

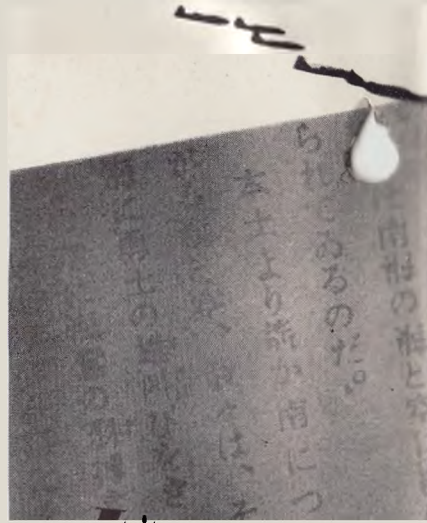
U. S. NAVY



U.S. NAVY BOMB DISPOSAL

# Intelligence

AUGUST 1945 BULLETIN Vol. 2, No. 3



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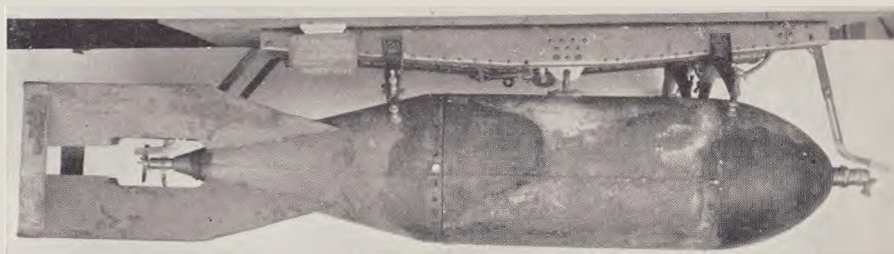
# HACKLES

In view of the fact that Bomb Disposal personnel may be called upon to remove bombs from crashed and captured Japanese bombers, the following general information on bomb racks and shackles used by the Japanese Air Corps is given.

Japanese Army and Navy bomb release shackles in standard use fall

into three general classes, namely: manually operated, explosive operated, and electro-magnetic operated.

Japanese Navy planes are equipped with either the manually operated or the explosive operated shackles. Army planes are equipped with any one of three standard electro-magnetic operated shackles.



*Typical .Nagy Bomb Rack Showing Arming Vane Stops*



*Manually Operated (Navy) Shackle Used on "Val"*



*Safety Lever Pulled (Side Plate Removed)*

*Release Lever Pulled*

*Displacement Gear Finger Released*

## **Manually Operated**

The shackle pictured above is a manually operated fuselage shackle used on the "Val," a Navy dive bomber Type 99 carrier borne Model 11. The "Val" Model 11 is now obsolete but the Model 22 is still in production and possibly uses the same shackle.

Also pictured is the displacement gear used on the "Val." The shackle releases the displacement gear which then swings downward and forward due to the weight of the bomb. The bomb is released automatically at the lower limit of movement of the displacement gear.

The shackle is operated by pulling a steel lanyard which leads up to the cockpit from the release lever on the shackle. Prior to pulling the release lever the pilot pulls another lanyard

attached to the safety lever. Pulling the safety lever disengages a projection on the end of the safety lever from a cutaway portion on the camming surface of the release lever.

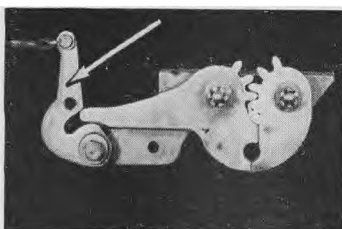
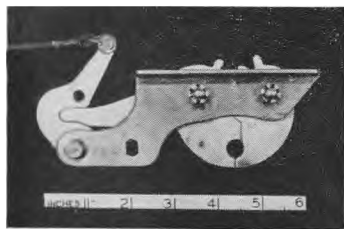
When the release lever is pulled, it frees the shackle hook. The weight of the displacement gear and bomb forces the hook open and the displacement gear swings down and forward releasing the bomb.

The picture below also show the arming vane stops used with this type of shackle. One stop is attached to the displacement gear and another is attached to the fuselage of the plane. This is the standard and only method used on Navy planes for preventing the arming vanes from rotating while in flight. It should be noted in this connection that it is not possible to jettison safe any Japanese

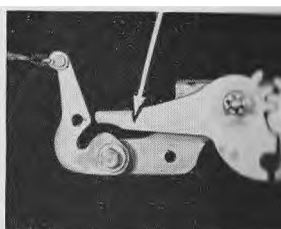


*"Val" Displacement Gear*

*Manually Operated Navy Shackle Used on Nell*



*Release Lever Pulled*



*Trigger Released*

Navy bomb from a Japanese Navy bomb rack.

The "Val" is reported to carry one 250 kg. bomb under the fuselage.

The "Nell" a Navy Type 96 Land Attack plane, now obsolete, used the manually operated shackle pictured above. This shackle has no safety lever, but operates by merely pulling a lanyard. This releases the trigger arm with a camming action, causing three notches or cogs in a half moon gear to engage cogs in a like portion on the opposite hook. This motion opens the suspension hooks releasing the bomb.

) The "Nell" is reported to have carried a 800 kg. or a 500 kg. or two 250 kg. or twelve 30 kg. bombs. It also was reported to carry an 800 kg. torpedo. However, according to available information only the 60 kg. bomb is carried on the shackle pictured.

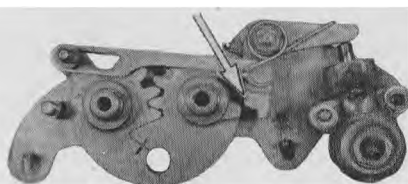
**Explosive Operated Shackles**

The explosive operated shackle pictured below is the shackle coming into general use on many Japanese Navy planes. Though designated an explosive operated shackle, it may also be operated manually.

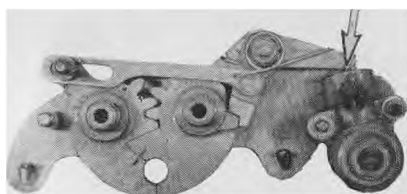
In general the operation is as follows. A small electrical cartridge is inserted below a steel plunger in the body of the shackle. When the cartridge is fired by closing the electric circuit, the plunger device is driven forward by the force of the explosion. In the shackle pictured below the plunger turns the locking lever freeing the suspension hooks. The hooks turn due to the pull exerted by a connecting rod running from the locking lever to one of the hooks. The opposite hook is forced to move



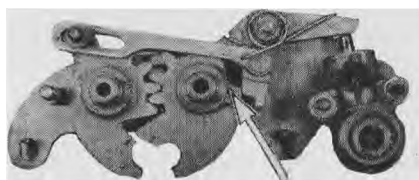
*Explosive Operated Navy Shackle Used on Betty*



*Piston Releases Trigger*



*Explosion Pushes Piston*



*Hooks Open*

as it is geared to the driven hook. This forces the hooks open and releases the bomb.

The shackle pictured is used on the "Betty." The "Francis" uses an explosive operated shackle, for large bombs, which operates very much the same but the explosive operated hook merely frees the displacement gear from the fuselage. Actual release of the bomb is accomplished by a system of levers which automatically open the hooks as the displacement gear swings downward.

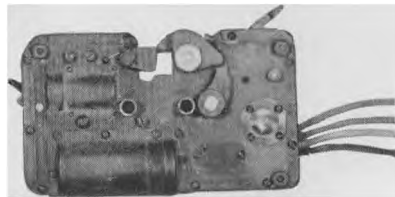
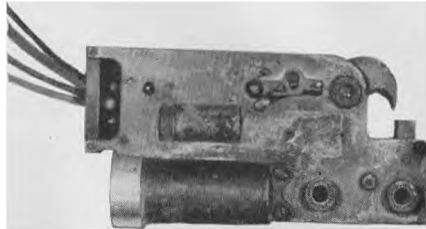
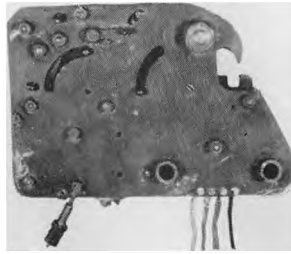
When the displacement gear and bomb have moved down to a point approximately 40° with respect to the axis of the plane, the locking lever is released and the bomb suspension hooks are opened allowing the bomb to fall.

A wiring diagram of the Type O six-bomb release panel found on the "Francis" indicates that the bombs carried may be dropped in salvo or independently with a time interval of release of the forward and rear bombs from 0.25 to 6 seconds.

The "Francis" also has a small bomb release mechanism in the forward part of the fuselage for carrying 30 and 60 kg. bombs. This rack is known as the Type 97, small bomb release mechanism.

Operation of the shackle is basically the same as the explosive operated shackle found on the "Betty." Two battery leads from the cockpit enter the rear of the bomb rack and lead out to an electrical cartridge on the shackle. When the electrical cartridge is fired, the operating plunger is driven up against a rocker arm. The rocker arm releases one of the hooks and also strikes a cam block, which by its cammed surface forces the opposite hook to open releasing the bomb.

The "Francis" is reported to carry one 800 kg. bomb or two 500 kg. bombs. In addition it carries two 60 kg. bombs forward of the bomb bay.



