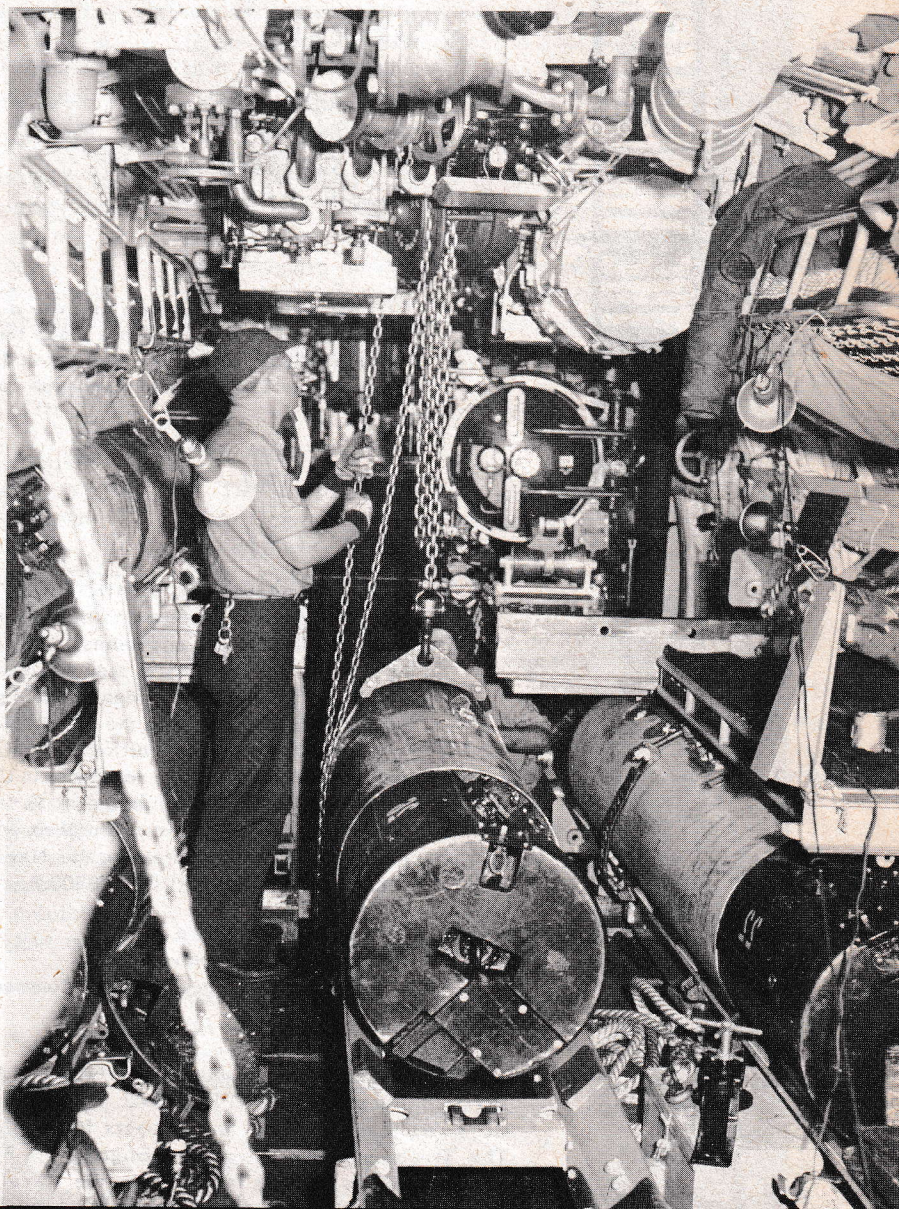


*mine and depth - charge*

# THE TROUBLESHOOTER

- ▶ Safe safety chains
- ▶ Post recovery analysis
- ▶ Reworking CA-817



**AN OFFICIAL NAVORD PUBLICATION**

*in this issue . . .*

*mine and depth - charge*

# THE TROUBLESHOOTER

Published by the Naval Mine Engineering Facility, Yorktown, Virginia  
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## REGULAR FEATURES

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**COVER PHOTO:** No room for error down here. When a sub takes on a load of mines there is little place for them to go but out through the torpedo tubes. This photo was taken during filming of Technical Film Report Weps 21-64 aboard fleet-type sub. Recognize her, anyone?

1 APRIL 1966

The Troubleshooter, an official NAVORD 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 NAVORD 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 NAVORDINST 8500.8.

**ARTHUR R. GRALLA**  
 Rear Admiral U.S. Navy  
 Commander, Ordnance Systems Command

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**THE OFFICIAL JOURNAL OF THE RUDMINDE PROGRAM**

# RUDMINDE REPORT TO THE FLEET

## Too much of a good thing!

A few days ago NMEF's technical information office received a request for thirty-seven copies of one of the supplements to OP 3232, the air-loading check lists. So what, you say? So why shouldn't they have 'em if they need 'em?

The fact is that they'll probably get them because — to use the 3232 check lists right, one pub expendable per plane load of mines — they probably need them. Still, a check of the various automated distribution lists shows that this same activity gets (and is satisfied with) only three copies of any other OP. So is this bad? For an answer multiply 37 copies of one check list by the number of lists projected for the 3232 series (26 planes) and you get the number of lists this activity would ultimately have to stock and maintain: 962 pubs just to cover this one facet of mining! So the answer is yes, this is bad . . . unless BUPERS takes it upon themselves to create a new series of rates for pubs maintainers, and assigns appropriate numbers of them to the mine shops!

## Bad things too

This knowledge, of course, is not new. Lt. Don Deona discussed it with us long ago and even then it was new. The fault, of course, lies in the fact that the check lists as we know them spread clear across the mine/airplane interface, covering final mine prep, airplane armament-system checkout, loading instructions, unloading instructions, pre-takeoff checkout, flight restrictions, and in some cases more.

What these lists did, thereby, was fill a void that no one else was willing to expend the money and effort to fill. Readiness absolutely demanded it. But that did not make it good.

