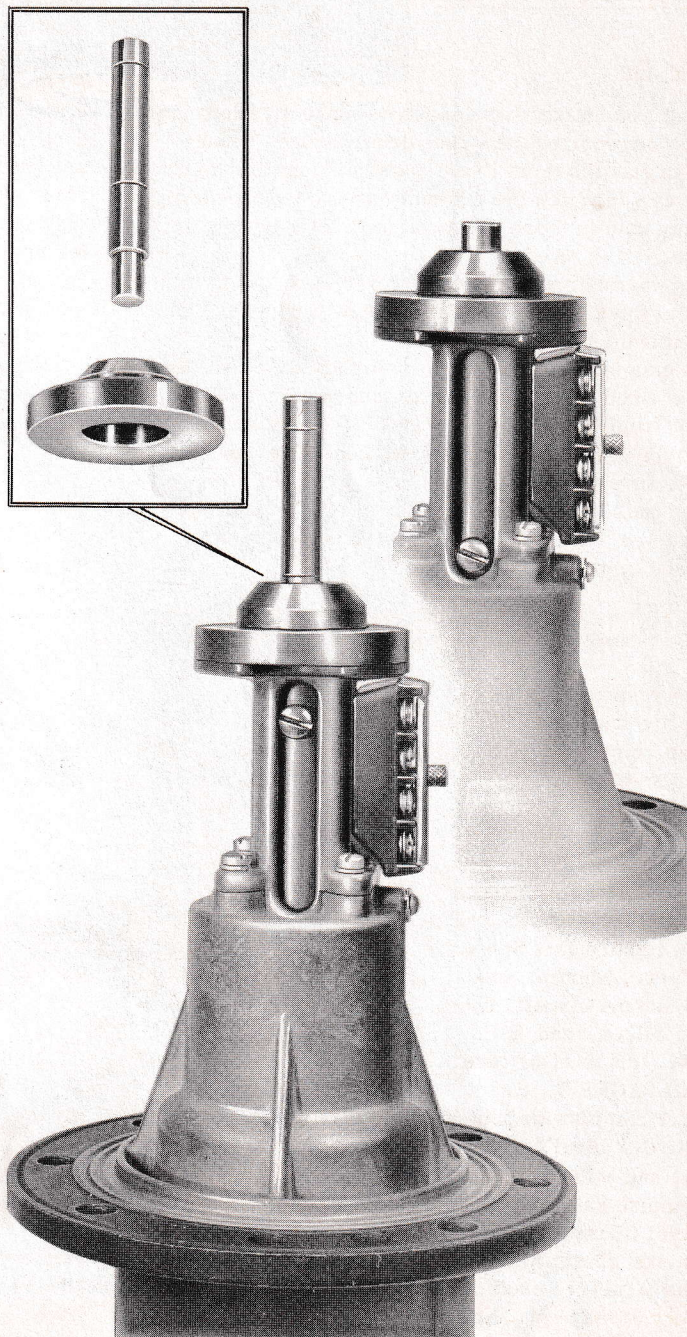
The answer is a piston-travel gage that shows positively whether extenders meet minimum operating requirements. Such a tool is shown here. It has been placed on procurement and has been added to APL 24155 Section I for the Basic Tool Set for Mines.

Called an Extender Testing Tool, it consists of two pieces which it will be necessary to order by separate stock numbers: Cap Z1350-859-0721 (DWG 2231128), and Rod Z1350-859-0722 (DWG 2231129). Here's how to use it:

- ▶ Secure the extender in the test pot.
- ▶ With the extender fully retracted, seat the cap on the extender's flange and insert the rod small-end-down through the hole in the cap, so that it seats in the extender's detonator socket. The annular groove near the top of the rod should now be flush with or slightly below the cap's upper surface.
- ▶ Apply air pressure (5 to 7.5 psi) per OP 1452. If the rod now moves up so you can see its lower annular groove flush with or above the cap's upper surface, the extender has met the minimum extension requirements. If not, reject it.
- ▶ Open the test set's outlet valve slowly. Full retraction as specified above must occur at a pressure-gage reading of no less than 0.75 psi. Otherwise reject.

—And there you are. New basic tool kits will have this gadget added as soon as it becomes available, and its use will be specified by OP 1452. To equip the kits already in your shop order from Hawthorne or Yorktown in about four (4) months.

*The Editor*





*Now for a*  
**RUDMINDE**

**...to tell how I saved this case!**