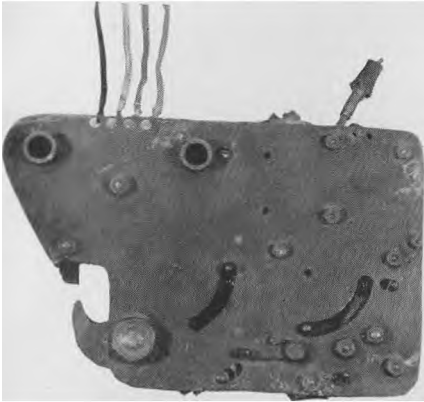
*Three Types of Electro-Magnetically Operated Shackles Used on Army Bomb Racks*

## **Electrically Operated Shackles**

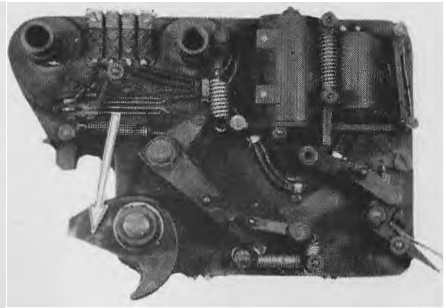
Three standard Army fuselage shackles with electro-magnetic release have been recovered to date. A new series of shackles are expected on new Army planes.

Japanese Army bomb racks, contrary to the system found in Navy racks, use arming wires instead of arming vane stops. Thus it is possible to jettison safe Army bombs when dropped from Army planes.

The release unit is a simple electro-magnetically operated double trip-trigger mechanism and should normally present no difficulty to B. D. (C) personnel required to recover bombs



*Army Electro-Magnetically Operated Shackle*



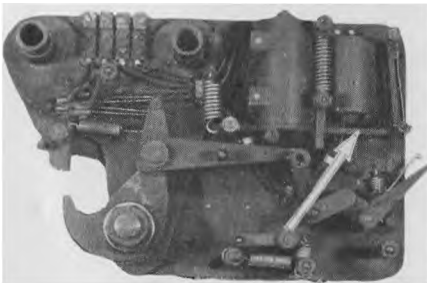
*Hooks Open*

from the bomb racks of a crashed aircraft.

The suspension hook carrying the bomb is locked in the closed position by a safety catch. When current passes into the shackle a magnetic field is established which pulls the safety catch away from the trigger release allowing it to move up. This motion releases the hook lock and allows the hook to swing down releasing the bomb. Pictured above are the three types of electrically operated shackles. The various stages in operation of one of the shackles is shown and should be self-explanatory.



*Safety Catch Released*



*Trigger Released*

It is not possible to say just which Japanese planes will have a certain type of bomb rack as sufficient information is not available at present. It is hoped, however, that the above will give a general picture of what can be expected in the various types of shackles.

In addition to the above discussed fuselage racks and shackles, are various types of wing racks which have been recovered, but as their operation is almost identical to fuselage racks of the same type, no detailed discussion is necessary.

Navy wing racks like Navy fuselage racks are either manually or explosive operated, and Army wing racks as far as is known are electro-magnetic operated.

Wing racks are in general small and designed to carry small bombs on fighters and light bombers.



*Hook Lock Released*



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C

Recovered rounds and captured documents indicate extensive development and increased use of hollow charge ordnance by the Japanese. This is particularly true in the design of ordnance for antitank weapons such as hollow charge projectiles, rifle grenades, and hand grenades, items all designed to give maximum penetration in armored steel.

According to information contained in a captured Japanese document, hollow charge ammunition design has been copied from or strongly influenced by German hollow charge ordnance development. The document indicates that this was especially true in the development of such items as projectiles, grenades, bombs, and torpedoes having cone charges. This fact is further substantiated by a corn-

parison of recovered Japanese and German ordnance.

1. Grenades and mines:
  - (a) Conical hand grenade.
  - (b) 30 mm. rifle grenade.
  - (c) 40 mm. rifle grenade.
  - (d) 45 mm. rifle grenade.
  - (e) Lunge mine.
  - (f) Pole charge.
2. Hollow charge projectiles:
  - (a) Ammunition for the Type 41 mountain gun.
  - (b) Ammunition for the Type 92 infantry gun.
  - (c) Ammunition for the 105 mm. howitzer.
  - (d) Ammunition for the 15 cm. howitzer.
  - (e) Ammunition for the 57 mm tank gun.

3. Bombs:
  - (a) kg. hollow charge bomb.
  - (b) 1 kg. hollow charge bomb.
4. Torpedoes:
  - (a) Mentioned in documents only.
5. Demolition charges.

These items will be discussed in the order listed and will be supplemented by information from documentary sources where such information is thought to be correct.

### Grenades and Mines

(a) *Conical hand grenade.*—The Japanese Type 3 hollow charge conical hand grenade has been recovered in two different sizes, varying in explosive filling, cone angle, and markings.

The two grenades are of Navy design and have the following information labeled on the explosive charge: Large model—"Bursting charge for large model hand thrown conical grenade, Type 94 (60% Tri-

nitroanisole, 40% RDX) Explosive." Small model—"Bursting charge for temporary designated hand thrown conical grenade." The explosive used in the small model was found by analysis to be pentolite but as this was designated an experimental round it is possible that future recoveries may contain Type 94 explosive as this is designated in documents as the standard explosive for use in hollow charge ordnance, and was found both by analysis and translation to be the filling in the large grenades.

The grenade consists of a cone-shaped explosive charge, a metal cone and a wooden base all contained in a silk bag. A simple inertia type fuze is inserted and a tail attached to the apex of the cone.

The explosive is cast in the form of a truncated cone. A metal cone, made of steel or aluminum depending on the size of the grenade, is inserted in the base of the cone and the upper

## ORDNANCE

*Illustration shows use of a lunge mine in the manner of a bayonet by suicidal Japanese*





A Conical Hand Grenade  
 B 30 MM Rifle Grenade  
 C 40 MM Rifle Grenade  
 D 45 MM Rifle Grenade (German)

to place the mine correctly and is further limited by the fact that the tank must be stationary.

(b) Rifle grenades.—Two sizes, 30 mm. and 40 mm., of the hollow charge rifle grenade have been recovered and a third, 45 mm., is mentioned in documents as being developed. Due to the lapse of time since the third size was reported, it is conceivable that it is in service use at present.

The two recovered grenades, 30 mm. and 40 mm., are almost exact copies of the German rifle grenades of comparable sizes. It is likely that the reported 45 mm. will also follow German design and for that reason, the German 45 mm. grenade is pictured with the 30 and 40 mm. Japanese models.

The grenades are fired from either the Type 38 or 99 rifles, both standard rifles issued to the Japanese infantry man.

The body of the grenade is cylindrical with a semi-conical shaped head. It is made in two parts threaded together and fitted with a ballistic cap and cone to give the hollow charge effect. The explosive filling of TNT and RDX 50/50 is cast around the cone. The after part of the grenade is made of aluminum. It contains the fuze and explosive train and has a rifled collar at its after end.

The fuze is a simple inertia type fuze which functions on impact with any solid object.

The total weight of the 30 mm. grenade is 0.28 kg., overall length is 6 inches including spigot, length of cone is 2 inches, cone angle, 22.5°. The 40 mm. has an overall weight of 0.474 kg., overall length is 7 inches including spigot, length of cone is 2 inches, cone angle, 22.5°.

The two spigots for the 30 mm and 40 mm. grenades, though the same length and having identical rifled col-

end is recessed out to receive the fuze gaMe.

The large grenade is 6 inches in length exclusive of the fuze and tail. It has a cone diameter of 2 inches with a cone angle of 30°. Total weight of grenade is 1.25 kg. The smaller model is 5 inches in length, has a cone diameter of 2 inches, a cone angle of 38°, and, has an overall weight of 0.84 kg.

The grenades were designed for attacks against armored vehicles but their effectiveness is questionable particularly when the human factor involved in the use of such ordnance is considered.

According to a document the Type 3 conical grenade can be launched by a self-projecting smoke candle by removing the smoke agent. The complete assembly is placed under a tank and fired by pulling a long cord attached to the igniter of the candle. Ignition of the black powder propels the mine against the bottom of the tank.

The effectiveness of such a device depends on the ability of the operator

lars, are not interchangeable, The 40 mm. grenade has been reported as being a modification of the % kg. Hollow Charge Bomb but a close study of the rounds shows that they are not interchangeable and require an entirely separate manufacturing process. These small variations requiring separate manufacturing processes are characteristic of Japanese ordnance design.

The 45 mm. grenade, if found, will no doubt incorporate the same size spigot as that used on the 30 and 40 mm. grenades and will be fired by the same type rifles.

Hollow charge rifle grenades, because of their light weight, glow speed, and oddly placed center of gravity, give very inaccurate trajectories and must be fired at rather close range. The average effective range given for both grenades was listed as 50 meters. At greater distances accuracy is very poor. The initial velocity given by the Japanese for the 30 mm. grenade is 53 feet per second with the Type 38 rifle and 70 feet per second with the Type 99 rifle. Figures given for the 40 mm. were 40 and 50 feet per second respectively for the two rifles listed above.

A captured document warns against over-estimating the capabilities of the grenade. Although hollow charge ammunition will penetrate thick steel plate, its effectiveness on the interior is considerably less than that of an armor-piercing projectile. This supposedly is due to the fact that an A. P. projectile not only penetrates the armor but also explodes after penetrating. The document also states that if a tank is protected by a metal grill or thin steel plates the hollow charge grenade is rendered ineffective.