Imagine your reaction, for example, if some airplane manufacturer with little or no experience or knowledge of mines began publishing manuals on how to test and assemble them. Safe? Reliable? Sensible? No more so than for a mine-oriented activity like NMEF to publish instructions on the armament systems etc. for that manufacturers' planes.

## A good break

Students of the Washington scene by now are aware that BUWEPS is no more, and that in its place, under the Chief of Naval Material, we have several parallel commands including the Navy Ordnance Systems Command with assigned cognizance of gear like mines, and the Navy Air Systems Command with cog of the airplanes. At last, then, there is an interface of command which is just as real and as definitive as the physical interface that exists between the mines and the planes. That is the simple but far-reaching reason that the mine/plane pub-

lications should interface too, and at last that is exactly what they are going to do.

## The new loading check lists

In spite of the fact that you will soon receive new revisions to at least two of the OP 3232 check lists, NMEF and certain activities on the air side began collaboration on new airplane-oriented check lists, even before the BUWEPS disestablishment, with the result that three have already been produced by aircraft manufacturers under contract to AIR. Later, by Bibliography, we will apprise mine assembly activities of their titles, numbers, and how to get them if they wish to do so for curiosity's sake, but the fact is they will not be required to have them. Covering only such functions as pre-loading airplane armament-system checkouts, instructions for bomb-bay configuration for mines, loading and unloading check lists, etc., such lists will be required publications only for those squadrons to whom the airplane in question is assigned.

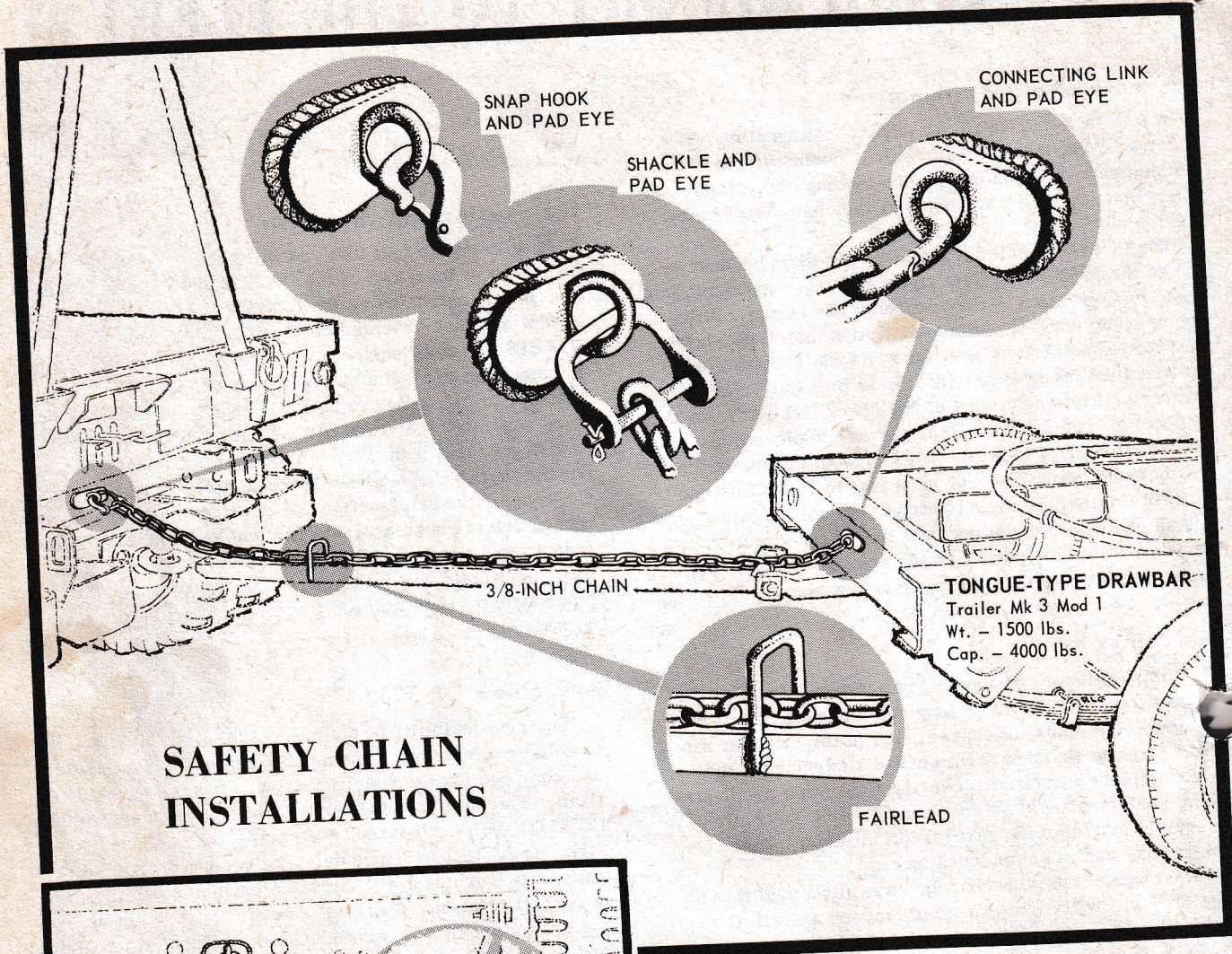
## And a new OP 3232

The responsibility of the mine side of the interface is to deliver mines that are properly configured, adjusted, and equipped for the specific airplane designated to fly them. The pub for doing this will be a new single-volume OP 3232. Being prepared in normal 8 x 10-1/2 inch page size, its content will include: 1) a general narrative discussion of working-level interface problems and procedures; 2) reference diagrams of each approved mine load for each aircraft type whose mission includes mine laying; and 3) for each aircraft type a removable, re-usable, plastic-laminated check list covering all procedures necessary to configure, adjust, mark, and equip Condition A mines for delivery to that airplane, covering all mine-types which that airplane is authorized to carry.

