

mine and depth - charge

THE TROUBLESHOOTER

► Colors, stencils,
& codes

► New rigs for
arming wires

► Plugs for 52/55 tests



311 WBR
32 W
324 A

AN OFFICIAL BUWEPS PUBLICATION

COMINPAC

in this issue . . .

mine and depth charge

THE TROUBLESHOOTER

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

Frederick F. Jewett, CDR., USN...Officer-in-Charge
Haines A. Miller.....Technical Director
Thomas R. Nevitt.....Editor
Roland R. Rollins.....Art Director

REGULAR FEATURES

Rudminde Report to the Fleet	1
Aviation Section	2
Hot Stuff	14
Job Right	17

ARTICLES

Color Coding and Stenciling	4
On the Subject of Grease	16
Plugs for testing Mine Mk 52/55	17

COVER PHOTO: Loading and handling mines aboard submarines has never been the TM's most popular sport. Indicative of its growing importance, though, is the fact that NMEF will soon release a new film on mine loading aboard subs . . . to be followed by loading check lists for sub-laid mines.

1 MARCH 1965

The Troubleshooter, an official BUWEPS publication, contains technical information pertinent to the assembly, testing, and delivery of US naval depth charges and mines. It is both authoritative and directive in nature, and reference may be made to a particular issue as the authority for adoption of ideas promulgated therein.

Troubleshooter is also the official journal of the Rudminde Program a world-wide defect-reporting campaign designed to promote a high level of undersea warfare readiness in US naval depth charges and mines. The Program's basic instrument is NAVWEPS Form 8500/5 (1-63). Everyone who encounters problems with these weapons should report them via this form direct to the Naval Mine Engineering Facility as prescribed by BUWEPSINST 8500.8.

ALLEN M. SHINN
*Rear Admiral U.S. Navy
Chief, Bureau of Naval Weapons*

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THE OFFICIAL JOURNAL OF THE RUDMINDE PROGRAM

RUDMINDE REPORT TO THE FLEET

What's Been Reported?

What's Being Done?

Another change in OP/OD changes!

Back in Issue 3-64 we announced a system for keeping all hands' OPs up-to-date between permanent changes by releasing T-Shooter Bulletins for direct insert, and thereby eliminating any further reliance on write-ins culled from The Troubleshooter magazine.

The idea was good but had its limitations. The publications supply system, centered at NSD/Philadelphia, is largely an automated operation, and there was no satisfactory way to make the Cog-I machinery spit out the right Bulletins in company with each mine and depth-charge OP for which NAVSTRIPS were received.

Write-ins are still out

Every advantage of a write-in change is offset by at least three disadvantages. Best by far, still, is the permanent OP change consisting of corrected pages to insert in place of the old. Such permanent changes are Cog-I items of supply and thus enjoy several much-to-be-desired advantages: 1) automated inventory control and replenishment; 2) automatic world-wide availability via NAVSTRIP; 3) automated listings in Navy-wide publications supply catalogs; 4) automatic stock reservations for mobilization; 5) self-identification in the OP; 6) fast, error-free incorporation; and 7) — newest of all — automatic supply in company with copies of the OP they affect whether or not the OP requestor asks for them or is even aware of their existence. This is the only kind of permanent change which NMEF will henceforth produce.

Such permanent changes, however, are plagued by one disadvantage; they can seldom be processed fast enough to answer truly urgent requirements. What is needed is an interim document that can, like the Troubleshooter Bulletins, be processed fast and inserted bodily in the affected OP, and yet can also enjoy at least some of the above-listed advantages of a permanent change.

Interims are IN

Strangely, there has never been a provision for replacement of one change (an interim) by another (a permanent change) without creating problems in the Cog-I system's automated machinery. But now there is. To get it we've had to resort to an oddball system of numbering, but at least it will work.

Let's say, for example, you receive a Change 21 to OP 2567. Since the only change you now have for OP 2567 is Change 1 you may well ask, how come?

Like all future permanent changes, your permanent Change 1 was identified by a one-digit change number (e.g., 1, 2, 3, 4, 5, etc.). So now, when you hear of a change identified by a two-digit number (e.g., 21, 22, 23, 24, etc.) you will know, even without seeing it, that it is an interim change. The first digit tells you what number the next permanent change will be (in the case of OP 2567, it will be Change 2). The second digit tells

you whether it is the first, second, third, etc. such interim (Change 21 is the first interim released pending release of a permanent Change 2). In this way nine interims can be released pending a permanent. Nine permanents can be released pending a revision (Navy word for new edition).

Each permanent change will incorporate and thus wipe out all earlier interims. Each revision will wipe out all earlier changes of either kind.

Because these two-digit changes have been made compatible with the Cog-I computer systems, each will have a stock number, will be listed automatically in NAVSANDA Pub 2002 (Navy Pubs Index), will be available world-wide via NAVSTRIP, will be supplied automatically in response to all requisitions for the OPs to which they pertain, and will be removed from the system upon introduction of the next permanent change into the system. This system, of course, applies only to pubs on depth charges and mines.

How to enter changes in your books

In recent months there has been much in our mail about whether change transmittal sheets should be destroyed, or placed in the front of the pub. The answer is that for both interim and permanent changes, all hands should follow the instructions printed right on the forms.

The interim changes, which are being printed on yellow paper, should be inserted right in the OP or OD they affect, facing the list of effective pages, and left there until the next permanent change to the book tells you to remove and destroy them. But not so with the permanent changes.

Remember, permanent changes will almost never contain any write-in information, so you won't need the transmittals to tell you what should have been written in. Neither will you need them to tell you which pages were changed, because every changed page will be clearly identified top and bottom, and the new title page has an updated list of inserted changes on the front right under the OP number, and an up-dated list of effective pages on the back which — for every page in the book — tells you exactly which should be an original, which blank, which are Change 1, 2, or 3, etc. Therefore the change transmittals for permanent changes will no longer serve any useful purpose in the OPs and ODs, so should be destroyed when the new pages they transmit have been placed in your books.

Bulletins too

This does not mean an end to the T-Shooter Bulletins. They will no longer serve as interim changes, so should no longer be inserted in OPs or ODs. But they will continue to be used as a fast means of releasing technical information that does not constitute a pub change.

We hope this new system of Bulletins and interim and permanent changes will be a real help.



Aviation Section

Devoted to items of interest to Aviation Ordnancemen

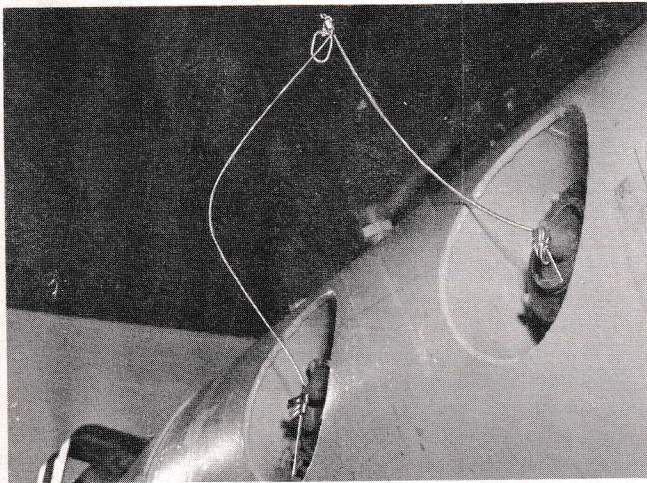
New arming-wire rigs

With the advent of mine planting by high-performance aircraft, and of carrier-based mining operations, the carriage of mines in bomb bays is fading and external carriage is becoming the general rule. One result: it has already become necessary to rig arming wires in ways neither MNs nor AOs are likely to have seen before . . . to alleviate two major problems:

- ▶ The loops of standard mine arming wires sometimes pull out of the planes' solenoids during high-speed and even medium-speed flight. This results in dud mines.
- ▶ Flailing arming wires, even when they do not pull out of the solenoids, inflict more damage to the planes' structure and skin than maintenance officers feel can be tolerated. (Parachute static lines or lanyards, used on older mine flight gear, are even worse . . . which is why some aircraft are restricted from carrying mines of that type.)

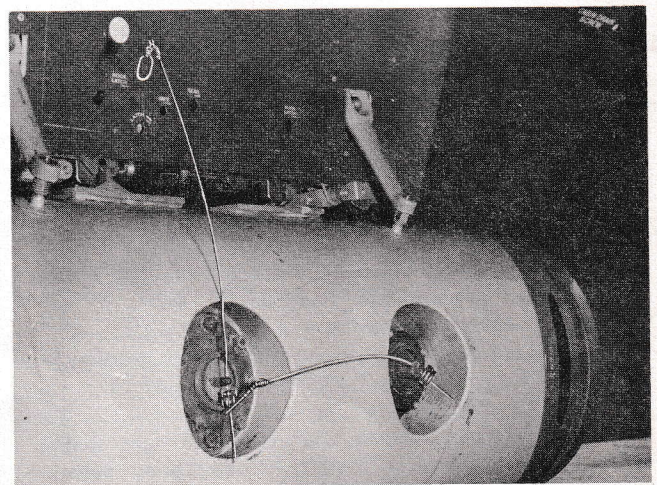
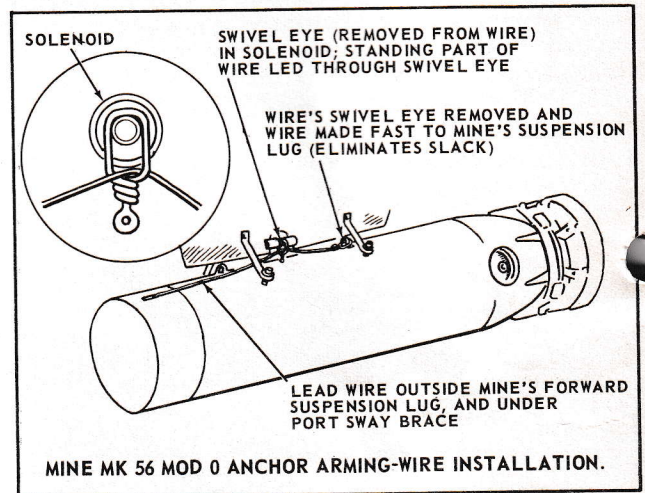
The two mines shown below, one a Mark 36 and the other a Mark 25, are actual examples of the first complaint! Both were ready to drop as duds from the wing racks of a P3A airplane after only one hour's flight in which the speed did not exceed 320 KIAS, and turns did not exceed 30° bank.