Documentary evidence dated August 1943 indicates that research had begun at that time on a 45 mm hollow charge grenade, and it was estimated that when perfected, the 45 mm. grenade would probably become the most important of hollow-charge rifle grenades.

(c) *Lunge mine.*—The Lunge mine, estimated by the Japanese to be one of their most effective antitank devices, is in reality a suicide weapon. Documents state that a man can make an attack on a tank and as the force of the explosion is directed away from the operator he can retire after the attack. The authenticity of this statement, however, is questioned.

The mine consists of a conical-shaped hollow charge, with a wooden handle at the apex of the cone. Three metal legs are welded to the base of the cone to give the optimum standoff distance.

The Lunge mine or "Hollow charge explosive" as it is known to the Japanese, operates in the following manner. The operator pulls out the safety pin, then using bayonet tactics, the left hand is placed at the center of the handle, the right hand at the after end, he lunges forward, the legs of the mine strike the target and the handle is driven forward into the cone-shaped charge breaking the shear wire, and driving the striker into the detonator initiating the explosion of the mine.

The overall length of the mine is 78 inches including the handle and stand-off legs. Total weight is 14.3 pounds. The explosive charge contrary to standard hollow charge ordnance is reported to be crude TNT.



*Japanese Lunge Mine*

The cone angle is not reported on rounds thus far recovered, but it is possible that the standard 22.5° angle is used.

A report from the Burma theater describes another hollow charge round known as a "pole charge." This is similar to but smaller than the "Lunge mine." The explosive filling is reported to be picric acid. The explosive filling in the Lunge mine is reported as cast TNT. The operation of the "Pole mine" is the same as for the Lunge mine.

The head of the charge consists of a cone 7 inches long and 5 inches in diameter on the outside with a hollow 23 inches in diameter by 3 inches deep. The main filling is believed to be picric acid. Three legs 3 inches long, are fitted into the face of the cone to provide the proper stand-off distance for the hollow charge. A sleeve 8 inches long by 3 inches in diameter is threaded into the end of the cone around a fixed detonator. A long pole with striker attached slides into the sleeve and is secured to the sleeve by a safety pin and a thin copper shear wire.

No details of the extent of damage the hollow cone charge is able to cause is available; an unidentified report stated that they were used with good effect against Sherman tanks.

## Hollow Charge Projectiles

Only two artillery projectiles, an Army 75 mm. used in the Type 41 and Type 94 mountain guns and an Army 70 mm. round used in the Type 92 infantry gun, have been recovered to date. Documents, however, mention a 105 mm howitzer projectile, a 150 mm. howitzer projectile, and a 57 mm. round for tank guns. The document states that some difficulties are encountered, however, in the designing of large hollow charge projectiles. In order to prevent the projectile case and charge from breaking up on impact and thus destroying the hollow charge effect, instantaneous

detonation is essential. In small projectiles, this is no problem but large projectiles have a time lag because of the greater distance from the fuze to the bursting charge at the base of the flash tube. In an attempt to minimize this, the nose of hollow charge projectiles must be made of a metal which breaks easily upon impact, such as cast iron or zinc; this absorbs the shock and prevents the shattering of the charge and projectile body. The distance between the fuze and the cone was also shortened in order to detonate the charge more rapidly but in large projectiles this makes the round short and squat.

The hollow cone in the fore part of the shell causes the center of gravity to be shifted backward, which has an adverse effect on the trajectory. This made it desirable to shorten the projectile length and blunt the nose to give the projectile better trajectory.

The Army 70 and 75 mm. hollow charge projectiles recovered to date show a marked similarity to known

German hollow charge rounds, both in projectile design and explosive filling. Both the 70 and 75 mm. rounds are fuzed with a Type 88 instantaneous (gun type) fuze. The nose cap is made of cast iron or a zinc alloy. The body of the projectile is made of machined steel and contains the bursting charge, a cast mixture of 60 percent TNT and 40 percent RDX wrapped in varnished paper. The cone and flash tube are made of steel. The cone angle on rounds recovered is 28°.

It can be expected that unrecovered but reported hollow charge projectiles will be similar in design to the 70 and 75 mm. discussed above. The symbol TA 47 is stencilled on all hollow charge munitions to indicate hollow charge design.

According to documents the same difficulties are encountered in the use of hollow charge projectiles as were

A 70 MM Hollow Charge projectile (cross section)

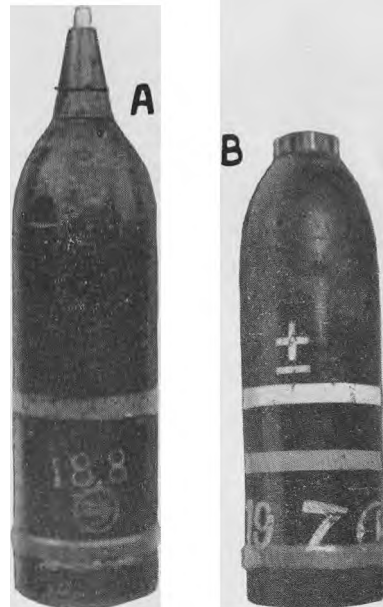
B Provisional Drawing of 57 mm Hollow Charge Projectile

described above for the 30 and 40 mm. hollow charge grenades. That is the problem of inaccurate trajectories at long ranges. Also, the use of hollow charge projectiles is limited to guns of low velocity and requires special modifications in propellant even in low velocity guns. Rounds fired in the Type 41 mountain gun have a reduced weight of propellant powder from that used in the standard H. E. projectile. Since the Type 92 infantry gun is naturally a low velocity gun, the hollow charge round can be fired with the Mk. I propellant (standard propellant for several types of Japanese projectiles). In this connection, it should also be noted that the 70 mm. hollow charge round does not vary greatly in weight from the common service round.

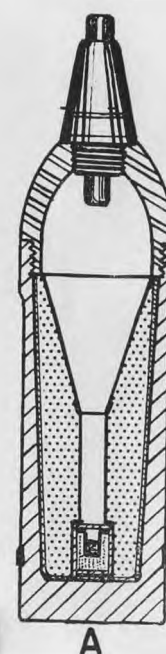
Documentary evidence indicates that hollow charge projectiles of large sizes such as the 105 mm. and

C 75 MM Hollow Charge Projectile

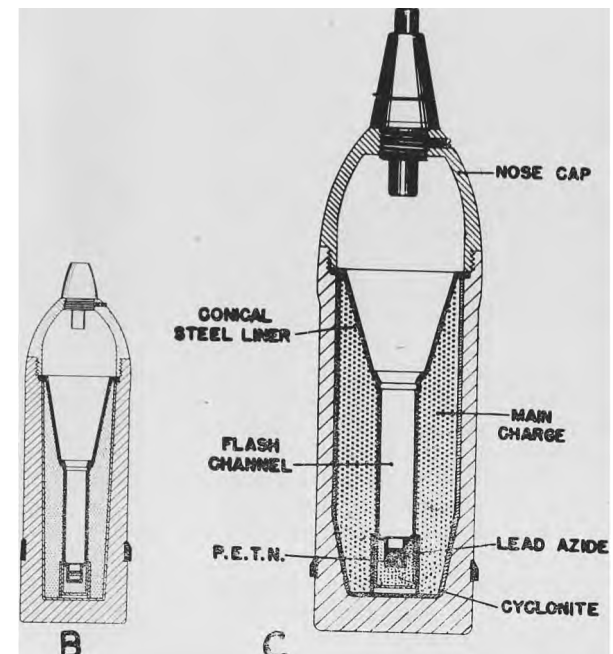
A 75 MM Hollow Charge Projectile  
B 70 MM Hollow Charge Projectile



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150 mm. howitzer types will be found to have a very low speed propellant powder.

## Bombs

To date only two sizes of hollow charge bombs have been recovered—the Army kg. hollow charge bomb and the Navy 1 kg. hollow charge bomb. Documents indicate that some research has been carried out on larger hollow charge bombs, and that the developments on this type of munition by the Germans has been closely followed by the Japanese. However, there are at present no reported or recovered bombs other than the two listed above.

The kg. hollow charge bomb has been recovered with slight modifications. A tail retarding plate was found on the earlier recoveries and in later recoveries this has been absent. Also a longer arming spindle has been noted on the later recoveries.

The kg. hollow charge bomb is of Army design and was developed for use against parked aircraft. It consists of a steel body with steel nose beneath which is a hollow 22.5° cone. The body aft of the cone is filled with a bursting charge of Mk. 2 explosive (50 percent TNT, 50 percent RDX). The after end of the bomb body is threaded to receive the booster assembly, tail fuze and tail assembly. A small layer of pure RDX is pressed into the bomb body directly over and in contact with the main filling. A booster of RDX is inserted into the tail assembly tube and the fuze and tail fins are screwed to the after end of the tube.

The first recovered bombs had a cone angle of 22.5° as mentioned above; however, the later recoveries are reported to have a cone angle of 50°. This is the first reported instance in which the Japanese have used so great a variation from the reported standard 30° angle established in early tests on hollow charge ammunition. That the Japanese have turned to a wider cone angle suggests that

they are well aware of modern developments in the design of hollow charges.