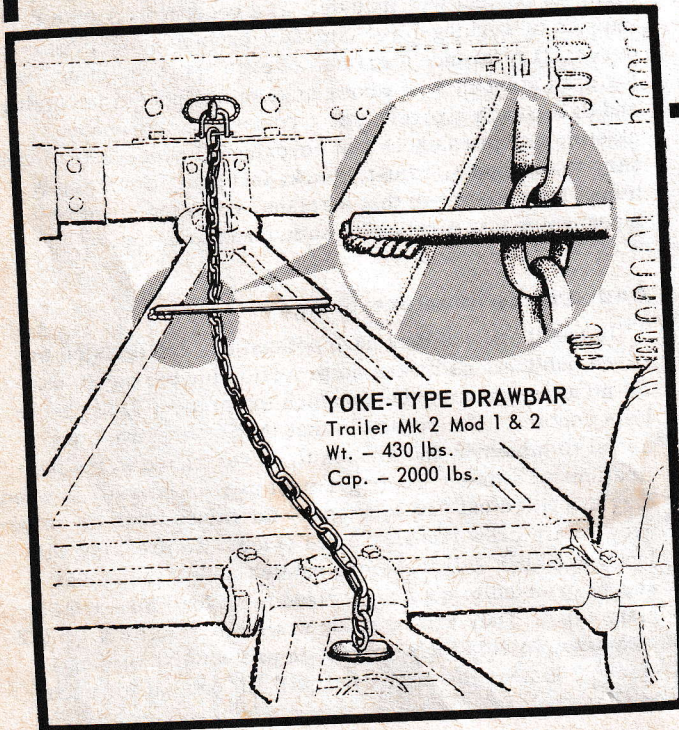
## And a pubs interface bridge

In the above you may have noticed that the division between publications makes no provision for the highly useful mine assignment sheets which the present 3232 check-lists contain. The reason is that they have proved too useful to minemen and airmen to be restricted to the publications of either. Their greatest use, of course, is when they are filled out and accompany the mines when the mine-crew to air-crew transfer takes place. To preserve this function NMEF will therefore publish mine assignment sheets oriented to each authorized mine load for each airplane type. They will be made available in full 8 x 10-1/2 inch size, as NAVORD Forms, in pads of 100, in Cog I stocks. In use, the mine crew will fill one out for each

(continued on page 3)



## SAFETY CHAIN INSTALLATIONS



## MATERIAL

| NUMBER | ITEM                          | STOCK NUMBER  |
|--------|-------------------------------|---------------|
| 1      | Shackle, 1/2", steel          | 4030-542-3180 |
| 1      | Snap hook, 3-ton capacity*    | buy local     |
| 2      | Pad eye, cross, steel         | 2040-278-9131 |
| 2      | Lug, suspension, DWG 495955 # | 1350-038-6547 |
| 1 pc.  | Chain, steel, 3/8", welded    | 4010-272-7741 |
| 1      | Link, connecting, chain, 3/8" | 4010-165-5605 |
| 1 pc.  | Rod stock, steel, 3/8" dia.   | 9510-596-2279 |

\* Alternate for shackle # Alternate for pad eyes (not shown)

# SAFE SAFETY CHAINS

EVERY MINEMAN knows about the requirement for safety chains on bomb trailers but more than a few have questioned whether their rigs meet safety requirements. In reply NAVSO P-2455, Article 0515, cites these pertinent points in the chapter on towing:

- ▶ Each chain (including attachment) shall have an ultimate strength at least equal to the combined weight of the cargo and trailer being towed.
- ▶ Attachments shall be mounted in the vertical plane of the longitudinal centerlines of the drawbar, tow, and towing vehicle. This does not preclude the use of double chains when the situation warrants their use.
- ▶ Double chains shall have no more slack than is necessary for proper turning.
- ▶ Chain shall be so attached that it will prevent the drawbar dropping in event the drawbar attachment fails.

Minemen have inherited a variety of rigs on bomb trailers used to transport mines over thoroughfares; some of them good, others not. It is not the purpose of this article, however, to inspire all hands to turn to and re-rig their trailers to duplicate the rigs shown here. If your present safety hook-up meets the requirements above there should be no reason to change. If you have doubts, though, or if you're about to do some trailer renovating, rigs that approximate those we show here should satisfy all requirements.

For either rig (Mk 3 or Mk 2 trailer) 3/8-inch steel chain and accessories will be satisfactory. The trailer end of the chain is fitted with a connecting link permanently secured to the trailer's pad eye. The other end can be fitted with a shackle or safety hook for off and on attachment to a tractor. This way the chain is more likely to stay with the trailer it was cut to fit (e.g., cut with just enough slack to keep the chain from taking the load instead of the drawbar). With excessive slack the chain would not keep the drawbar off the ground, if the bar should come adrift from the hitch. Ideally the pad-eye on the truck should be welded high enough above the hitch to enhance this feature.

The inverted U fairlead on the Mk 3's drawbar can be fashioned from 3/8-inch steel rod and welded about a foot back from the hitch. The loop it forms should be large enough to provide easy clearance (no snags) for the chain. It's this piece that would hold the drawbar off the ground and provide at least some steerability in case of hitch failure.

For the yoke-type drawbar (Mk 2 trailer) a straight piece of 3/8-inch rod is shown welded across the yoke near the apex of the triangle at the hitch end. When the chain is led under the rod and over the hitch as shown, the bar serves the same purpose as the fairlead shown

on the Mk 3. Again the opening between rod and apex should be large enough to let the chain pass freely without snags.

Reports from recent on-site mine inspections indicate some misunderstanding concerning requirements for ground straps on bomb trailers. Static electrical charges are generated by the movement of vehicles equipped with non-conductive wheels, such as bomb trailers. In chapter 42 (Static Grounding) however, OP 5 states that static electricity does not represent a hazard during the handling of unexposed explosives. In short, small sparks such as could result from a static discharge are likely to cause an explosion only if the explosive is finely divided (e.g., granulated) and exposed to the air. Explosive-loaded mines present neither condition, and it is therefore unnecessary to provide ground straps on trailers used to transport them.