The same thing happened to the arming wires of a Mk 36 mine carried in a bomb-bay rack. In fact the failure, observed through the deck glass, occurred before the bomb doors had reached full open position!



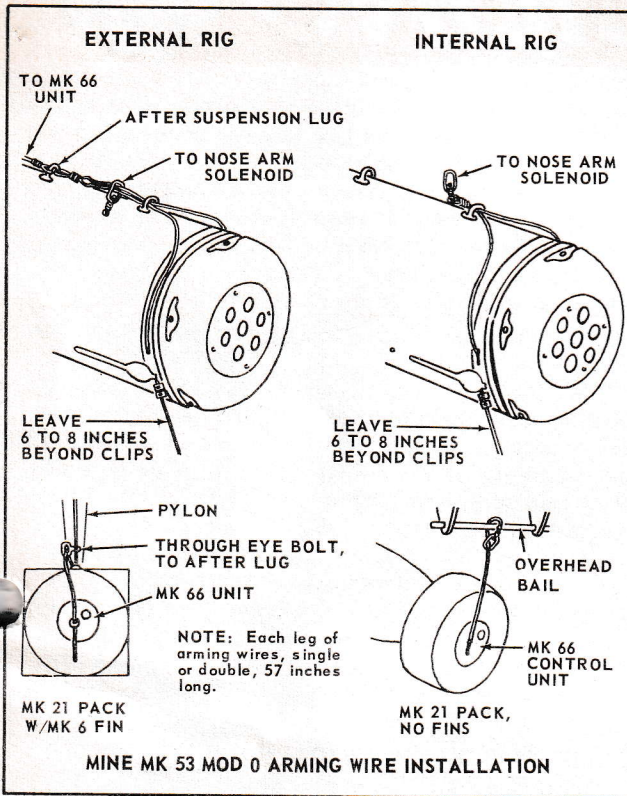
Double arming wire on Mine Mk 25 pulled out of solenoid during hour's flight aboard P3A at 320 KIAS.

Ways and means have had to be found, then, to control the amount of flailing and whipping while the mines are in flight. But that's not all. The wires must still pull out of the mines' arming devices when the mines are dropped for a plant . . . and the ability to jettison safe still requires ability to drop the arming wires with the mines without their being withdrawn from the mines' arming devices. And now, in addition, the lashup must be such that externally-carried mines will take the arming wires with them when dropped for normal mine-field plants.



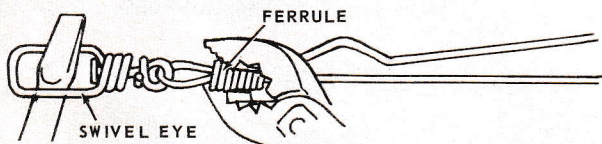
Single arming wires on Mine Mk 36 pulled free from solenoid.

Now, using techniques that are already appearing in applicable check lists for loading mines on high-performance planes, it is possible to meet all these requirements using the present vintage arming wires that are delivered with the mines to the plane-loading squadron personnel. Two typical solutions — for the double arming wires for the anchors of Mines Mk 53, and for the single wires for the anchors of Mines Mk 56 — are shown here.



Preparing the arming wires

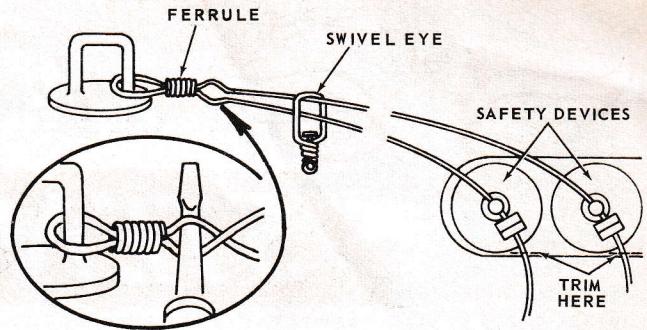
For the P3A, as well as several other airplanes, it's easiest to make up these rigs on the mine — before latching the mine in the bomb rack. Where a double arming wire is required, the following method is typical:



Put screwdriver through loop eye and grab ferrule with pliers.

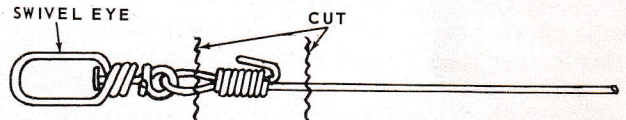


Pull ferrule in direction of wire ends and slide off. Slip arming wire out of swivel eye.

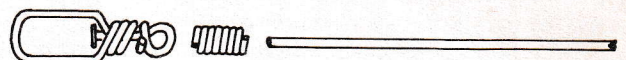


Loop wire on suspension lug and slide ferrule up snug, then put screwdriver shank between wires' legs and against ferrule and bend as shown to hold ferrule in place. Pass standing parts of wire through swivel eye and install in mine's safety devices; Remove slack and trim excess wire after mine is secured in the bomb rack, with the swivel eye in the plane's solenoid.

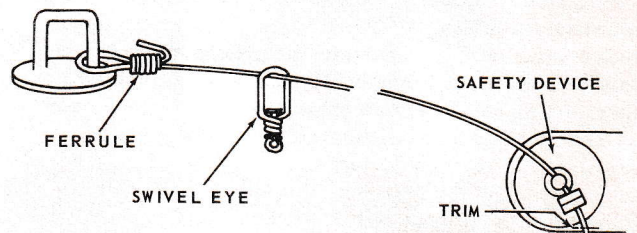
Where a single wire is required, the following is typical:



Straighten bent wire of short leg and cut wire in two places as shown.



Pull apart and discard bent section of wire.



Loop end of wire around suspension lug. Slide ferrule against loop and bend back short leg by hand (do not use pliers), then trim wire as shown, and install standing part of wire in mine's safety device. Remove slack and trim standing part after mine is secured in bomb rack, with the swivel eye in the plane's solenoid.

WARNING From the above you have some advance knowledge of methods that will soon appear in appropriate loading check lists (NAVWEPS OP 3232), and you know why these procedures have been adopted. You should not, however, take this as license to adopt these methods, or methods of your own, when loading mines on high-performance planes. Install arming wires for any given type of plane only as directed in the published OP 3232 supplement (check list) pertinent to that plane.



SEE ALSO T/S 3-62
PAGE 7 COLOR CODING
ON MINES/DC

color coding and

STENCILING



IN the last year, no subject has brought in more Rudmindes, letters, etc. than the subject of stenciling and color coding for mines. It all goes back, apparently, to a feature on color coding we published in Issue 3-62, which we had hoped would settle a lot of arguments. Instead, the effect was to inspire a whole new generation of conflicts. Everyone, apparently, wanted to get into the act.

So here we go again. Only now things look considerably more settled. First there's a STANAG (NATO) Instruction on color codes which has lately been quite universally adopted by the participating countries, whereas it was only in draft form in 1963. Implementing it, for U.S. Armed Forces, is MIL-STD 709 with Change 1, entitled Military Standard Ammunition Color Coding.

In recent Bureau and inter-activity conferences we have secured broad agreement on interpretation of color coding, whereby we feel that the doctrine in this article is 100% conformant to the intent and latest specific requirements of MIL-STD 709. With this article in your hands, then, you have the most definitive information available: moreso than BUWEPSINST 8020.4, Ammunition Color Coding, because it is general (all ammo) whereas this article is tailored in detail to depth charges and mines, yet on no point in conflict; NAVORD OSTD 52 Rev 20, Painting of Ordnance Equipment, wherever its failure to reflect latest MIL SPECS reveals conflict because it has not been kept up to date; OP 2238, Identification of Ammunition because it is not up-to-date now but will, in its next (1st) revision, reflect not only MIL-STD 709 but also this article as far as mines and depth charges are concerned; and BUWEPS letter RUME-222-BHT of 30 March 1962, which initiated Change 1 to OP 2238, but which is nevertheless no longer current, nor consonant with forthcoming revisions to MIL-STD 709.

But, you ask, why can't there be just one document? That's exactly what we're working for: a single easily-kept-up NAVWEPS OD on stenciling and color coding as they apply to depth charges and mines which will be the Navy's one and only authority on that subject . . . even to the extent of standing as the standard reference for the design documents and drawings. We think there's a good chance of our having a copy in the hands of every mining activity within the next year. Meantime, for activities

concerned with these weapons, this Troubleshooter article should be used as the definitive guide at all levels from depot to advanced base.

Paint 'em now?

Before you make a mad dash for the paint locker let us point out that BUWEPS and NMEF are well aware that there simply isn't enough money floating around loose to cover the cost of repainting every last depth charge and mine to conform to the requirements laid down here. The times to repaint, then, are only when these weapons are subjected to alteration (ordalting), overhaul, or repair, or — as in the case of boosters, detonators, and similar explosive devices — when they are removed from their containers for inspection, testing, or maintenance. So do not — repeat, not — start a painting campaign merely to update the color-coding on your gear.

Neither should any activity use color coding as a criterion for stowage compatibility or shipping-hazard classification. OP 5 Vol 1 Rev 2, Ammunition Ashore: Handling, Stowing, and Shipping; and OP 1631 Rev 2, Ammunition Hazard Classifications, Dimensions, and Weights, are your hard-core guides in these areas.