The bombs are carried in clusters of 30 or 76 depending on the type of container used.

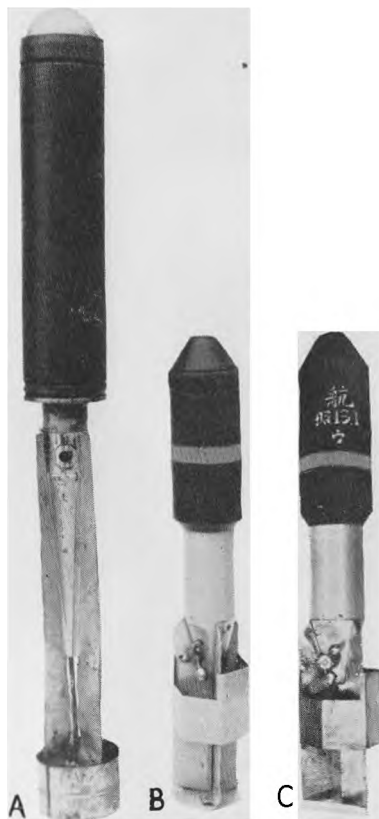
The 1 kg. is of Navy design. It consists of an unpainted sheet steel body with a black steel cone and an aluminum nose cap in the forward end. The cone angle is identical to the

kg. Army bomb, that is, 22.5°. Four tail fins welded to a tail cone are attached to the base of the sheet steel body by four small screws. The arming system consists of the arming vanes and threaded reach rod which screws through the upper end

A. Navy 1 Kq Hollow Charge Bomb

B. Army  $\frac{33}{33}$  Kq Hollow Charge Bomb

C. Army  $\frac{Y_3}{Y_3}$  Kq Hollow Charge Bomb Modified

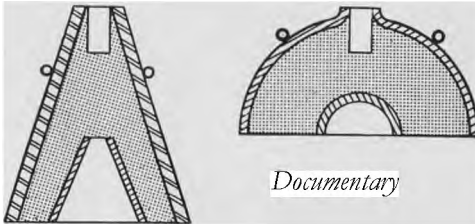


of the fuze body and into the inertia weight. The bomb body contains a bursting charge of Type 98 explosive (TNA 70 percent, HND 30 percent) and a tetryl booster.

The bombs are carried in a Type 2 No. 6 Mk. 21 container which carries 40 of the bombs. They may also be carried in other containers such as the Molotov bread-basket.

## Torpedoes

Information on hollow charge torpedoes is strictly documentary. The Japanese have done a great deal of research on a torpedo incorporating a hollow charge effect but to date information concerning its construction is fragmentary.



## Demolition Charges

Documents indicate that the Japanese have a few prepared charges having a hollow charge effect but to date none have been recovered. The documents state that by using these prepared charges, it is possible to penetrate a concrete wall or steel plate of the same thickness with a fraction of the weight of the explosive charge hitherto used.

The charges are made by casting picric acid and other explosives and by pouring these into a mould, cone-

shaped and hemispherically shaped charges are formed. In cases of a demolition charge of 2 kg. or less, the conical type is used; when 3 kg. or larger, the hemispherical is preferred.

## Summary

In general the Japanese hollow charge munitions reported and recovered to date conform to the following characteristics.

1. Cone angle approximately 30° with a few variations. (Latest recoveries have larger cone angle.)
2. Cone is made of steel.
3. Explosive filling is a mixture of TNT and RDX, or TNA and RDX.
4. All rounds have instantaneous fuzing.

The Japanese have published the following precautions to follow in handling and storage of hollow charge ordnance.

The charge used in this ammunition is extremely delicate, and even slight deviations in its manufacture greatly effect its power; therefore, great care should be exercised in handling it.

When a charge is placed in a projectile, it is coated with paraffin. Unless care is exercised to keep the paraffin from melting in the direct rays of the sun, the position of the charge within the projectile may be changed.

The type of nose coupling differs from that of the ordinary shell; since moisture is liable to enter the booster charge chamber, especial precautions must be taken to guard against dampness.

Since the hollow charge rifle grenade absorbs moisture easily, special care must be taken.

# JAPANESE DEMOLITION EQUIPMENT

Japanese demolition equipment is quite similar in appearance and construction to that of the Allied nations. Personnel trained in the use of allied demolition equipment could efficiently use captured Japanese material. Since the history of storage conditions and age of such captured equipment is not known, it is recommended that it be used for routine 'demolition work rather than the destruction of equipment or installations where positive detonation on the first attempt is essential to tactical plans.

## Safety Fuze Igniters

**TRIGGER TYPE**—Consists of a housing, firing assembly, and sear lever. A pull on an attached lanyard cocks the firing pin by compressing the spring, and the sear is forced under the firing pin, holding it in position. The device is on "safe" position when the solid portion of the safety ring is rotated beneath the trigger. To fire the device, the safety ring is rotated until the cutaway portion is opposite the trigger. Depressing the trigger raises the sear and releases the firing pin.



**PULL FRICTION TYPE**—The "Red Type" is composed of a brass body with a red plastic outer sleeve. At one end a screw cap is fitted with

an eye for attaching a pull or trip cord. Attached to the inside of this cover is a short pull string which projects through a small pellet of friction ignition composition. When the sanded end of the string is drawn through the pellet, it ignites and flashes through the igniter body. The end of the igniter into which a safety fuse is crimped is covered with a piece of tinfoil to keep out moisture. The ignition pellet is contained in a brass tube crimped into the brass case. Igniter length, 2% inches. It has only one ring or depression on the body for gripping.

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**CONFIDENTIAL**



**THE "BLACK TYPE"** differs slightly from the red igniter, the brass case is slightly longer and the black plastic sleeve is slightly larger. The friction ignition pellet is also slightly larger. The sleeve over the case has 14 rings or depressions around it to give a firmer grip on the fuze body. The igniter pellet is contained in a brass tube crimped into the brass case. The cap is not threaded but slides off as the ring is pulled by the trip wire. Both ends of the igniter are sealed with tinfoil to keep out moisture. The igniter length is  $33 \frac{1}{6}$  inches. Both the red and black igniters are wrapped in wax paper.

### Time Fuse



All recovered safety or time fuse should be tested for burning time before each use.

There are four known types of safety fuse, each being identified by the fiber coating. The tan covered fabric with one white thread wound spirally on its surface has a rate of burning of approximately 32 seconds per foot.

The "Black" type has a black fabric covering. The rate of burning is reported to be 32 seconds per foot. Two white fabric covered safety fuses have been recovered. However, they vary greatly in rate of burning. The Type 1 fuse has a waterproof cover-

ing, which according to document will keep the fuse dry for a period of 24 hours. The powder train is covered with silk layers and cotton and hemp layers. A coat of white paint is applied over the entire covering. The rate of burning is 30 seconds per foot. The other white safety fuse has a white thread covering. The rate of burning is approximately 45 seconds per foot as compared to the rapid 30 seconds per foot Type 1 fuse.

### Blasting Caps



Japanese blasting caps are manufactured to be fired electrically or by means of safety fuse.

The nonelectric caps to be fired by safety fuse are the copper case cap, brass case cap small, and brass case cap large. The copper case cap corresponds in size to the U. S. No. 6 cap. At the lower end of the detonator there is a cone-shaped depression to utilize the Monroe effect and direct the force of the initiating explosion toward the booster or charge.

Length .....	1% in.
diameter .....	% in
Total weight .....	2.34 grams.
Explosive content & weight:	
(a) Fulminate of mercury ..	1.00 gram.
(b) Tetryl .....	0.17 gram.
Material of construction .....	Copper.

The brass case cap small size corresponds closely to the U. S. No. 8 but is thinner and longer.

Length .....	22% <sub>2</sub> in.
Diameter .....	% in.
Total weight .....	4.24 grams.
Explosive Content & weight:	
(a) Fulminate of mercury ..	0.40 gram
(b) Tetryl .....	0.85 gr am.
Material of construction .....	

The large brass case cap is larger and more powerful than any used by U. S. forces for demolition.

Length .....	2 <sup>2</sup> / <sub>2</sub> in.
Diameter .....	<sup>1</sup> / <sub>6</sub> in.
Explosive content & weight:	
(a) Fulminate of mercury	<sup>1</sup> / <sub>2</sub> 88 gram
(b) PETN..	<sup>1</sup> / <sub>2</sub> 93 grams
Material of construction .....	Brass

The Type 97 is the only electric blasting cap recovered to date. It consists of a brass outer case containing a brass inner case filled with fulminate of mercury, a deadening agent and PETN. Also crimped into the outer case is a plastic tube filled with fulminate of mercury. A plastic plug carrying the electric igniter bridge slips into this tube and is held in by a crimp in the brass case. The assembly is sealed with white cement at the point where the two wire leads enter the brass case. Documents also mention a Type 98 electric detonator which is water-proofed and can remain in water for 12 hours without damage. The cap has a platinum firing bridge and leads.

### Demolition Explosives

*Detonating cord.*—Type 97 detonating cord resembles the "Tan" safety fuse but is larger in diameter. It consists of a PETN core surrounded by wrappings of cotton, hemp and waterproof layers. It is tan in color, <sup>1</sup>/<sub>2</sub> inch in diameter and has, a detonating rate of 19,000 feet per second. According to documents the cord will remain waterproof for. 72 hours.