## TOO FAT TOO

Troubleshooter 3-65, page 9 gave a field fix for Test Pots Mk 6 Mod 0, whose bellows struck the diaphragm cover of the Pressure Detector Mk 1 Mod 1. The cause was bellows rods that were too long.

Now it appears that, even when rods are the correct 3.125 inches, the bellows in some cases may still strike the diaphragm cover when the cam lever is swung to hold position. The reason is that some of the rods are too large in diameter to seat in the guide cup at the bottom of the bellows.

So when you have a test pot that does not go from signal to hold position easily, we still say don't try to force it. Instead disassemble just as we said in T-Shooter 3-65, but check diameter as well as length. If the diameter exceeds .248 inches machine it down to that diameter with a tolerance of plus zero, minus 0.004.

### Rudminde Report

(continued from page 1)

plane load of mines, delivering it to the squadron with the mines, just as is done now with the reduced-size OP 3232 assignment sheets.

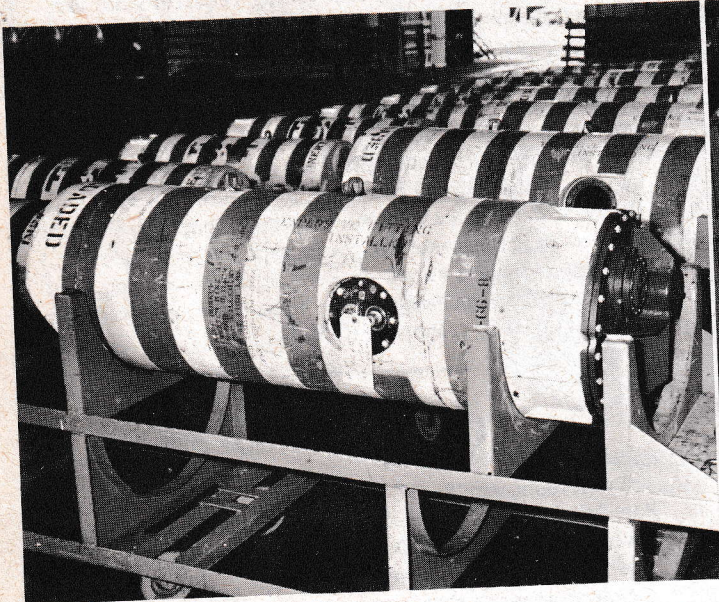
### Loud and clear!

For the benefit of the few mine personnel who have seen some of the new loading check lists and found them non-conformant to what we have said here, let us make it clear that our gripes have been louder than yours. Future lists will not contain mine-prep info. They will not be released without NMEF review and approval of the tech info on mines. Those you've seen which violate these precepts will be superseded by new ones which do not. No ifs, ands, or buts.

# POST-RECOVERY ANALYSIS, PACIFIC

**A**N ENTERPRISING observer (NMEF's Dick Springe) and a cooperative photographer (Williams, MN2) teamed up to produce a picture story of how post-recovery analysis by Drill Mine Preparation

Facility, Long Beach, identified the component responsible for Mine Mk 52 during FSMT CNAP 2-66. Some teams used a Ouija Board for which instructions were published



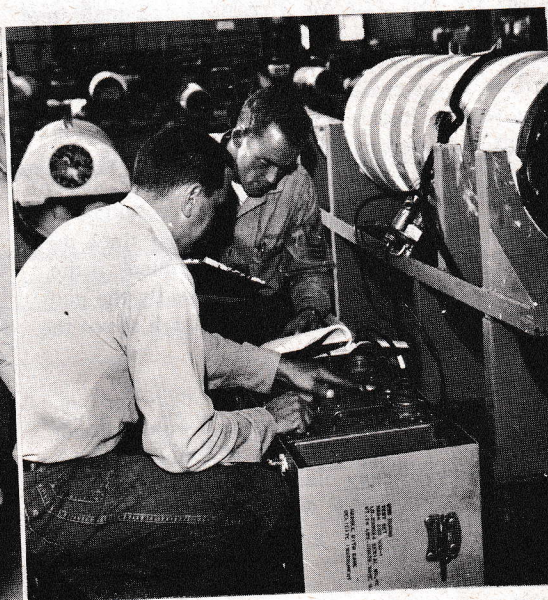
Home from the sea is Mine Number 8, a Mk 52 Mod 3, in the foreground. Tag on arming device tells the story in one word — **FAILED** — also advises that explosive fitting has been removed.



Analysis begins. After checking for case damage and evidence of leaks, O. M. Henry, MN-1 removes and inspects arming device and checks mine fire recorder. Since mine did not fire, recorder should still be running.



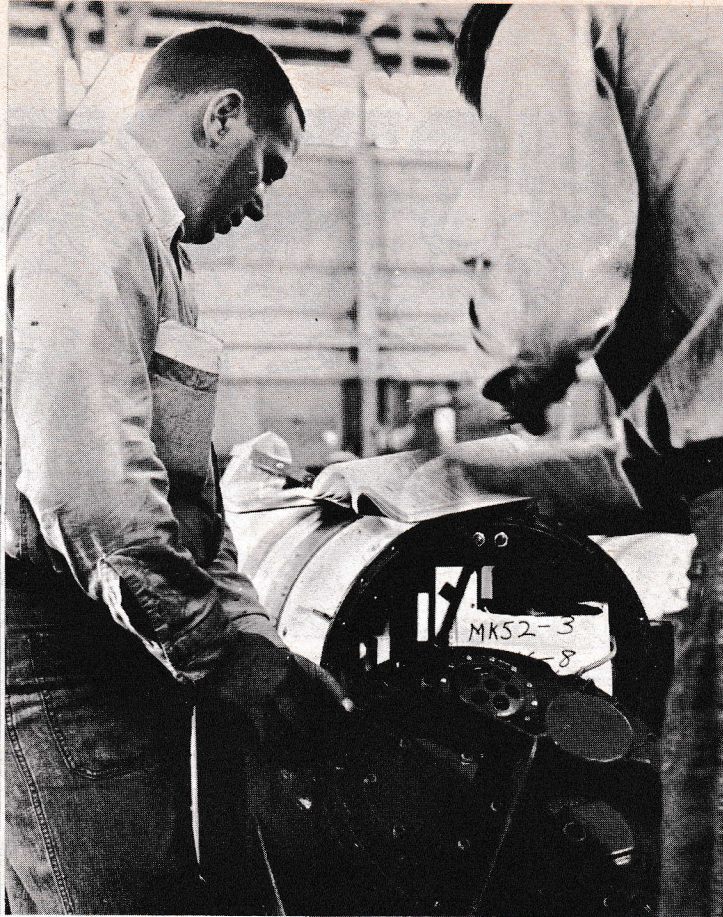
Inside, Henry and Cisco check remaining counts on ship counter for comparison with original setting . . . also visually inspect for clues to failure.