The language of colors

The meaning of the colors is set down in MIL-STD 709 with firm interpretations as they affect underwater weapons. Those we list here are not the only colors defined, but they are the only ones we use on depth charges or mines:

- ▶ **YELLOW** — Danger, high explosive: whether used as round spots, bands, or overall color, on mines, boosters, detonators, etc.
- ▶ **ORANGE** — Recoverable, non-combat: identifies inert-loaded drill and test mines. A fluorescent red-orange with no coding significance is also used to enhance visibility above water, as on drill floats.
- ▶ **BLUE** — Practice or dummy: used as the background color on non-recoverable weapons and devices containing no load, for training.
- ▶ **LIGHT GREEN** — Smoke: used to code drill mines and their signals.
- ▶ **GRAY**: no coding significance on underwater ordnance as a background color, as when used as the case color for depth charges.

BLACK: no coding significance when used for stenciling (inert-loaded cases) or as the background color on moored mines.

▶ **WHITE:** no coding significance when used for stenciling (all explosive-loaded cases) or as background color on striped inert-loaded mine cases for drill and tests. When used on signals white signifies pyrotechnics.

Pilgrim's Progress

Once we were sure that the man who first mouthed the bit about "... if you can't pick it up, paint it" had been handling mines. Now we know better. If it had been mines the saying would go "paint it and stencil it". And to this, the response would be absolutely predictable: "who, what with, when, and where?"

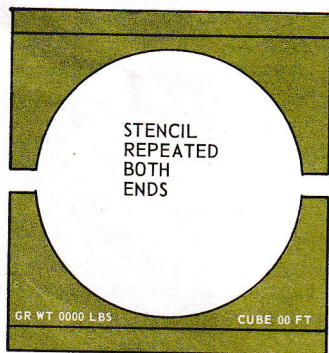
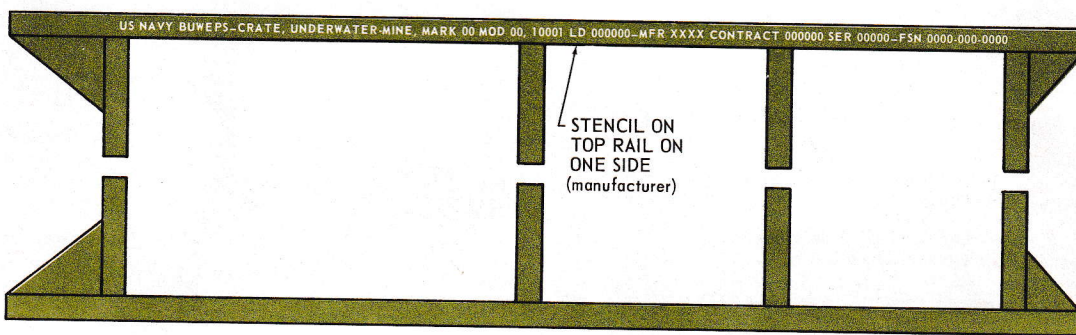
At least the "who" part is easy. Mine and depth-charge cases are stenciled and/or painted first by the manufacturer, then by the loading plant, again by the basic

assembly shop, and then at advanced bases. That much is firm. Now let's consider the locations for stenciled-on information . . . the "where". This is now firm too.

Where to stencil

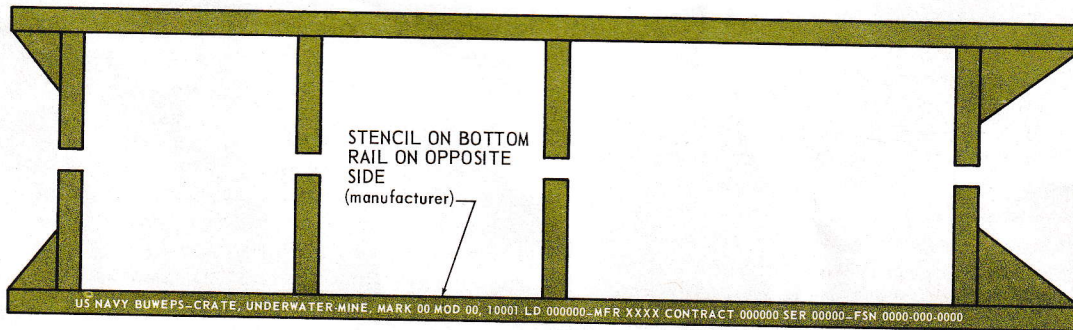
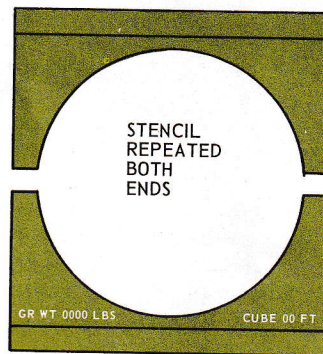
No matter what the stage in the progression from empty case to assembled weapon, no matter what shape, mark, or mod, all of the standard stenciling that needs to be done can and should be confined to a single area no greater than 6 by 14 inches. No more will be needed if the instructions in this article are followed, and stencils are cut on a standard cutter that makes 1/2-inch-high letters.

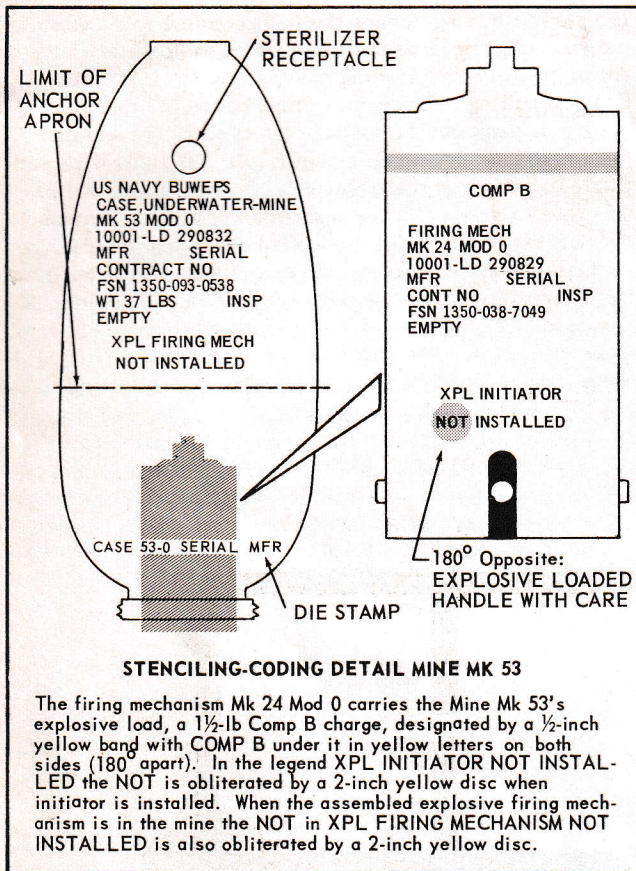
The accompanying illustrations show the proper location for each weapon (locations on inert cases are the same as for xpl-loaded). On surface- and air-laid cylindrical mines the stenciling area is centered on and forward of the component-well openings in the mine's side. Exceptions are the Mk 36 case, where the stencil



CRATE STENCILING

Background color olive drab. Stenciling in white includes information applied to crates by manufacturer and loading activity.





area is between the wells, and the Mk 39 case where it is aft of the wells.

Stenciling on the spherical Mk 6 mines will be on the upper hemisphere of the case, located where it will not be obscured when and if a D-4 float is installed.

The Mk 18 case stencil area is centered between the lifting eyes on the side nearest the filling hole and firing mechanism wells, with the top of the stencil about 2 inches below the top rim.

The assembly of the Mk 53 mine is really in two parts, mine and anchor. The mine-case stencil area is centered on and immediately below one of the sterilizer receptacles. The anchor stencil area is as near the open end as practical, and centered on an anchor paddle.

So now we know where to stencil. As we said before, all standard stenciling (excluding special local requirements such as identification of mines for a test) can be confined to the areas specified here, thus eliminating the present situation where some mines we've seen have so much stenciling they look like cylindrical books. As we proceed, we'll tell you specifically what to stencil in or paint out at each stage.

At the factory

Manufacturers make empty cases, not depth charges or mines, which is why at least some of the painting and stenciling they do is temporary — subject to change when

the empty case is later converted to a loaded one, or to an assembled weapon.

Case colors. First, of course, comes the background color. For bottom mines (Mks 18, 25, 27, 36, 39, 49, 50, 52, and 55) the case background color applied by the manufacturer is olive drab. For moored mines (Mks 6, 10, 53, and 56) the case color is black and the paint is an anti-fouling type. Exceptions are the fiberglass Mk 57 which is a moored mine but is painted dull brick red, and the Mk 41 which is painted blue.

Anchors for all moored mines are painted black. The olive drab, black, and brick red have no coding significance. The blue designates the Mk 41 as a practice mine, and is the only "code" color applied by the manufacturer. Die stamping. The case manufacturer's die stamping goes on the tail flanges of cylindrical mines and on the instrument-well flanges of others (the Mks 6, 18, and 51). All new cases will be die stamped but many now in the system were not, which is one reason we still need so much stenciling. Navy manufacturing installations use P/O (project-order) numbers in place of contract numbers, but other than that the manufacturer's die-stamped information is as follows:

MK [] MOD [] SERIAL [] MFR []
CONT. NO. [] LD []

Case stenciling. The manufacturer's case stenciling will be as shown below. Note that the FSN at this stage is the stock number for an empty case. The color for all manufacturer's stenciling, on all cases, is white:

US NAVY BUWEPS
CASE, UNDERWATER-MINE,
MARK 00 MOD 00
10001-LD 000000
MFR (Name or symbol)
CONTRACT NO. 000000
SERIAL NO. 0000
FSN 0000-000-0000
EMPTY



Inspector's Stamp

Crates. Crates for all mines will be painted olive drab. The only stenciling applied by the manufacturer will be that on the crate's upper rail on one side of the mine, and on the lower rail on the other side. Stenciled in one line, in white ½-inch letters, it will read: US NAVY BUWEPS — CRATE, UNDERWATER-MINE, MARK 00 MOD 00, 10001 LD 000000 — MFR XXXX CONTRACT 000000 SER 00000 — FSN 0000-000-0000. On gussets, fore and aft, is added the gross weight and cube (with an empty case) as illustrated, also in white.