A Type 3 detonating cord is mentioned in documents and is reported to be used to destroy enemy airplanes and barbed wire entanglements.

The cord is a rubber tubing filled with Pentolite (PETN 50 percent/ TNT 50 percent). It evidently is carried in short lengths of about 3 feet with a safety fuse and firing device attached when used for specific purpose mentioned above. The delay was listed as 3 to 30 seconds when rigged as above.



**PLASTIC EXPLOSIVES**— Japanese plastic explosive is issued in four ounce rolls 4 inches in length by 1<sup>1</sup>/<sub>2</sub> inch in diameter. Three of these rolls, individually wrapped in parchment paper, are packed in a paper wrapper.

An analysis of this explosive shows a content of 80 percent cyclonite and 20 percent vegetable oil binder. The explosive is light brown in color.

**PREPARED CHARGE S**—The Japanese use three main explosives in demolition blocks: picric acid, haishoyaku (a combination of ammonium perchlorate, cyclonite, silicon carbide and paraffin) and tonoyaku (TNT / RDX). Dimensions of each block are 2 by 2 by 1 inch, weighing <sup>1</sup>/<sub>2</sub>, pound. These blocks are used to make different size charges by joining them in strips, inserting in cans or binding together in bags.



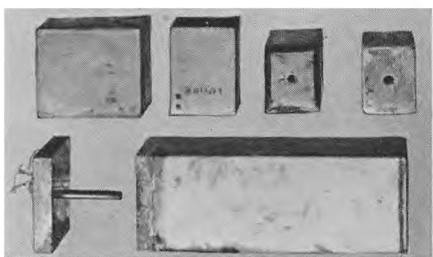
Type 3 detonating cord

### TNT AND PICRIC BLOCKS.—

These two blocks are identical in size and weight. One is made of pressed wrapped grain TNT, and the other consists of pressed, wrapped, grain picric acid. Weight, 7 ounces; dimensions, 2" x 2" x 1" inches; two holes are provided for the insertion of blasting caps.

### TNT AND PICRIC STICKS.—

These blocks are 4½ inches long cylinders weighing 7 ounces. One stick consists of pressed, wrapped, grain TNT, and the other is pressed, wrapped, picric acid.



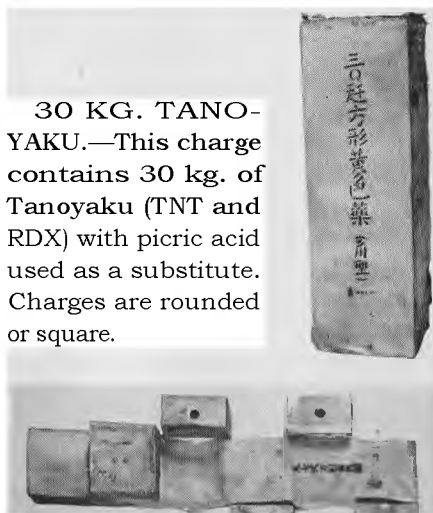
**DEMOLITION BLOCK.**—This charge is made up of four blocks of picric acid packed in a light metal container. The top block is twice the size of the other and contains a hole to receive the detonator. Weight, 2 pounds 14 ounces.

**DEMOLITION BLOCK.**—Three 7¾-ounce blocks and one 1-pound block of grey-colored explosive. These blocks fit in a tin-plated steel container.

**DEMOLITION CAN.**—This charge consists of three pressed, wrapped, picric acid blocks in a rectangular zinc can.

**1 KG. DEMOLITION CAN.**—This can is filled with cast wrapped picric acid. Strings are attached near the two primer seats to facilitate attachment of blasting caps.

**5 KG. DEMOLITION CAN.**—Can filled with cast, wrapped, picric acid. Weight is 5.5 kg. Two primer seats on the top and one on the side have strings attached to facilitate attachment of blasting caps.



**30 KG. TANO-YAKU.**—This charge contains 30 kg. of Tanoyaku (TNT and RDX) with picric acid used as a substitute. Charges are rounded or square.

THE TYPE 97 demolition block is often encountered in translation of documents refers to the form of the blocks and not to the chemical analysis of those blocks. Type 97 explosive according to documents may be of any one of three chemical formulas.

## Demolition Tubes

The Japanese bangalore torpedo, finned demolition tube, Type 99 demolition tube and obstacle demolition tube fall into this classification.

The Japanese bangalore is a brown steel tube filled with cyclonite and TNT. A pull igniter and two blasting caps which screw into one end of the tube serve as the firing device. Additional lengths of tube may be screwed onto the other end or a steel ogive is screwed on as a closing plate.

The bangalore torpedo is used against barbed wire obstacles, mine fields, and for other demolition purposes. It may also be rigged as a booby trap.

To explode the torpedo, the safety pin is removed from the fuze head and the lanyard attached to the igniter is pulled. The fuze contains an 8-second delay.



*Bangalore torpedo fuze*



*Finned demolition tube fuze*

The finned demolition tube is similar to the bangalore, but has fins attached to the after body. The torpedo is fired from a Type 98 projectile discharger. The fuze used in the torpedo is a combination instantaneous and delay fuze. The arming vanes are released by a set-back pin and rotate off the striker as the torpedo travels through the air. On impact the striker drives the firing pin into the primer detonating the explosive train. No shear pin is present; a weak creep

spring holds the firing pin away from the primer.

The Type 99 demolition tube, another demolition weapon, has been reported in documents. The tube is reported to weigh 35 kg. and is 44 inches long. The fuze is actuated by a pull cord and has seven-second delay.

Another reported but not recovered demolition tube is known as an "Obstacle Demolition Tube." It is reported to be 35 feet long and weighs 102 kg. The construction is similar to the bangalore, but the fuze is actuated by electrical means. The exterior of the tube is colored light brown.

Documents mention a "Land Demolition Charge, Modification 1." It is stated that the charge is used in Bomb Disposal work to open the ground or for demolition of ground objects, supposedly used to blow buried bombs in situ. The explosive used is Type 98 (HND 40 percent, Trinitroanisol 60 percent or Picric Acid-770 g. The dimensions were given as: Height, 100 mm.; diameter, 80 mm.

There are two types, one type for use in humid areas and the other for use in dry, areas.

## DELAYED ACTION MINE

The following is an excerpt from a captured Japanese document on methods of improvising mines. Special purpose mines may be improvised from Type 98 No. 25 Land Bombs Model 1 Modification 1, Type 2 No. 25 Mk. 3 Model 1 Modification 1 Incendiary Bomb, or Type 1 No. 25 Mk. 2 Bomb Model 1 Modification 1, fuzed with Models 1, 2 or 3 of Type 99 Special Tail Firing Mechanism (C-1 (a)). The bombs are buried vertically, nose down, with shipping plug

in the fuze pocket. The plug is removed and the fuze is inserted at the appropriate time.

The firing mechanism is armed by removing the safety fork, unscrewing the vanes and striking the head of the firing mechanism with a hammer.

The delay periods are as follows:

Model 1: 2-12 hours.

Model 2: 12-72 hours.

Model 3: 72-120 hours.

Delay periods will vary greatly, depending upon temperature.

# BOOBY-TRAPPED

## AMMUNITION DUMPS

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The following is a reprint from a Military Intelligence Bulletin.

Retiring Japanese troops on the Batangas Peninsula, Luzon, ingeniously booby-trapped three sizeable ammunition dumps in the vicinity of Imoc Hill. The existence of probable hidden demolitions in this area was revealed by the shattered bodies of two civilians and a dog, who had paid the price of inquisitiveness. Ammunition dumps at Gapan also have been booby-trapped, and one of these, too, had been set off by the unwary.

An investigation of the remaining munitions in both areas revealed that other dumps had been cleverly booby-trapped. The munitions booby-trapped in a typical instance consisted of 75 boxes of Type 99, 7.7 mm. rifle and machine-gun ammunition, and 15 boxes of Type 89, 50 mm. grenades. The boxes were neatly stacked six high within a revetment cut into the side of a hill. The revetment was only large enough for the munitions. Entrance and encirclement were not