Class C (operational) test with Test Set Mk 263 Mod 1 is next step in analysis. Test was unsuccessful, pointing to clock delay as the malfunctioning component.

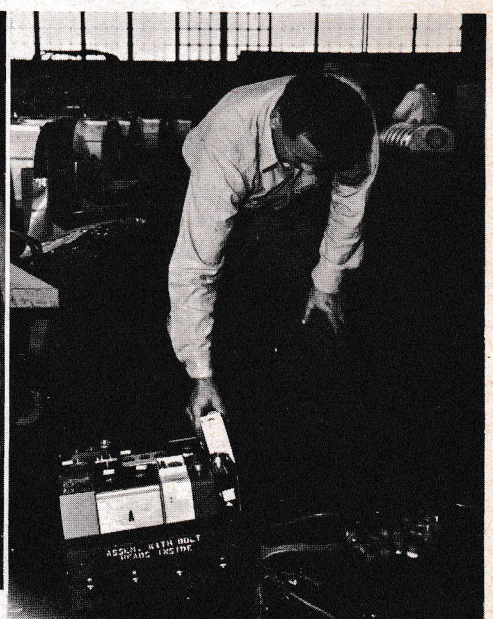
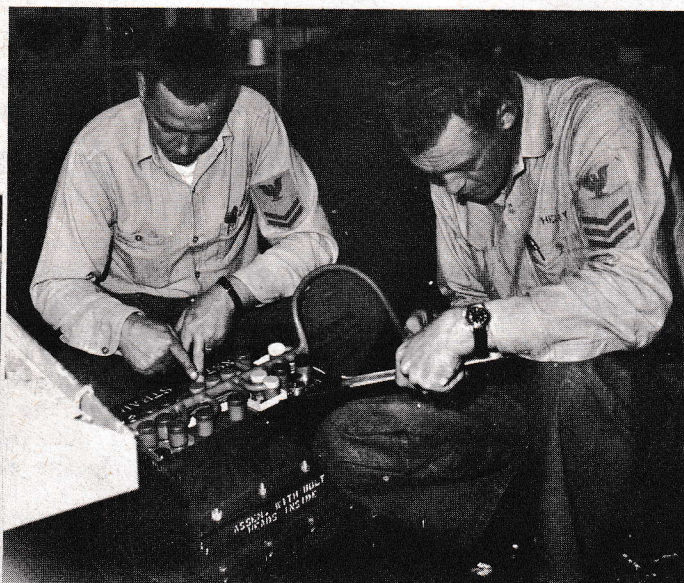
# FILE

responsible for a dud  
prefer to use the  
troubleshooter 1-64.



removed the read-out tag is removed from  
attached to it. This insures against  
catch Serwis card, recorder, and mine. Failure to  
is promptly can cause mix-ups and loss of data.

Next step in isolating defect starts with removal of tail cover.  
Cisco, MN2, joins Henry in the analysis. Absence of flooding  
indicates the cover was correctly installed. Absence of other  
activity in immediate area reduces distractions from job at hand.



Instrument rack is necessary  
analysis further.

Before going directly to clock delay the instrument rack  
is visually checked further for loose connections, cable  
damage, etc. This is good procedure . . . to inspect  
everything before tearing it down . . . prevents haste  
and enthusiasm from destroying unsuspected evidence.

Finally clock delay is removed for a  
Class B test. To complete the analysis  
a good clock will be substituted and mine  
operational test performed again.



by B. Arnaclebutt, MNC

### Three thousandths off

Dear Hot Stuff,

That seal saver tool described in Job Right, issue 2-65, is a good idea for a smooth operation when installing reset and impeller-wheel shafts during overhaul of the nose sections of the Mk 27 mines' Vehicle Mk 1 Mods 1 and 2. The only trouble is that the .315-inch outer diameter of the tool won't let it pass through these .3125-inch bushings. You goofed?

F.E.F., MNSN

Dear Critic,

We goofed. All hands concerned should note on that 2-65 Job Right that the outside diameter of the bullet-nosed seal-saver tool should be no greater than .312 inch.

*B. Arnaclebutt*

### Trouble with Hubbell

Dear Chief Butt:

Back in Troubleshooter 4-63 you described a tool for disconnecting those Hubbell Connectors from search coils in Mk 52/55 mines without tearing up the hook on the male prong. Now, in one lot of nine CA-832s, we find eight whose Hubbells have bent stems . . . a different problem created by who knows what.

So do these go to Code H? Actually we bent the stems straight by hand and they

work good as new. Does this make Code A, E, or what?

HCC, MNC

Dear HCC:

At a saving of \$135.00 per cable who could object Every time you make a used one work as freely as a new one I'll say that you've made it Code B. If it's a cable which has never been used (e.g., in a drill or FSMT plant) make it Code A.

*B. Arnaclebutt*

### Mark 27s drop hard

Dear B:

The extension tubes designed to adjust the length of our universal torpedo dollies have a nasty habit of coming loose when handling Mk 27 mines and, if not caught in time, of dumping the mine.