At the loading plant

Occasionally a few empty cases will be issued empty, exactly as received from the manufacturer, to make cutaways, displays, training aids, etc. Usually though, they will be explosive loaded for service use, or inert loaded for drill or test use, before issue.

Case colors. Loading plants need make no change in the

MINE MK _____	MOD _____
SERIAL NO. _____	
MFR _____	CONT NO. _____
CASE INSP B/L	<input type="checkbox"/> OK
CASE LEAK TEST	<input type="checkbox"/> OK
CASE GAGED B/L	<input type="checkbox"/> OK
CASE HOT MELTED	<input type="checkbox"/> OK
INSP BEFORE CLOSING	<input type="checkbox"/> OK
FILLING HOLE CLOSED	<input type="checkbox"/> OK
INSP & GAGED A/L	<input type="checkbox"/> OK
LOADING DEPOT SYM	<input type="checkbox"/>
MO & YR OF LOADING	<input type="checkbox"/>
LOADING ORDER	<input type="checkbox"/>

INSPECTION TAG

The blanks on this tag, 2-7/8" x 5-3/4" (BUORD DWG 1406800, attached to the mine or depth charge case) are accomplished by loading activity personnel as work progresses. It remains on the case until after loading when the tag has served its purpose and can be removed.

For cylindrical cases striping will begin with an 8-in orange band at the nose followed by the orange striping. For the Mines Mark 27 Mods 2 and 3 the striping includes the 72-inch inert-loaded explosive section, and for Mods 4 and 5 the entire 125-inch inert-loaded war-battery section. All other surfaces will be olive drab. (Nose sections of Exercise Vehicles Mk 1 Mods 1 and 2 are reuseable for service shots, in which case they would first have to be repainted back to olive drab.)

Inert-loaded Mk 6 cases (spherical) will be white with two 4-inch orange bands on the upper hemisphere. The bottom edge of the lower band will coincide with the welded joint of the two hemispheres and the upper band will be placed 4 inches above the lower band. Anchors for moored drill or test mines will remain black.

Inert-loaded Mark 18 and Mark 51 cases (tub-shaped) will be white with two 4-inch-wide orange bands spaced 4 inches apart painted horizontally around the sides of the case with the top band starting four inches below the case's upper edge.

Inspection tag. Much information which at one time or another has been stenciled on the mine cases by the loading activity should henceforth be confined to an inspection tag attached during the loading process, to be removed when the process is complete. Such a tag is illustrated with this article.

Die stamping. Before closing the loading cavity, the loading activity will die-stamp the filling-hole cover, in 1/4-inch letters, as follows:

TYPE FILLER **DEPOT SYMBOL** **MO/YR LOADED**

overall case color applied by the manufacturer when they fill the cases with explosive for service use. They need merely touch up the paint as maintenance for preservation may require.

But when a case is to be inert loaded a new paint job is needed to make the mines more easily visible to divers, underwater. For these mines the loading activity will change the background color to white, with 4-inch orange stripes (recoverable, non-combat) spaced 4 inches apart as illustrated in this article. These colors will be used for both bottom and moored mines. There is no requirement that the white or the orange be antifouling since drill and test mines do not stay down long enough to need it.

If a plastic fairing covers the filling-hole cover, this information should be die-stamped on the case near the filling hole, before loading the case.

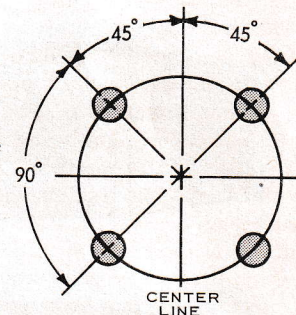
Case stenciling. On service-mine cases the loading plant will paint out the manufacturer's symbol and contract number, the serial number, the FSN, and the word EMPTY, adding in their places the type of filler and its weight, the project-order number, the activity's symbol, the correct FSN for the xpl-loaded case, and the date. On inert cases, of course, the stenciling will all have to be newly painted because of the change in case color. In any case, however, the stenciling after loading — in white on explosive-loaded cases or in black on inert-loaded cases (still confined to the prescribed stencil area) — will now read like this:

US NAVY BUWEPS
CASE, UNDERWATER-MINE,
MARK 00 MOD 00
10001-LD 000000
XXX-O-FILLER WT 0000 LBS
GROSS WT 0000 LBS
P/O 0-0000 XXX/X MO/YR
FSN 0000-000-0000

Also in white 1/2-inch letters, the loading plant will stencil close as possible to the appropriate well opening the legend DETONATOR NOT INSTALLED. On inert-loaded cases this legend should be in black and should read: XPL INITIATORS NOT INSTALLED.

Case color coding. Striped cases for drill or test require no further color coding. On explosive-loaded cases, 180° opposite the "detonator" legend specified above, stencil a 2-inch diameter yellow dot, then in 1/2-inch yellow letters the legend EXPLOSIVE LOADED — HANDLE WITH CARE, followed by a second 2-inch yellow dot. (On Mark 10, 27, and 49 cases, put this warning 45° from the extender well rather than opposite it, so it can be seen when the case is in its crate.)

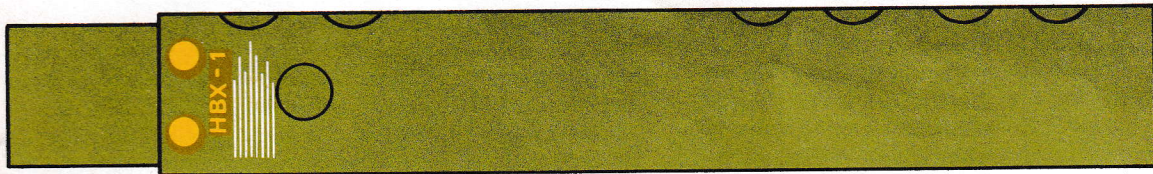
To further code the explosive-loaded case, paint four yellow discs as near the noses of cylindrical cases as possible, still staying on the largest circumference of the case. They should be visible through the crate, 3 inches in diameter, 90° apart, and fall 45° on either side of the case's vertical centerline.



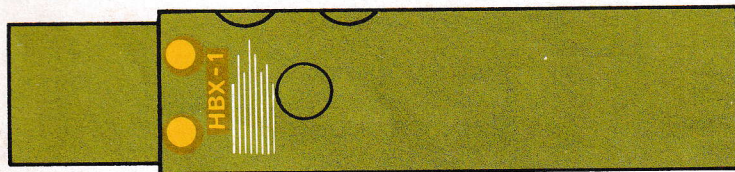
The spots on explosive-loaded Mk 6 cases should be equally spaced on the upper hemisphere, located so they span the stenciling area and also the D-4 float when and if installed.

On the tub-shaped mines the discs go on the sides of the cases. For the Mk 18 case they are placed just below the lifting eyes. On the Mk 51 no reference point for locating the yellow spots is required except that they

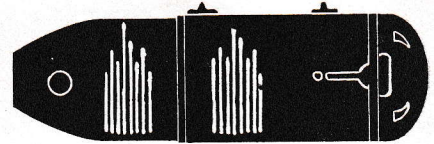
COLORS FOR SERVICE DEPTH CHARGES AND MINES



MINE MARK 27 MODS 4 AND 5



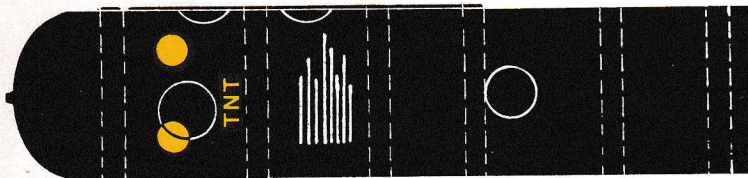
MINE MARK 27 MODS 2 AND 3



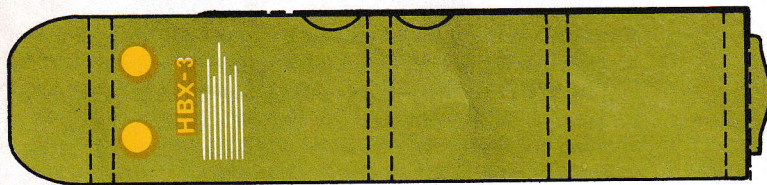
MINE MARK 53 AND ANCHOR



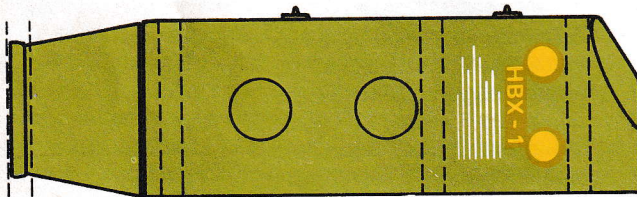
FIRING MECH 24-0



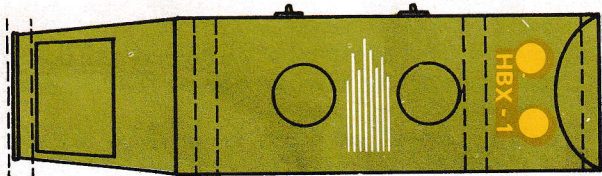
MINE MARK 10



MINE MARK 49



MINE MARK 25



MINE MARK 36

should span the stenciling area with their top edges 3 inches below the top edge of the case.

On all cases the coding initials for the type of explosive filler, such as HBX-1, is stenciled in yellow between the yellow spots and ahead of (or above) the case stenciling block, in letters up to 3-inches as shown. On Mine Case Mark 18 this explosive-filler code is repeated on top of the case between the mechanism well and filling-hole covers, as shown.