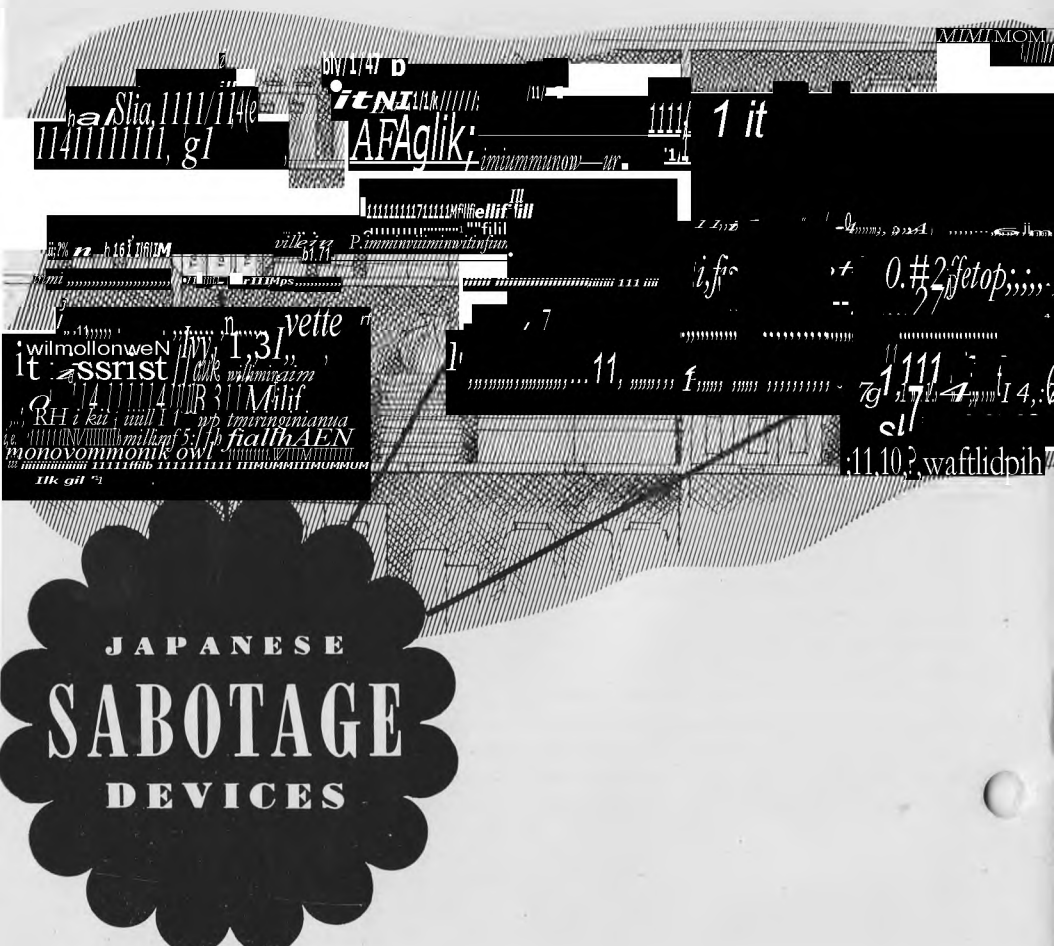
possible on the ground level, and inspection could only be made from one end and from above.

From the top of the embankment, the site resembled a poor attempt at concealment of a trench. Loose dirt, twigs, and grass had been thrown on top of a roof consisting of two sheets of corrugated iron and a plywood door, presumably from one of the dwellings nearby.

Fastened beneath the main components of the roof to long branches were the strings of six "Black Type" (See article this issue on Demolition Equipment) friction igniters fixed in box type mines. The mines were placed directly on top of the stacks of munitions and carried the entire weight of the roof. Therefore, any attempt to move any portion of the covering material would be likely to pull at least one of the igniters, detonate the blasting cap crimped to the end of the igniter, set off the picric acid blocks of a box mine, and cause the explosion of the ammunition.



*You needn't be quite so meticulous with those shaped charges, Hubert.*



JAPANESE  
**SABOTAGE**  
DEVICES

As our forces move toward the Japanese mainland, they have noted a marked increase in the use of sabotage devices. Crude improvisations used as sabotage devices in the early stages of the war are being superseded by standard manufactured devices. From a haphazard novice program of sabotage and booby trap warfare, the Japanese are rapidly emerging with workable devices and personnel trained in their use. Any or all of the devices manufactured for sabotage work could very easily be used as a booby trap.

New Japanese sabotage devices recently recovered in the China-Burma theater are discussed below. The in-

formation is taken from a report sent in by Lieut. Smith and Lieut. Lundholm. Where additional information on sabotage equipment is available, it is also listed.

The Japanese made no extensive use of sabotage in India or during the recent campaign in Burma. However, at various times isolated pieces of sabotage equipment like explosive-filled tins of strawberries and tubes of toothpaste were reported, and on one occasion two complete demolition kits for saboteurs were found.

One revetment of a large ordnance dump north of Rangoon was devoted entirely to sabotage devices. There were no complete individual demoli-

## Libby's 'Strawberries' and "Pineapples"

The tin of "strawberries" was first found in India last December and reported as a sabotage device. The smaller "pineapple" can was discovered more recently near Lashio, Burma, and was reported both from this theater and from the Philippines, where it was also found, as a booby trap. Both cans may be effectively used as either, their true identity being cleverly disguised by an exact counterfeit of the labels used by the Libby Co. on its tins of canned fruit. But any common labels could be used for that matter.

The tin of "strawberries" is described in the U. S. Navy Bomb Disposal Intelligence Bulletin, #85. The "pineapple" is similar in all respects to the "strawberries" except for size. The former is according to the label, a 14 oz. can, whereas the latter is the standard No. 2 can and the markings indicate that it holds 1 lb. 4 oz.

In addition to the safety fuse method of ignition described in USNBDIB #85, a slight modification employing a brass sleeve with an enclosed friction igniter is known to exist from the isolated specimen recovered near Lashio. No brass sleeves were found at Rangoon, however.

An effective booby trap can be made if the pull igniter is appropriately secured, for example to the ground or to a shelf. Thereafter any attempt by a hungry and unwary person to pick up the can will result in detonation.

tion kits assembled as such, but stored there were large quantities of items obviously intended to equip persons (with little or no training required) as saboteurs.

The items found included not only the previously reported cans of explosive deceptively camouflaged as Libby's Strawberries or Libby's Pineapple but also the following: Explosive coal; incendiary bricks; four different types of well constructed metal incendiary cylinders (not camouflaged); small bakelite cylinders each containing a small dry cell battery.

It was impossible to determine the exact quantity of each type of device in the revetment because Burmese iooters had taken away the planks used to shore the sides and cover the top of the dump, so that the revetment caved in and buried most of the stores. However, there seemed to be at least 40 or 50 wooden cases and each case can hold for example, 20 cans of "Pineapples."

One instance of the effective use of home of this equipment occurred last week in Rangoon. A Japanese or a sympathizer placed a liberal amount of explosive coal among the ordinary coal in the tender of a locomotive. When the fireman stoked the boiler, some of this "coal" was shoveled into the fire box. The resulting explosion ruined the boiler and killed the engineer and fireman.



*Libby's "Strawberries" and "Pineapple"*

In Engineer Intelligence Summary No. 1 published by ALFSEA (Allied Land Forces Southeast Asia) an acid delay to be used in conjunction with the "fruit" cans for sabotage purposes is reported. However, no details of construction or operation were given and there was no mention as to source of the information. No acid delays were found in the Rangoon dump.

### Explosive Coal

The explosive coal, which is believed to have caused the locomotive explosion described above, has the external appearance of a piece of anthracite. As with genuine coal there is no uniformity of shape among individual pieces, but each is approximately 3 inches long with a maximum depth and width of 2 inches. The casing is a thin earthenware substance coated with a bitumen type paint to give it an anthracite appearance. Close visual inspection of a piece of this "coal" should immediately arouse suspicion that it is something other than coal, but it would be virtually impossible to detect the difference in a coal pile or bin.

The main filling is RDX, and contained in the explosive is a copper tube filled with gunpowder and a small detonator. The tube is placed in the explosive with the gunpowder and close to the casing, but there is no external evidence that it is present. In operation, the "coal" is tossed into a fire and the heat of the fire will eventually ignite the gunpowder which in turn sets off the detonator and the main charge.

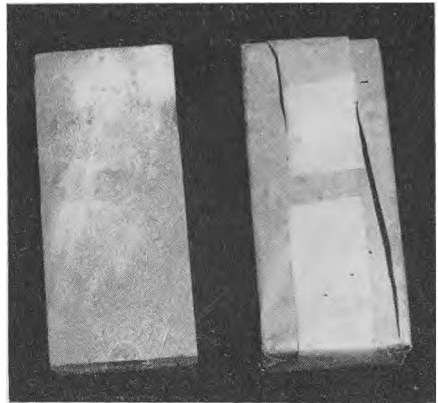


*Explosive coal*

### Incendiary Brick

Unless one is a skilled artisan, it is almost impossible to discern that this incendiary device is other than a genuine glazed brick. It is comparable in size and weight to a standard building brick, and is simply a block of thermite wax-coated with paint to give it a bricklike appearance. There is no place for the insertion of a detonator or initiating device, and there does not appear to be a self-contained detonator, as with the "coal." Nor is any other explosive present. These writers in conjunction with the Chemical Warfare Intelligence Officer of the British 12th Army ignited a brick, which had been exposed to the monsoon rains for some time, with a blow torch. It burned with a sputtering effect giving off many white sparks and fusing into white coals; there was no detonation to scatter the incendiary about.

The device is made to resemble a brick merely to permit its being carried about without detection.



*Incendiary Brick*

### Incendiary Cylinders

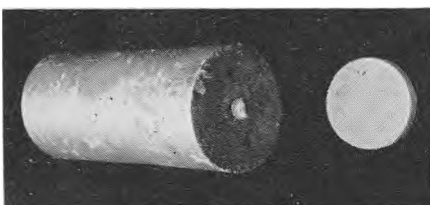
Four types of incendiary cylinders were uncovered in the same revetment with the other sabotage equipment. The casing is constructed of a very light undetermined metal, and in all types measures 2% inches in diameter and 6% inches in length. An igniter is fitted into the upper end of the



*Four Types of Incendiary Cylinders*

cylinder and extends down into the main filling which is believed to be **thermite**. There are two different means of ignition and one cylinder has vents around the upper portion to permit faster escape for the thermite.