Here at NOF/Yokuska we'd been lucky for a long time, but finally the inevitable happened: we dropped a 27 during a training session, while marrying the afterbody to the war-battery section.

The problem is in those wing nuts that are supposed to lock the tubes: they vibrate loose when you wheel 'em around, letting the dolly halves separate. You absolutely cannot get the wing nuts tight enough by hand, and if you use a wrench the wings break off. Our solution has been to replace the wing nuts with hex nuts and lock washers. A



ent is no longer as easy but it sure is better than spilling mines.

B.P.S.

Dear B.P.S.,

Anything that avoids such an accident is good. Some shops, though, even go you one better. They keep the wing nuts but do away with those extension tubes altogether, substituting 4-foot lengths of 1½-inch black steel pipe (galvanized won't fit).

A disadvantage may be the fact that when the dolly is shortened all the way a portion of each pipe sticks out at the ends. But as I see it this is a negligible problem.

In any case, this makes two workable solutions, and my advice is that all shops using these dollies put one of the two to work!

*B. Amadebutt*

## Fish paper

Dear B.B.,

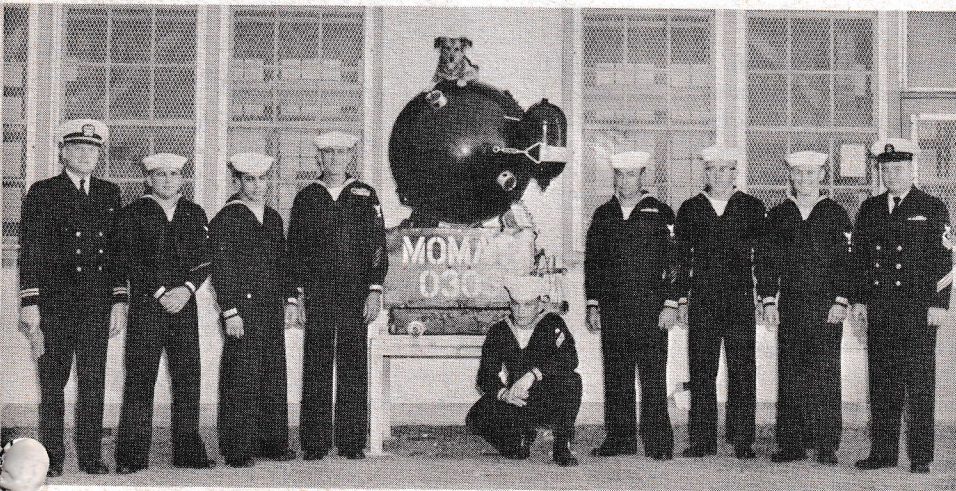
During final prep of some 6-15 mines we found the fish paper insulation for the booster a torn, tattered, dog-eared mess. Why can't a thicker, more durable insulating paper, such as that for Mine Mk 25, be used?

J.O.N., MN1

Dear J.O.N.,

Only one reason: it won't fit. The fish paper used in the Mine Mk 6 is 0.005-inch thick while the paper used in cylindrical mines is 0.015-inch. That is just enough difference to make the booster fit in these Mk 6 cases snugger than snug.

## PUTTING ON THE DOG



Members of MOMAT 0305 stationed at U. S. Naval Air Station, Whidbey Island, Oak Harbor, Washington are shown here in a group photo taken October 1965, compliments of Al Boreen. We don't know who posed "Little Dick" on that venerable Mk 6 but the group includes, left to right, LT A. R. Boreen, Officer-in-Charge; R. Williams, MNW; S. J. Rossi, MNSN; A. W. Niederbaumer, MN1; E. S. Kramer, MNSN; C. M. Johnson, MN2; D. A. Lovett, MNSN; W. R. Thompson, MN3; and G. A. Chipman, MNC.

When picture was taken Rossi, Kramer, and Lovett were slated to sew on their MN3 crow's.

The .005-inch paper, though, is not so fragile that it can't survive the hardships of assembly and final prep. What it won't stand is repeated use, and the antidote for this is 1350-038-7358 . . . the stock number that will get you new sheets at 8 cents per each.

*B. Amadebutt*

## Keep it clean

Dear Barnacles,

In performing tests on Hydrostatic Switch Mk 22 Mod 1 we get frequent contact resistance failures. Following current instructions the switches are placed in Code F awaiting major repair action.

Why not permit Code E so the component can be restored to serviceable by the field activity . . . can't we clean up the contacts and accept these switches as Code A if they then pass Class B tests.

HSM, MN1

Dear HSM,

I can't imagine why not. Like this:

- ▶ Remove all clamps securing CA-821 to the plate.
- ▶ Remove all three switches.
- ▶ Insert a burnishing tool between each contact pair and squeeze and stroke gently (Burnishing Tool 5120-585-8273 is good for this).
- ▶ Install switches and cable back on plate making sure insulated brace engages slot in piston per OP 1452. If switch then passes Class B tests per 1452 you're in business: Code B if a used switch, Code A if new.

*B. Amadebutt*

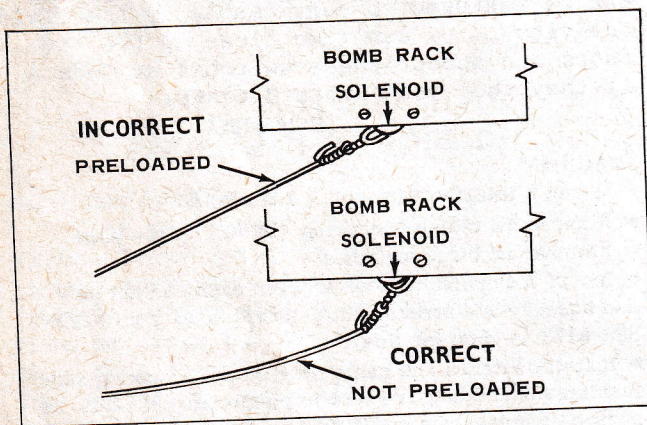
# Aviation Section

Devoted to items of interest to Aviation Ordnancemen

## Don't preload arming wires

Too many mines recovered in two recent service-mine tests were recovered with arming wires still on the mines. In short, they were dropped safe . . . a waste of time, manpower, equipment, and money. Here, then, is one more possible cause to look out for.