Crates

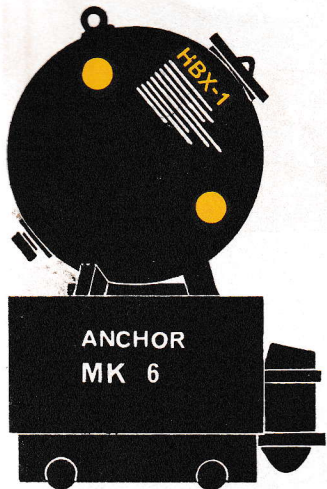
To prepare the crates for use with mine cases the loading plant will change the gross weight stenciled on the crate gussets fore and aft to reflect the weight added by the filler (see illustration). This is stenciled in white. Except for correcting the gross weight, the loading plant makes no changes to the manufacturer's stenciling on the crates.

When the case becomes a mine

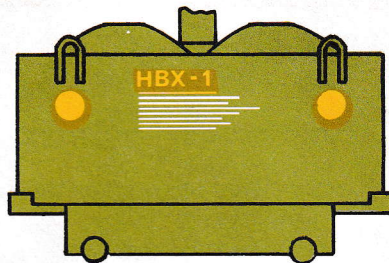
When does a mine case become a mine? At a basic assembly activity it happens when the major mine components are installed in the case, even though some may be left out, as in a typical "assembly-for-shipment" operation, where FCC or similar regulations must be complied with.

At an advanced base it happens when sufficient mine components are installed to cause the resultant assembly to be listed in records and plans as a mine in one of the readiness/assembly conditions defined in OPNAVINST 08550.12. In any event the treatment at the advance base or final prep activity is not the same as at the basic assembly activity, so we will discuss them separately, the former first.

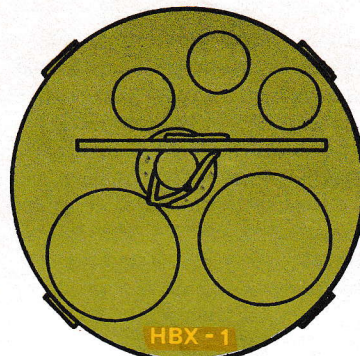
--- = LOCATIONS OF CRATE CROSS-MEMBERS



MINE MARK 6

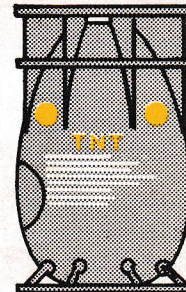


SIDE



MINE MARK 18

TOP



DEPTH-CHARGE CASE

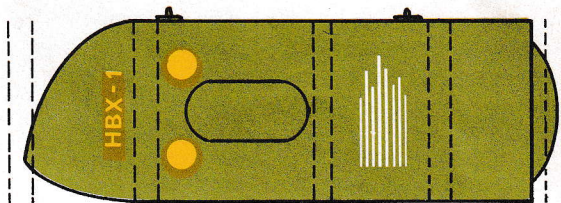
At the basic-assembly activity

The "basic" activity will paint cases only for maintenance and preservation, and then merely to restore the colors, coding, etc. already applied as specified earlier in this article. Naturally all stenciling information should be noted on paper before painting it out so you'll remember what to stencil back on!

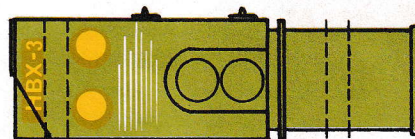
Case stenciling. Usually painting at the basic assembly activity will consist of changing the loading plant's stenciling to reflect the change from case to mine when firing components are installed. This includes stenciling in a new FSN in place of the old, adding mine mark, mod, and OA in place of mine case mark and mod, putting the assembly activity's code and assembly date in place of the loading plant's project-order number, and changing gross weight to reflect the installation of the internal mine components. With these changes the case stenciling will look like this, still confined to the same area that the manufacturer used at the outset, and still using white stencil paint for service mines or black for inert loads:

US NAVY BUWEPS
 MINE, UNDERWATER,
 MARK 00 MOD 00 OA 00
 XXX-O-FILLER WT 0000 LBS
 GROSS WT 0000 LBS
 MFO 000 XX 00 XXX/X MO/YR
 FSN 0000-000-0000

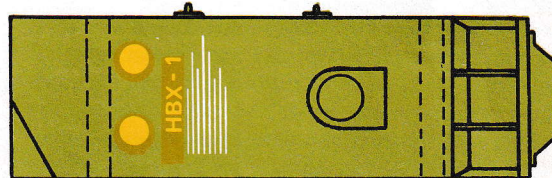
FSMT and drill identification. Special stenciling requirements to identify specific FSMT or test operations are spelled out in the FSMT Guide and in



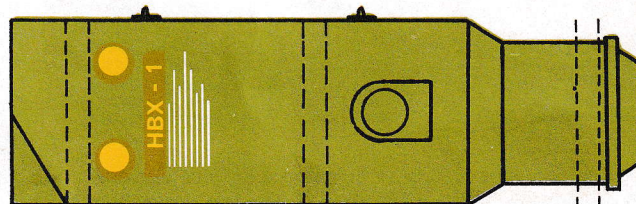
MINE MARK 39



MINE MARK 50



MINE MARK 52



MINE MARK 55

the operational orders for the various exercises. Such stenciling is somewhat of a local command prerogative and as such is over and above the context of this article. Crates. Change the gross weight on the crate's gussets (nose and tail) to reflect the new gross weight stenciled on the mine. Color: white.

At final prep and advanced bases

Whether you receive partially-assembled mines for final prep at a stateside coastal activity, or loaded cases for assembly at an advanced base, the procedures to follow are essentially the same. If it's an inert mine you change no paint, coding, or stenciling until you're ready to install a detonator, initiator, or explosive fittings. But if it's a service mine, at some locations you'll be getting your brush to work at once.

Local commands may require that service mines and service-mine cases at advance bases, or ready-to-plant mines elsewhere, have all stenciling painted out. This may be done early or late, but the fact is that stenciled identification is generally disallowed on mines planted in wartime and that's what these explosive loads are for. So the earlier it's painted out, where so required, the better. Just two don'ts: Do not paint out the yellow coding discs at any time, and do not paint out the stenciling until you've copied the information for your records.

Putting it on tape

Where some temporary identification is needed to take the place of stenciling, one trick is to use masking tape. To equip yourself, if and when necessary, a good stock number is 7510-290-2025. That will get you a package of 12 rolls, 1½-inch wide. To write on the tape use magic markers. A package containing a dozen of these can be had by ordering Marker, felt-tip, black, 7520-973-1059.

Actually, only a minimum of information will be necessary at this stage. Here is the scheme for the information that can go on two lengths of masking tape, in freehand lettering of course, to be stuck on the mine in a location that will be visible when stored in a magazine.

MINE MK XX MOD X OA XX ACTIVITY MINE NO X

TYPE FILLER XXX CONTRACT NO XXXX

In those rare instances where you'll be identifying a case rather than a mine, your tape should of course read "mine case" and the OA will be left blank. For mines, a

MINE, DEPTH-CHARGE FILLERS

The abbreviations or code used in identifying fillers in stencils are:

Explosive Loaded

HBX-1 type explosive . . HBX-1
 HBX-3 type explosive . . HBX-3
 Trinitrotoluene TNT

Inert Loaded

Inert plaster INERT-PL
 Inert concrete INERT-C

third piece of tape located near the extender well should bear the legend:

DETONATOR NOT INSTALLED

Upon installation of the detonator the word NOT is merely crossed out, as:

DETONATOR ~~NOT~~ INSTALLED

In addition to the above, any additional operational data required by the area commander should also go on tape. The positioning of the tapes on the mines is up to the mines officer, remembering that mine-field numbers — which should be on tape on each side of the mines near the nose — should be put on as soon as they become known.

Delivery to the laying agent

Service mines. Disposal of "stenciled" information, as required for service mines being delivered to the flight line or loading pier, is simple: you merely strip off the masking tape. In fact, this can be delayed until the mines are actually turned over to the squadron or submarine personnel. If it is not — if you strip before delivery — be sure to leave the tapes with the mine-field numbers on the mines because these alone give the AOs and TMs their vital clues to the required order of loading aboard.

Final prep for drill & test mines. With these mines the problem is not to get rid of information that could aid the enemy, but to retain information that can warn or inform divers, recovery crews, fishermen, or anyone else who may later come in contact with them. So on inert mines mine-field numbers go on masking tape near the mine's nose just as on service mines. But other info remains stenciled. When the detonator or other explosive device is installed, you merely paint a 2-inch yellow disc over the word NOT in the legend at the appropriate well, like this:

XPL INITIATORS ~~NOT~~ INSTALLED

yellow →

THE PAINTS TO USE

BACKGROUND COLORS:

Lusterless enamels are to be used on mine and depth-charge cases and crates. Specs for listed colors are TT-E-515, TT-E-516, and MIL-E-10687, except for black which is MIL-P-16189. Do not use luster (gloss) enamel except for Mine Mk 57, for which see explanation in article.

SHADE	COLOR NO. ¹	QUANTITY	FSN
Olive Drab	34087	1 gal	8010-297-2116
		5 gal	8010-297-2113
Gray (blue)	36231	1 gal	8010-297-2120
		5 gal	8010-297-2117
Blue	35109	1 gal	8010-297-2119
White	37875	1 gal	8010-297-2111
Orange ²	32246	1 gal	8010-845-4237
Green (light)	34558	1 gal	8010-828-3193
Yellow	33538	1 gal	8010-297-2112
Black ³	37038	5 gal	8010-290-4247
Brick Red ⁴			

STENCILING (coding) COLORS:

Paint for stenciling is per FED-SPEC-TT-P-98, Type I. Type I identifies a brush-on stencil paint. Type II is a paste-type. FSN numbers are for 1-gal containers.

SHADE	COLOR NO.	FSN
White	-----	8010-285-4933
Black	37038	8010-297-2101
Yellow	33538	8010-285-4936

NOTICE: In all painting, do not paint guide studs, countersinks, counterbores, electrical contact or insulating surfaces, joint or sealing surfaces such as O-ring grooves, or plated surfaces.