The igniters are either pull type or scratch type, with a delay element (length of delay unknown) and a first fire charge consisting of 5 grams of a mixture of antimony sulphide, aluminum, and potassium chlorate. The string for the pull type igniter is secured in the shipping position with scotch tape. With the scratch type igniter is provided a circular piece of wood with rough sides, wrapped in wax paper and secured on the top of the cylinder with scotch tape. The match composition protrudes slightly from its recess in the top of the cylinder so that the wooden piece may be readily rubbed across it. This type igniter is fitted to the cylinder with the vents.



*Incendiary cylinder showing scratch block*

It should be noted that no attempt has been made to camouflage these incendiary cylinders, but their shape and external appearance are so simple that suspicion may not be aroused on first glance.

### **Bakelite Battery Containers**

The use of this device is a matter of conjecture. However, since it was found in a sabotage dump it is assumed that it is intended to be used to ignite electric detonators, although the battery seems too small.

The over-all length of the container is 2 inches and it has a uniform diameter of 2 inches. The small battery is 1' X<sub>6</sub> by 1%<sub>6</sub> by % inches. The positive and negative poles are on opposite ends of the battery. The negative pole rests in a seat on a copper strip in the bottom of the container, the copper strip being attached to a terminal which extends through the casing. The middle section of the case is threaded to the lower part, and in addition to the central hole in the top, one side is lopped off so that the positive pole of the battery is exposed both through the side and through the top. The upper section in turn threads on to the middle section. A hole in the top of the upper section matches the central hole of the middle section, permitting access to the

positive pole of the battery. But there is no corresponding opening on the side of the upper section, so that lateral access to the battery is not possible with the upper section or top on.

Perhaps one wire lead from a detonator is attached to the terminal on the casing. Thereafter, if the other lead is attached on the positive pole, the battery should fire the detonator.

### Bakelite Battery Case

No person interviewed by these writers could give any clue as to the use of this device and all were in accord that the battery seemed much too small to fire an electric detonator, especially if the lead wires were long enough to establish a normal safety distance from the detonator. Nevertheless, the device was found in the midst of a purely sabotage collection and must therefore have some related use.



*Bakelite Battery Cases*

### Bar of Soap

An incendiary charge specifically designed to resemble a bar of "Ivory" soap has been recovered. The bar measures approximately 4.17 by 2.67 by 1.45 inches and weighs approximately 14 ounces. The analysis of the composition is:

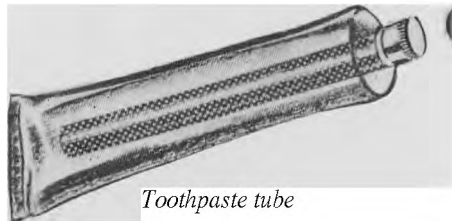


*Ivory Soap*

	<i>Percent</i>
Paraffin wax .....	19.4
Rosin .....	10.9
Barium nitrate .....	30.4
Ferrosulfuric oxide .....	9.1
Aluminum metal .....	11.1
Magnesium metal .....	11.3
Nitrocellulose metal .....	4.4
Gritty siliceous material .....	2.6

No definite system of ignition has been found to date but it is possible that some type of pull igniter with detonator attached may be inserted in the bar.

The bar is difficult to light and is easily extinguished by water.



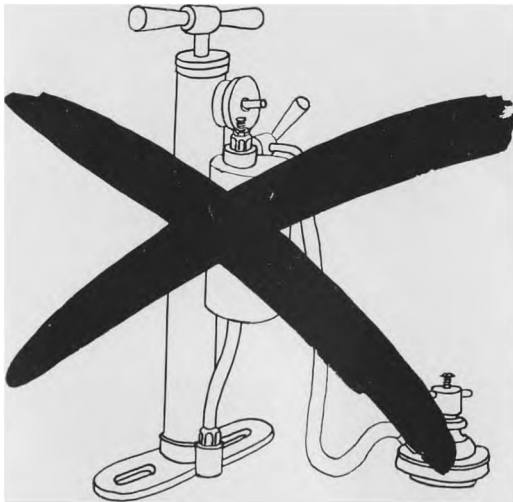
*Toothpaste tube*

### Tube of Toothpaste

The "Tube of Toothpaste" consists of a tube containing the main explosive, and an igniting system. Externally it appears to be a tube of toothpaste with the paint completely removed.

The tube, which is 6.87 inches long and about 2 inches in breadth, is made of tin. The tube can be squeezed into shape as in the case of a tube of toothpaste and hence the breadth measurement is only approximate. The tube is closed by a screwed cap. It contains a filling which consists of 80.2 percent cyclonite and 19.8

(Continued on Inside Back Cover)



## **LINEAR- SHAPED CHARGE ATTACK ON VT FUZES**

Recent development at O. I. L. of linear shaped charge for halving 5-inch projectiles has resulted in a simpler method of disposal of VT fuzed rounds. Two linear shaped charges of the proper dimensions, when placed axially along the projectile, spaced 180° apart and detonated, will separate the projectile into two halves, with no explosion of the main charge. It also throws both the nose and tail fuze from the round, thereby performing the function of remote control projectile fuze removal, a B. D. operation which has not previously been possible.

By means of this technique, it is possible to remove Mk. 32 VT fuzes from dud 5-inch projectiles remotely without causing the round to detonate. Without further moving the fuze, its booster can be blown high order, thereby completing the attack.

The advantages of this method of disposal over the Stevens Stopper attack are: (1) that the only special equipment necessary is the linear charge liners, and (2) that the charges can be quickly placed with the minimum of excavation around and movement of the round. The disadvantages are: (1) that there is a chance of

high order detonation of the round due to mechanical shock to the fuze when splitting the projectile therefore requiring evacuation of the area, and (2) that two set-ups are necessary—one to split the projectile and the second to detonate the booster of the VT fuze without moving it.

### **ATTACK METHOD**

Two linear shaped charges, built according to specifications shown on page 27, are required for each projectile. Plastic explosive is packed tightly into the corners, the liners are filled completely and the explosive is trimmed off level with the edges of the metal walls. Approximately 1% pounds of plastic explosive is required to fill the two liners. The projectile is uncovered so that slightly more than one-half of its surface is exposed, the metal bracket is laid approximately 1 inch ahead of the rotating band (see figure 1) and the charges are laid in place. The metal bracket supports them 180° apart on the circumference of the projectile. If no brackets are available, a wire or light cord may be slipped under the projectile and the charges tied firmly in place, 180° apart. (See figure 4.) The large end of the charge must be lined up to exactly even with the butt

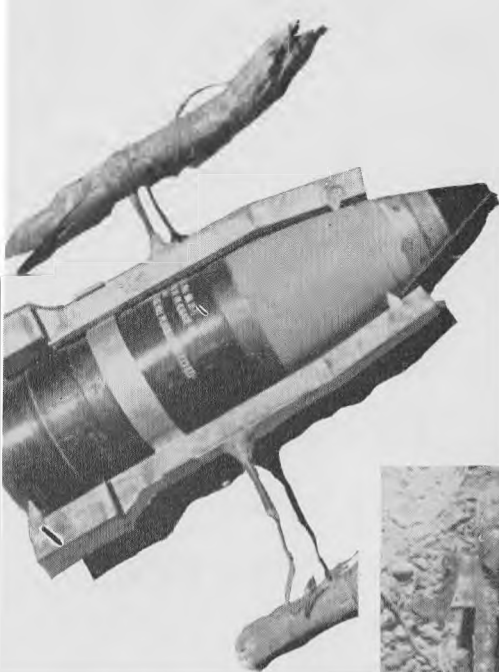


FIGURE 1 *Left—Linear shaped charges installed on VT fuze 5" projectile with support bracket.*

FIGURE 2 *Below—VT fuze 5" projectile after splitting with linear shaped charges.*

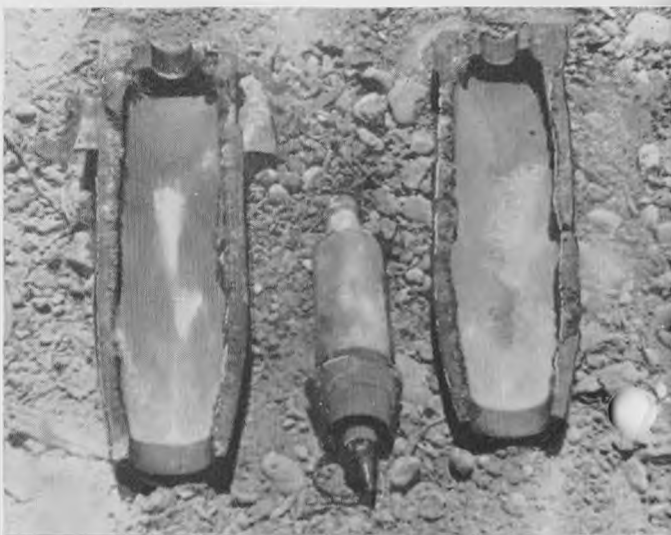
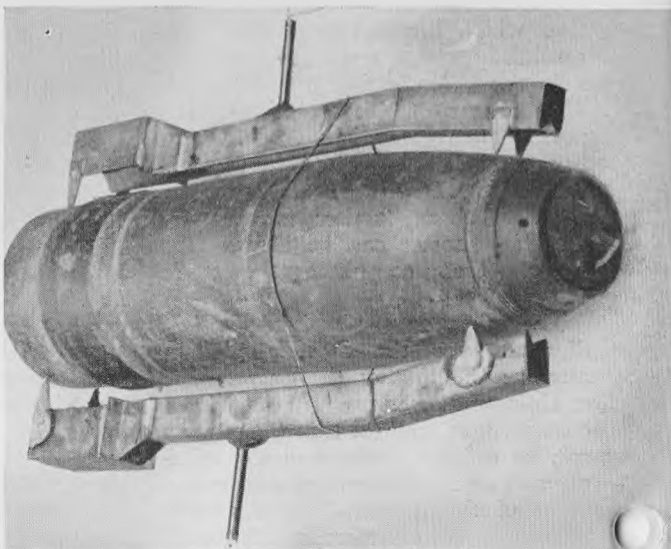


FIGURE 3 *Below—VT fuze being pulled from partially split 5" projectile with line.*

FIGURE 4 *Right Below—VT fuze 5" projectile with linear shaped charges wired in place.*





forced into the plastic in the liner, an uncut spot in the projectile will usually result.)