For bombs (vs mines) a recent Aircraft Armament Bulletin points out a warning not to preload arming wires when rigging between the planes' solenoids and the weapons, since a preloaded wire (i.e., one drawn taut) can cause the wire to pull out of the solenoid in flight and go down with the weapon. Mine or bomb, this appears to be true.



The solution: after connecting and trimming the arming wires, provide a good sixteenth-inch slack at the wires' swivel eyes where they install the solenoids. That's not much, but it sure seems to do the trick.

## New bands for hoisting sling

The Aero 61A Bomb Sling has long enjoyed the reputation of being adaptable to hoisting any store into any aircraft station authorized for that store. In fact it has been the only sling that can hoist any and all service mines into the limited space of the P2E & H aircraft bomb bays.

When used to hoist 2000-lb stores with diameters of 17 inches or more, though, two bands of the 61A sling have had to be spliced together by using an extra anchor fitting. If correctly assembled this rig can do the job, but:

- ▶ Correctly adjusting and placing the splice fittings (anchor and latch) can waste plenty of time . . . placement varies with each bomb-bay station, and clearance can be as small as an eighth of an inch, making the loading operation somewhat of an exercise in trial and error.
- ▶ Normal stretching of the band, no problem with most

stores, can make it more than a little difficult to latch the bomb shackle into aircraft station's hooks when the store is a 2000-lb mine.

- ▶ Careless assembly of the splice could cause band failure; a hazard of no mean proportions!

To overcome these difficulties a longer, heavier-gage band has been developed, procured, and distributed to all patrol squadrons. Designated as Aero 61B Hoisting Band, the new item is .010 thicker than the 61A band, and 95-3/4 inches long as compared to the 58-inch length of the 61A. The fittings, anchors and latches of the 61A sling will accept either band.

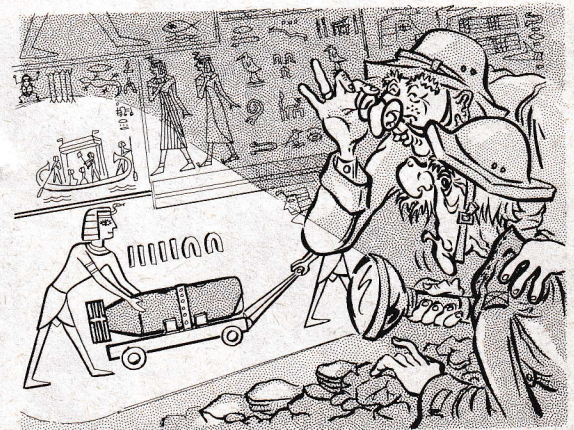
As issued, the Aero 61A sling formerly included four 61A bands with hardware. The current Aero 61B includes two of the 61A bands and two of the heavier 61B bands. The newer bands are marked "Aero 61B Hoisting Band, Heavy Gage 65A101D2-1", and these are the only bands of the two approved without reservation for single-point hoisting of mines Mk 25, 39, 55, and 56. Using two 61A bands spliced, for the reasons cited above, will henceforth be considered only for emergency use with these mines.

The 61B band is also preferred for lighter large-diameter mine stores such as Mines Mk 36 and 52.

## AN/USM-116A HAZARD FIX

Activities using the multimeter AN/USM-116A (VT) have a personnel hazard on their hands if their meters bear serial numbers A1 through A1472 inclusive. Holders of any of these meters should order Field Change 1-AN/USM-116A FSN-2F-6625-788-8447, available from NSC Oakland or NSC Norfolk without cost. Approval to issue or install this fix is not required.

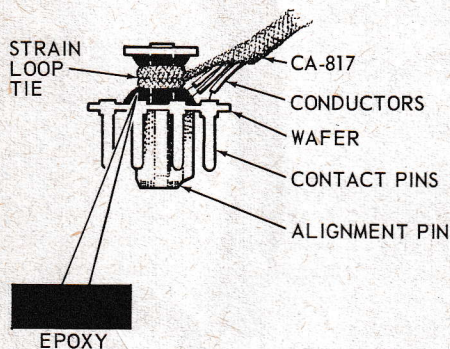
The hazard lies in the fact that users can get a pretty stiff shock from this VTVM's case, which is hot. The field fix grounds the case.



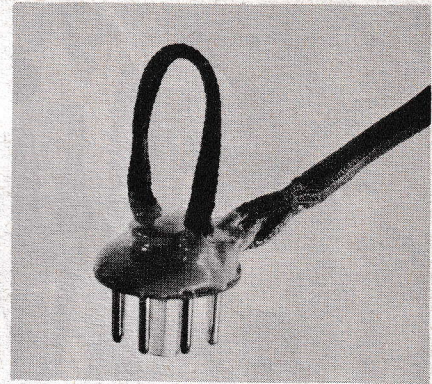
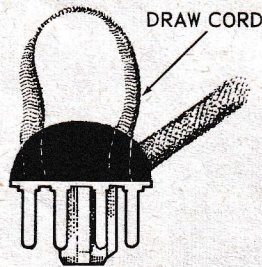
"Egad, Smedley, it is a Mine Mk 25 Mod 2!"

# Do You do this Job Right?

## STEP ONE



## STEP TWO



USABLE FOR YEARS

### REWORKING THE CA-817

THOSE STRIPPED-DOWN octal plugs on Cable Assembly CA-817, the battery cable for the Mine Mk 50 Mod 0, continue to succumb to the push-pull of connection and disconnection in ever-increasing numbers. Most everybody, including ye T-Shooter, has had a hand in offering a solution without success.