TOUCH-UP (pressurized spray can) COLORS:

For repair jobs on surfaces and stenciling use of spray-can paints are authorized as long as colors approximate those per FED STD 595. Avoid lacquers - they blister and flake when applied over enamels. Several enamels meeting requirements are:

SHADE	COLOR NO.	FSN
White (16 oz)	37875	8010-878-5761
Black (26 oz)	37038	8010-067-7984
Olive Drab (16 oz)	34087	8010-848-9272
Yellow (16 oz)	23538	8010-851-5525

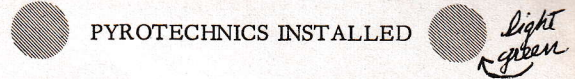
¹ Per Federal Standard 595.

² For orange used on floats, see page 13.

³ Antifouling black used over a pretreatment wash primer, formula No. 117, MIL-P-15328 (1 qt resin, 1/2 pt acid, 8010-850-7076, and 4 gal resin, 1 gal acid, 8010-165-8577). Follow by vinyl-red primer, formula No. 119, MIL-P-15929 (5 gal, 8010-722-7119) or vinyl-zinc-chromate primer, formula No. 120, MIL-P-15930 (1 qt, 8010-584-2953, and 5 gal, 8010-753-4714).

⁴ For Mark 57 fiberglass case, but not available in supply system: use Copperpac Antifouling Paint No. 9134, Type 1, manufactured by Dolphin Paint and Varnish Co., Toledo, Ohio. For pretreatment use wash primer, formula No. 117, MIL-P-15328, and primer, formula No. 120, MIL-P-15930 (stock numbers in footnote 3 above).

For drill mines, when you install an assembled drill float, you should add another legend right under or over the one for the xpl initiators, in light green, preceded and followed by 2-inch green discs, as follows:



An oddball

Mine Mk 53, as we explained earlier (also see illustration) defies several of the rules because it is handled, transported, etc. in three sections - case, anchor, and firing mechanism - of which only the last contains any explosive. And since the firing mechanism is not installed until just before actual planting, no coding is required at any time on the case. Instead the legend EXPLOSIVE MECHANISM NOT INSTALLED is stenciled in white as shown, and the NOT is painted over by a yellow disc when final prep for planting is complete.

What about depth charges

The steps in painting, stenciling, and color coding of depth charges parallel those for mines. Service depth charges are painted ocean gray and the successive stenciling includes the same information as for mine cases, with appropriate changes in nomenclature such as CASE, DEPTH-CHARGE, instead of CASE, UNDERWATER-MINE, etc. Stenciling is in 1/2-inch white characters.

The information supplied by the manufacturer may appear as an etching (die stamp) on the fin of tear-drop shaped cases, or on a plate welded to the side of case. On the ash-can type charge the same information may appear on a plate welded to the top of the case.

The loading activity's information should appear as a stencil on the side of the depth-charge case (tear-drop) as shown in our illustration. The stencil will occupy relatively the same position on the ash-can type, with four 3-inch yellow dots near the end from which the case is filled, followed by the explosive filler designation in yellow, followed by the explosive-loading activity's stenciling.

Depth charges are shipped and issued without pistols, boosters and booster-extendors installed. Aboard ship, shipping covers are left on the central tubes until ready weapons are required topside, at which time the pistols, detonators, boosters, and booster-extendors are installed. This obviates any need for an assembly activity to alter the case loading activity's stenciling. The exception: when the Battery BA-250/U is installed in Depth Charge Mark 14 the following is stenciled in white on one of the fins per OP 669:

EFF BATT STORAGE (in months) _____
 DATE BATT INST _____
 DATE OPER TEST _____

We can find no history of inert-loaded depth charges but if one were ever to appear it should be painted orange and stenciled appropriately in black 1/2-inch characters. Practice depth charges are to be painted blue.

Crates on depth charges are another rarity. Although steel crates similar in design to the mine crates exist they are nowhere currently in use. Instead depth charges, explosive-loaded and empty, are palletized for domestic shipment and boxed for shipment overseas. If the crates were to be used, their stenciling should supply the same information as that on mine crates, in characters of the same size and color. (Marks and Mods of

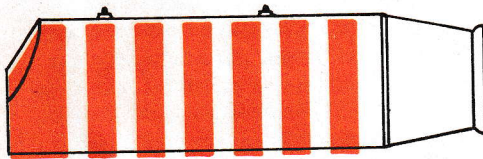
D-C crates supply no numerical clue to the charges for which they are intended. D-C Crate Mark 1 Mod 0, for example, is intended for use with DCs Mk 9 and Mk 14. D-C Crate Mark 2 Mod 0 is for use with DC Mark 16.)

Color coding for components

The color coding of explosive or pyrotechnic weapon components may be done by the issuing activity, as in

INERT-LOADED DRILL & TEST MINES

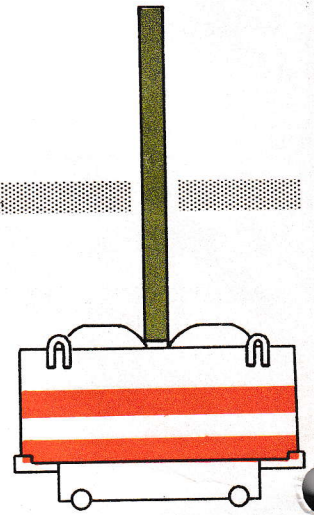
Air- & Surface-Laid



TYPICAL CYLINDRICAL MINE

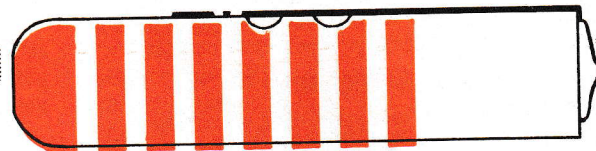


MARK 6

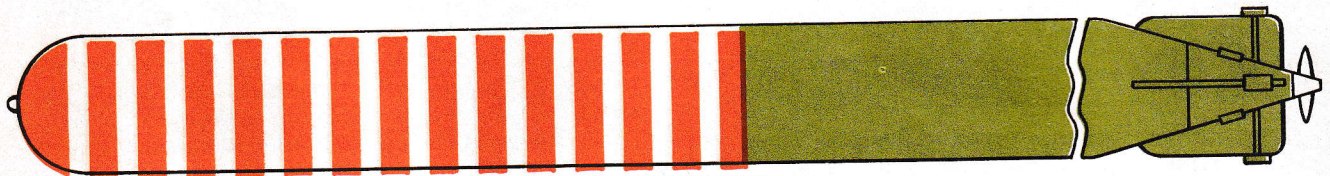


MARK 18 & MARK 51

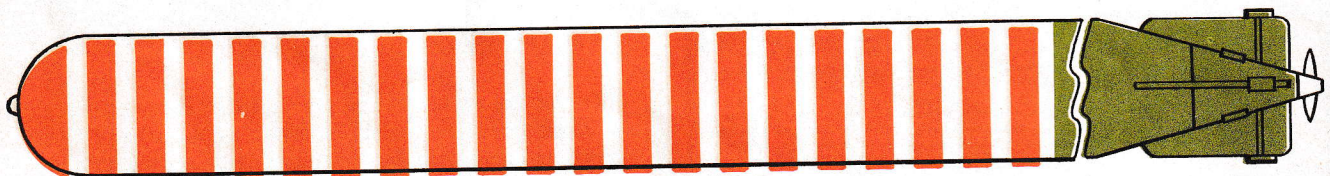
Sub-Laid



TYPICAL CYLINDRICAL MINE

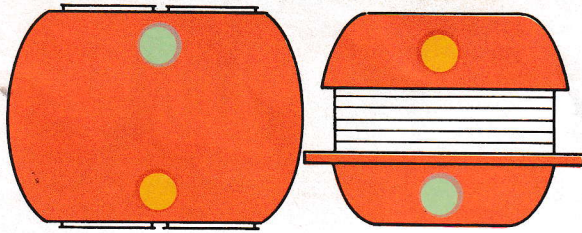


MARK 27 MODS 2 AND 3



MARK 27 MODS 4 AND 5

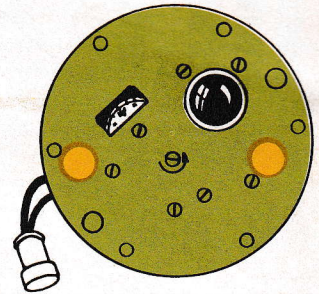
NINE COMPONENTS



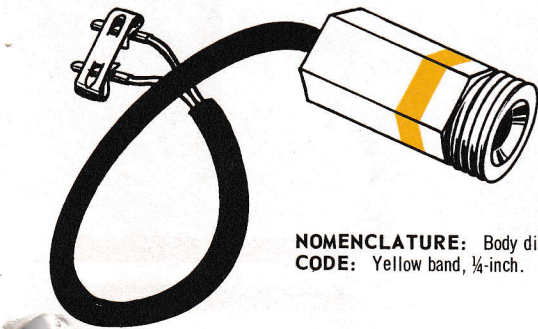
NOMENCLATURE: Stencil black 1/2-inch letters
CODE: Two 2-inch yellow spots and two 2-inch light green spots, one each per side, green above yellow on one side, yellow above green opposite side, when explosive fittings and signals installed:



NOMENCLATURE: Stencil black 1/2-inch letters
CODE: Half-inch yellow band on upper third of container.



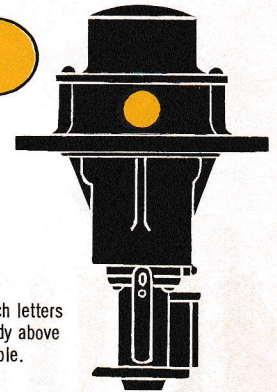
NOMENCLATURE: Stencil (or stamp) white 1/4-inch letters on cover
CODE: Two 1/2-inch yellow spots.



NOMENCLATURE: Body die stamped
CODE: Yellow band, 1/4-inch.



NOMENCLATURE: Rubber stamp (black)
CODE: Paint metal case yellow.



NOMENCLATURE: Stencil white 1/4-inch letters
CODE: Two yellow spots on flange, or body above it. Size to conform to area available.

the case of boosters and explosive initiators that are shipped explosive-loaded, or by the assembly activity in the case of arming devices etc. which do not become explosive hazards until detonators or explosive fittings are installed.

In the application of color coding to components, regardless of who does it, size of the item governs the size of spot or band employed to do the job.

Examples here show a booster using a 1/2-inch band while the smaller explosive fitting uses a 1/4-inch band.

Spots are used on the examples of extender and parachute control unit. They can be on flange or body and range from 1-inch to 1/2-inch, to fit the available surface. Two spots 180° apart should usually be sufficient. Detonators, on the other hand, lend themselves to overall color coding.

Floats Mk 15 and 17 are shown as examples of items with both a pyrotechnic and an explosive fitting installed. A pair of dots on each side, one yellow and one green, does the job. On one side the green dot is at the top and on the other the yellow dot.

Floats are painted red-orange for visibility rather than for coding. They are reusable and can be repainted by using a high-visibility fluorescent paint system, red-orange (633 color/BUAER). It comes as a kit, 8010-682-6836, that includes three 1-gallon pails of paint and two 1-gallon pails of clear over-coating. (The spec is MIL-P-21536.)

Coding on the signals that go into the floats tells a more complete story. The signals are painted white to indicate a pyrotechnic content, with a green band which indicates smoke. If colored smoke (other than gray) the name of the color is stenciled under the band. Colored signals now in stock are painted the smoke color overall, and will probably remain so.

We quit

Need any more be said about painting, color coding, and stenciling? We hope not. We hope we've answered more questions than we've raised, and provided a system that meets local and international safety and identification requirements, and at the same time will be reasonably easy to live with.

Probably in closing we should mention that the enamels we've cited for stenciling and coding are based on requirements laid down by MIL-STD 709 and NAVORD OSTD 52 REV 20 as they apply to depth charges and mines. These references provide for no authorized alternatives in specs and colors. For example, colors identical to those specified may also be available as deck paint or lacquers, but such should never be used for painting, stenciling, coding, or touching-up mines.

In short, activities having the responsibility for painting, coding, and stenciling should plan in advance to have the required paints on hand. Chances are you won't find all you need ready and waiting in your local supply.

HOT STUFF

by
B. Arnacbutt, MNC

Cables of note

Dear B.B.:

What do we do for replacements when a test-set cable proves defective? So far we have relied on trading substitute cables between sets - a practice that has no future. Some minemen say the best procedure is to order another test set but there should be a better way.

C.T.S., MN1

Dear C.T.S.:

Down at MCSU, Charleston, Chief Fred Reid called your problem the Musical Cable game. For the benefit of any blessed mineman who has been spared this hassle, it is played with test sets with missing or defective cables. Over the years, lack of replacement cables in the supply system has resulted in an enforced popularization of the game ashore and afloat.

But now, friends, you can stop the music! Replacement cables have at long last been made available and are listed by test set in APL 24280, Mine Test-Set Repair-Parts List currently dated 15 April 1963. They are also listed by drawing number in the SPCC (OSO) Stock List of 1A- and 2A-Cog material, Book 3 of 4, dated 1 September 1964. Naturally the latest change bulletin should also be used in conjunction with this list (No. 3 now in effect) and also the Master Cross-Reference List.

Also be patient. The overall test-set cable project was only 75% complete at the time of this writing, so you may have to call back later for a particular need.

B. Arnacbutt

It's a neat fit

Dear Chief Butt,

Appreciate the explanation of the Control Unit Mark 66 Mod 2 in Troubleshooter 3-64 but that new explosive-fitting connector makes it tough to fit the control unit into parapaks with shallow wells. Is there an easy way?

T. O. F., MN3

Dear T. O. F.,

It's true you don't have much room to maneuver the battery case past that new red-coded connector. The



reason is that the new connector had to be made 3/8-inch longer than the older one, to accommodate the ferrite bead.

The solution is to rotate the connector counter clockwise so the free end is hard against the wall of the well just as it shows in the picture on page 5 of T-Shooter 3-64. Then, with the "Warning" segment of the control unit cover over the connector, the control unit will slip into place easily.

B. Arnacbutt

Not in the deep freeze please

Dear B. Butt,

Received Batteries BA-1322/U whose history cards indicated they had been subjected to zero degrees storage many times since 1962, and recently to temperatures as low as -5 degrees. Since Vol 1 of OP 1452 Rev 3 reads that minimum allowable storage temperature for a mercury cell dry battery is + 10° F, we rejected and ordered replacements. Right?

HKS, MN3

Dear HKS,

Right. While Leclanche-type batteries are not damaged by frigid storage, mercury batteries are a different breed of cat. Stored at temperatures below + 10° F they

may be damaged and current output diminished, so you were right to reject . . . you and LTJG P. W. Hanks of MOMAT 0322, who reports the same experience with a box of eight BA 1322/Us.

All this leads us to believe that people responsible for refrigerated storage of dry cells are missing the caution for mercury battery storage in Revs 2 and 3 of OP 1452. This caution, which says not to store mercury cells colder than + 10°, applies to any of the current 1300-series batteries including the BA-1328/U used with Test Set 265-0, BA-1359/U used in Mines Mk 56 and 57, and BA-1383/U to be used in improved Drill Mines Mk 25, 36, 52 and 55.

B. Amablebutt

Careful with that cable

Dear Hot Stuff:

What's happening to cables these days, especially those CA-817s that connect the batteries to the firing mechanisms in the Mine Mark 50? Seems to me too many are being consigned to Code X due to missing alignment pins, damaged connectors, etc. Wouldn't it pay "Uncle" to buy some stronger connectors?

BJF, MN1

Dear BJF:

As this is written there are a dozen Rudmindes before us involving cable damage by pinching, breaking, and mistreatment in general. And the advent of modular designs hasn't helped. Instead, cables have become more intricate, more susceptible to damage, more difficult (if not impossible) to repair, and more expensive to replace.

For example, we are still hearing about damage to the Hubbel connector (800-1800-series cables) which shouldn't happen if procedures on Page 21 of T-Shooter 4-63 are followed. Prying instead of tugging on leads also helps to save push-pull type connectors. But the fact is that all these connectors require tender loving care. Especially those on your CA-817, which are not merely delicate but actually fragile. You can't pry them or you'll break the bakelite insulation. You can't use pliers on those brass buttons that stick up so invitingly or you'll break 'em off. You can't push or pull violently either or you'll push or pull the center alignment pin clear out of the connector.

Contrary to all other cable practice, then, the best way to disconnect a CA-817 is to pull on the conductor itself . . . no jerks but gently, with a rocking motion. This way a strain loop inside the plug takes the stress while the rocking motion serves the same purpose as prying. This is the best solution we know until a stronger connector comes along.

B. Amablebutt

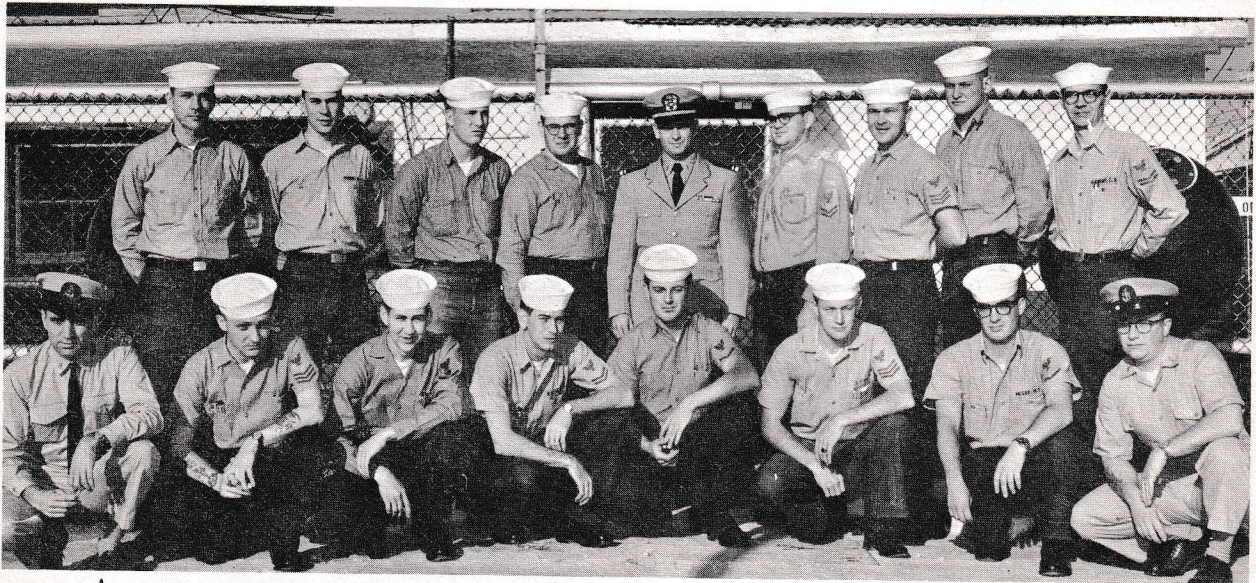
HOW TO GET PUBLISHED

If, upon seeing this photo of the mine crew out at Navy 96670, your first reaction is to wonder why they've been published and you haven't, maybe you should talk to long-time Rudminder Chief H. P. Menser.

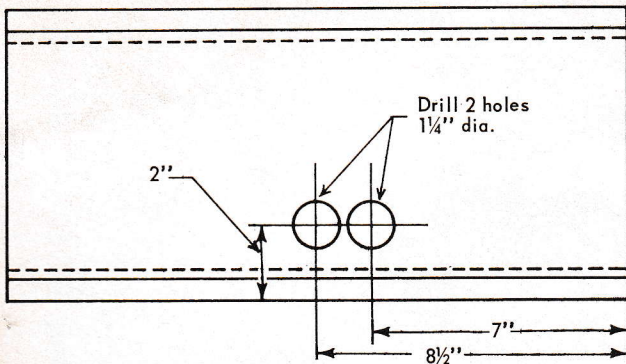
"This photo was taken March 1965," he writes, "and in view of the fact that you didn't publish the last one . . . we have decided not to send in any more Rudmindes if this one does not appear in a forthcoming issue!"