You can't pry on the wafers without damaging them. You can't use pliers on the center pin without loosening it. And you can't rely on the strain loop without a good chance of pulling out the conductors before the plug. Now, though, we have a solution that seems to work time after time: encapsulating the entire tops of the plugs in a non-conductive epoxy material, with a loop (draw cord) added to provide a handle for disconnecting. The material we recommend is EPIBOND 122, MIL-A-8623A, 8040-270-8137 (2-lb kit). Also acceptable (from open purchase) would be Epoxy, non-conductive, Scotch-Weld, catalog number E.C. 1838 B/A, by Minnesota Mining and Mfg. Co.

For the draw cords (one yard to handle the 12 plugs on each cable) use nylon of about 100-lb test. A good one is parachute shroud line: Cord, Nylon, 1/8-inch, 4020-640-9363, of which one yard costs 3 cents.

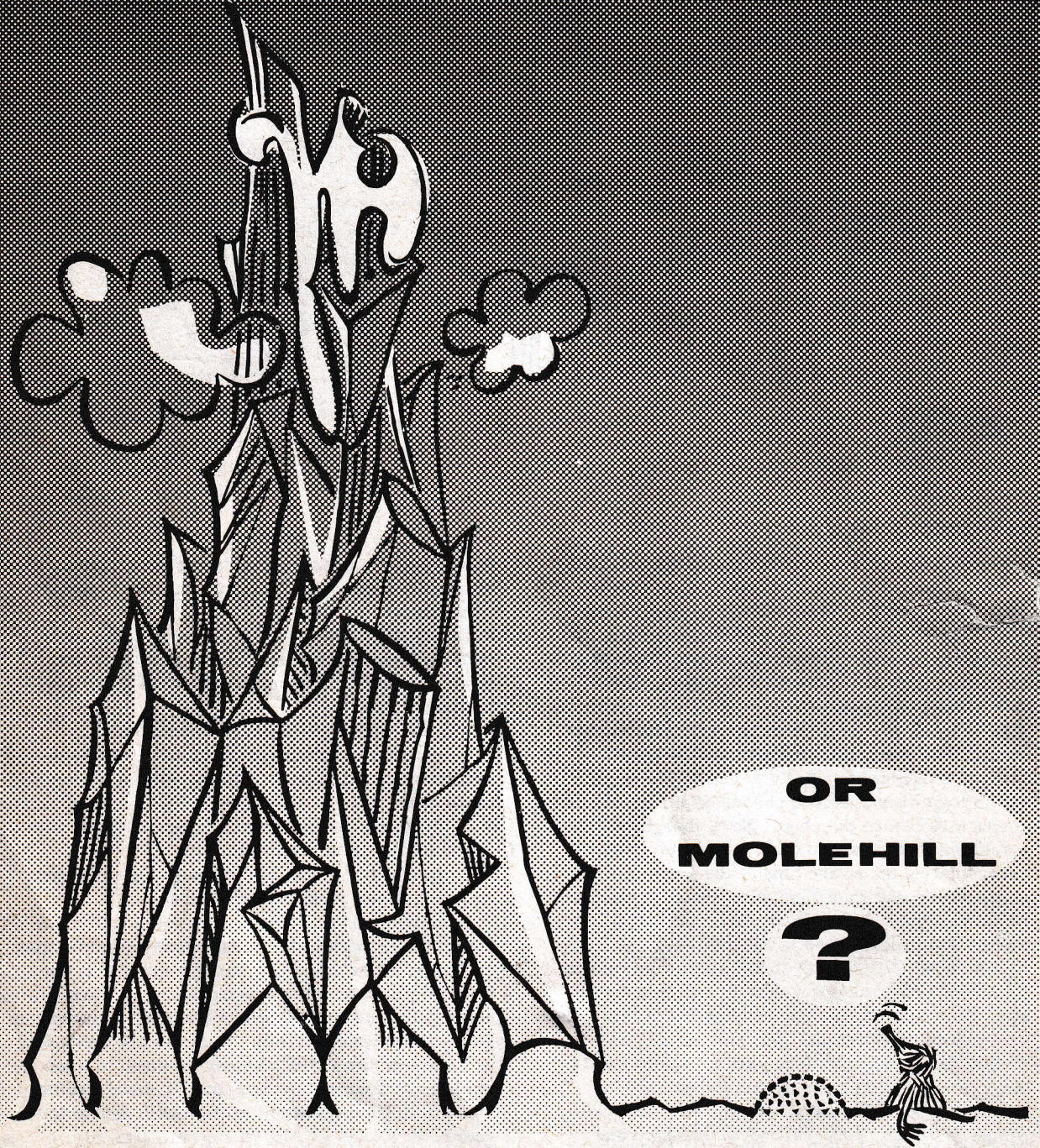
The time to make this fix is when replacing batteries in the course of maintenance of Mine Mk 50, or at time of assembly. When replacing batteries try to get the cable free one last time without tearing up the plugs. Then:

- ▶ Remove any grease or moisture from plugs. Be sure each strain loop is tied up shorter than the conductors.
- ▶ Cut twelve 3-inch draw cords per cable and heal each end of each by holding in a flame for a few moments. (Nylon "heals" when heated, will not fray thereafter.)
- ▶ Mix the epoxy per package instructions.
- ▶ Using a scrap of wire or tooth pick, work epoxy around alignment pin in area where strain loop is made fast.
- ▶ Apply epoxy to each end of draw cord and, with more epoxy, "glue" cord in place.
- ▶ To finish, pot entire top of connector with epoxy and cure it per package instructions.

Actually, the job can be made easier by plugging each plug into a discarded battery and this is one time (the first time!) you won't have to worry about the whole works pulling apart later, when you go to take them out. For those who are leery let us point out that it isn't nearly as much of a job as it seems. And we do think it will make cables that are in good condition to start with usable for years.

*The Editor*

**MOUNTAIN ...**



**YOUR PROBLEM NEED NOT BE EITHER WHEN YOU USE  
RUDMINDE!**