Now with an ultimatum like that, what can we do?

So there you are, Chief . . . your crew's picture in print and many thanks for your letter from ye T-Shooter and NMEF. Now - how about those *#?x! Rudmindes!



Front row, left to right: H. P. Menser, MNC; J. T. Kennedy, MN1; P. E. McCumber, MN3; C. W. Briggs, MN2; R. E. Sapp, MN3; J. E. Spoon, MN1; M. T. McGee, MN3; C. F. Tomashofsky, MNC. In the back row are: L. A. Ziegler, MN1; D. E. Swain, MN3; J. H. Clifton, MNSN; D. M. Moore, MN3; C. J. Wright, LT(JG); W. R. Terry, MN2; R. N. Hart, MN1; J. E. Temple, MNSN; C. D. Graham, MN2.



HOLES IN TWO MADE LARGER

IN HOLES IN TWO (T-Shooter 2-64, page 4) we passed on Gordon Webster's idea for drilling two 1/2-inch holes in the instrument rack cover for Mines Mark 52 and 55. This allowed Control Box Mk 39 Mod 0 and Mod 1 settings to be changed without otherwise unnecessary disassembly of the instrument racks.

While the original holes will let a screwdriver in to change the settings, our field correspondents now tell us that the 1/2-inch peep holes are not large enough to see the setting indexes. So to make a good idea even better drill 1-1/4-inch holes, instead of the 1/2-inch ones, on centers shown above.

Drawings have been changed for new procurement, but on current stocks. It's still a case of do-it-yourself.

MK 26 SIGNAL FAILURES

WORD comes via Rudminde that Signals Mark 26 Mod 0 (used in drill mines Mark 6, 10, 49, and 51 are failing to eject often enough to bring the reliability of these signals into question. The story, we feel, is this:

Signals manufactured under Contract NOrd 16935 are known by NMEF to be of questionable reliability. But because BUWEPS plans no new procurement, they will continue to be retained in Code E status and issued in an "as is" condition. To help, though, each issue includes 25 per cent spares. That, we think, would be fine except that special instructions that were planned to accompany such issues are being omitted when shipment is made by the issuing activities. So in the absence of these instructions, here is what you should do when you broach a shipment of those suspect Mk 26 signals.

- ▶ Visually check for exterior damage such as gouges, cracks, etc. that would hamper free exit from projector.
- ▶ Make sure firing pins are not dislodged.
- ▶ Replace obvious defectives from spares, and dispose of the defectives in accordance with your local safety procedures.

This is the best you can do to insure operable Mk 26 signals. Another condition . . . some likelihood of the signal's time fuse not burning full length to ignite the pyrotechnic candle . . . can't be detected until after it's happened. The probable cause: age.

ON THE SUBJECT OF GREASE

ONE grease can't serve all purposes . . . wherein lies a problem.

Manufacturers of Mark 52 and 55 cases have been shipping them with silicone grease on the tail-cover flanges. The shipping gaskets absorb the grease and the unpainted flange surfaces rust. To correct this, manufacturers will henceforth use bearing grease on machined flanges when shipping gaskets and covers are being installed.

Now there are two things to do:

If you receive cases whose gasket surfaces are rusted, remove the rust and apply Silicone Compound MIL-S-8660 to O-ring surfaces at time of mine assembly.

When you find flange surfaces which have been coated with bearing grease, clean this grease from the O-ring surface and use the silicone compound when assembling.

In short, it's bearing grease for shipping gaskets but silicone for the O-ring used in assembly . . . from here on out.

ELIMINATE THE TWIST

DURING post-recovery analyses for FSMT CNAL 3-64 it was discovered that P-3 plugs of the 1800-series instrument cables for Mines 52/55 were being damaged by overtightening the retaining nut. The plug P-3 connects to the Explosive Fitting Mark 18 Mod 0.

During assembly or disassembly these plugs had been twisted with such force that their insulators were broken and an expensive cable made useless. The trouble lies in the design of the locking nut, which invites use of a wrench, and thus overtightening, although Instruction Sheet P-3 for the installation of the arming device in OPs 2608/2974 warns: screw the locking ring handtight.

In the future, then, minemen should follow this instruction and eliminate that damaging twist to plug P-3.



A recent snapshot of the crew at Bangor, Washington. Left to right: J. P. Davis, MN2; C. A. Nicklin, MNC; B. L. Bishop, MN1. A. R. Higgins, MNSN, not present.

Do You do this Job Right?

TESTING assembled instrument racks for all mods of Mines Mark 52/55 with Test Set Mark 263 requires two shorting plugs. One, designated Plug, Jumper, Clock Delay Mark 21, DWG 2231215, simulates arming of the clock delay. The other - Plug, Dummy, Arming-Device, DWG 2231216 - simulates arming of the hydrostatic switch.

The hitch is that these plugs, although listed as items in the Basic Tool Set for Mines (LD 296048), are not now available and will not be until February 1966, as Minemen Mueller of DRILLMINPREPFAC, Long Beach, and J. M. Scott of NAD/Hawthorne have already discovered.

At the time of this writing, of course, the Mark 21 clock delays are under procurement and only a few are available for use, while Clock Delay Mk 18 Mod 0, an alternate item, can be armed manually. Mine shops will nevertheless probably need those jumper plugs for the CD-21s before the date on which they will become available in the tool kit.

The answer is to make your own, for which you will need one Connector 5935-257-7803, one shell 5935-187-1606, and four half-inch lengths of insulated hook-up wire. With that gear on hand, you can make a jumper plug like this:

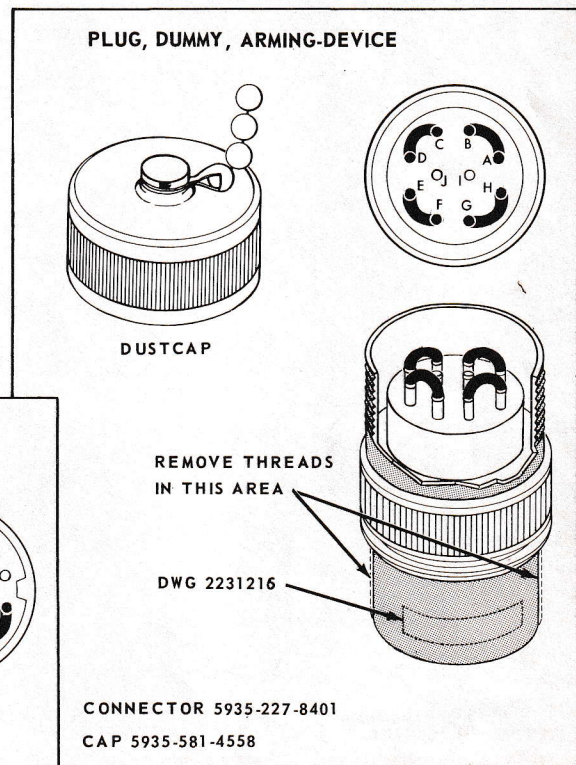
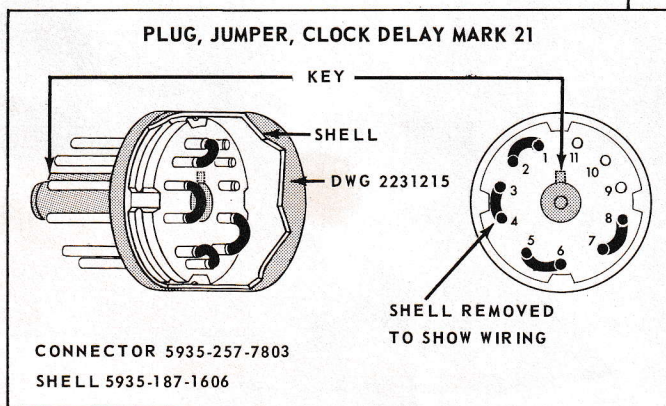
- ▶ Using the plug's key as a reference point, number the pin terminals on the back of the plug counterclockwise from the keyway 1 through 11.
- ▶ Solder in wire jumpers connecting pin 1 to 2, 3 to 4, 5 to 6, and 7 to 8. Leave pins 9, 10, and 11 unconnected.
- ▶ Inspect soldered joints. If good, identify the cap as DWG 2231215 by etching or engraving, and install it on the plug.

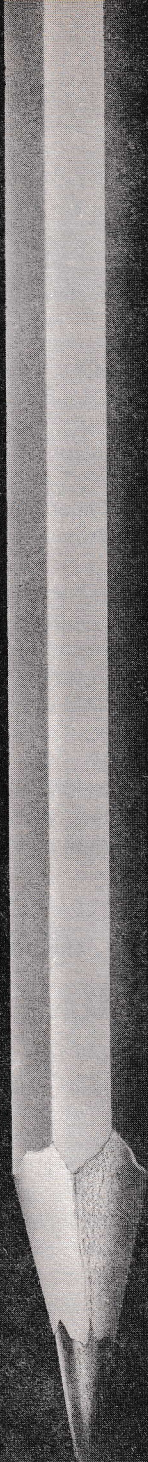
While you're at it, you might as well make a dummy plug for the arming device too, because you'll need it before the manufactured jobs become available if you're going to be assembling 52s or 55s. For this one you'll need an AN connector 5935-227-8401, a dust cap 5935-581-4558, and four half-inch lengths of insulated hook-up wire. Make it like this:

- ▶ Remove threads from body of connector, in the area shown.
- ▶ Solder in wire jumpers on terminal side of connector to connect terminals A to B, C to D, E to F, and G to H. Leave I and J unconnected.
- ▶ Inspect soldered joints. If good, identify body of connector as DWG 2231216 by etching or engraving.
- ▶ Remove chain from dust cap and install the cap on the plug.

When inspecting soldered joints watch for heat damage to insulation, cold solder, solder splashes, etc. Store the finished plugs in your basic tool set, ready for use.

The Editor





**1 pencil
1 rudminde . . .
1 huge improvement in warfare readiness**

✓ do it today!