The caps may be wired in series or in parallel and adequate evacuation distances for high order detonation of a 5-inch projectile must be cleared. In testing this attack, 1 Mk. 32 fuze out of 21 fired when the projectile was being split. The auxiliary detonating fuze did not function in this case, although armed, so high order detonation of the projectile did not occur. As the possibility of high order detonation does exist, however, evacuation distances should be maintained.

The normal results of firing the shaped charges are shown in figure 3. The projectile is split cleanly in half. The top half is thrown 30-50 feet, while the VT fuze is thrown 15-20 feet. This type of splitting occurs in about 4 cases out of 5. In the fifth case, the results shown in figure 3 occur. Incomplete splitting is caused by jet interference where the 1s-inch liner joins onto the 3/4-inch liner. The forward end of the projectile is opened up sufficiently to allow the VT fuze to be thrown clear. In only 1 case out of 21 was the fuze not thrown clear by the charge and in this case, the projectile was opened enough so that a line looped around the fuze made possible pulling the fuze clear remotely as shown in figure 3.

When the projectile is only partially split, the hot slug from the jet may come to rest in the explosive and set it on fire. If the fuze has been thrown clear, no danger exists from this condition as the explosive will burn quietly in this unconfined state. However, if the fuze is not thrown clear, the heat of burning may detonate the fuze booster so the evacuation distance should be held for about 30 minutes while the explosive burns out and the booster detonates.

The VT fuze should not be moved after it has been thrown from the pro-

jectile because it may detonate at any time by movement. Enough tetryl is present in the booster to kill or seriously maim anyone handling the fuze. The best procedure is to direct an Mk. 2 shape charge cone at the booster and detonate it remotely or detonate with plastic or s-inch block of TNT placed near it.

Details of the shaped charge liner are shown on page 27. It will be noted that a 3/4-inch liner is used for cutting the thin section of the projectile wall while a 1 3/4-inch liner is needed to cut the base. The shape of the liner, thickness of the metal, and stand-off distances must be made with very close tolerances to obtain satisfactory results.

The Bureau of Ordnance is planning to supply these linear shaped charges to all Bomb -Disposal activities and they will probably be added to the J-4A allowance lists.

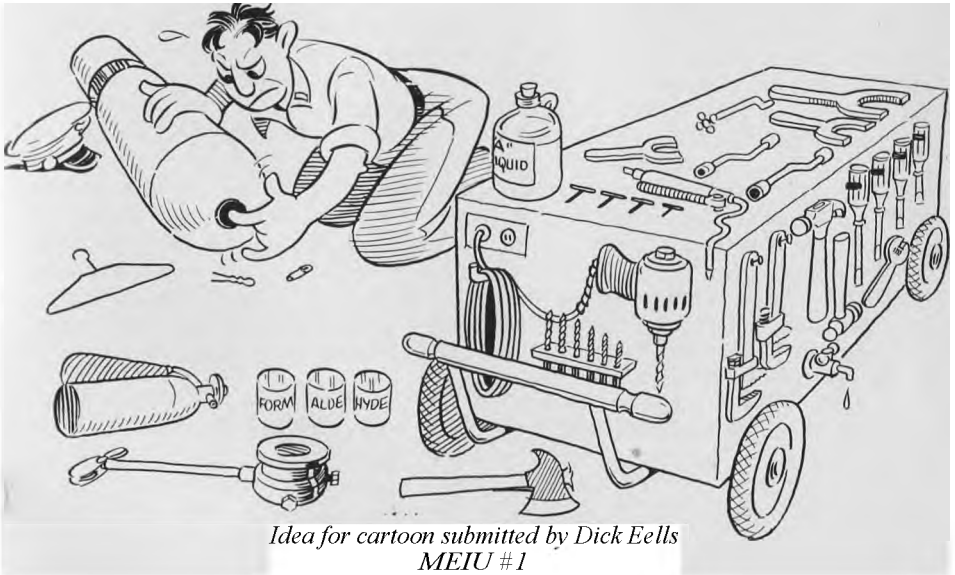
While this attack is applicable for any VT fuzed 5-inch projectile, its value is greatest in replacing the Stevens Stopper attack on Mk. 32 and Mk. 40 VT fuzes. It should always be used to dispose of 5-inch projectiles fuzed with Mk. 32 Mod. 0-20, 40 fuzes and should be used to dispose of Mk. 32 Mod. 30, all Mods. of Mk. 40 fuzes unless they are known to be more than a week old, in which case they are safe to remove to disposal areas. The Mk. 53 fuzed 5-inch round is rendered safe more simply by directing the jet of a Mk. 2 shape charge cone at the firing condenser under the plastic nose so this linear shape charge is not necessary.

Obviously with this attack, the same waiting periods before a VT fuzed projectile may be approached with safety must be maintained. These periods are 4 hours for the dry battery energized fuzes, Mk. 32 Mods. 0-20, 40 and 15 minutes for the wet energized fuzes Mk. 32 Mod. 30 and all Mods. of Mk. 40.

# THEORY

cl

## OF BOMB DISPOSAL ATTACK



*Idea for cartoon submitted by Dick Eells  
MEIU #1*

Most graduates of the Bomb Disposal School should remember the sequence in the British movie "UXB" of Mr. 'awkins using a doctor's stethoscope on a (17) German Rheinmetall fuze to determine whether or not it was functioning. They also undoubtedly remember seeing, while they were in school, some stethoscopes costing about \$175 each especially acquired for USN Bomb Disposal. The only use the latter has ever been put to, so far as the writer knows, is as a field telephone by an enterprising BDO. It connected his office with his workshop. The Kim costing around \$125 was used to pick up nails in the Caribbean and at the Bomb Disposal School. Remember the brass collets for the L. F. D. They cost \$90 each. A lot of time and money-

consuming research has been done on tools for B. D. by all three British services and by both the American services. Most graduates have never used the tools. Naturally, many BDO's and PO's are confused about the whole tool situation and every time they hear of research or a new tool they ask "WHY?"

Special B. D. tools have always been designed to take care of a minority of the work done in the field. Their development has always been directed toward two ends: one, to take care of a situation that standard tools could not cope with; and, two, to provide an alternate attack for a situation which standard tools could cope with. In the latter case, specialized tools are insurance. Keeping the fact in mind that special B. D.

tools are designed primarily to handle "the odd job", it is entirely possible that a BDO may dispose of tons of ordnance and never use a special tool. Two hundred BDO's may never use a special tool. But if one man uses a special tool once and it saves him from injury, the time and cost of that tool is not spent in vain.

The basic philosophy of attack boils down into a few cardinal principles as far as use of tools are concerned. (1) **The more ways of attacking a fuze an operator knows, the better the chances are that he will know the best one to use on his particular problem.** (2) **No remote control tool increases the chances of completing the job successfully. They merely increase the operator's safety if the job is unsuccessful.** (As a matter of fact, some believe remote control tools decrease the chances of completing the job successfully, because they are more difficult to handle than hand tools.) (3) **Many operators will "get away with" unsafe methods and brag about it, but that doesn't mean that the next person will have the same success.**

The Bomb Disposal School is obligated to furnish as many safe methods as possible for each situation. It is up to the operator which one he uses. The school is obligated on the other hand, not to order a person to use a specific attack. It must be the operator's choice. If he wants to use unsafe methods, it is his own life with which he is playing. The school is doing its best to make known safe methods. There is still room for improvement; but the BDO who brags about foolish methods in official reports to BuOrd and CNO, tends to put himself in a bad light rather than the Bomb Disposal School.

Methods taught here at the school in the past have varied from time to time and will continue to vary. All of the methods taught have been proved from a workable and a safety point of view. Let us look at some

of the specific attacks for illustrations of these points.

Any fuze that can be removed by the tape and line method can obviously be removed also with a Stillson or by hand. This would apply to fuzes such as the B-4 (a), B-3 (b), B-2 (a), Mk. 219, and Mk. 223. This would also be true of fuzes on which the Jap reel can be used. Common sense would also tell one that any fuze that is removed with the rocket wrench can also be withdrawn with a Stillson or by hand depending on how tightly it is secured. Other specialized tools which perform the same function as hand tools are the British fuze pocket remover, the split pipe, and projectile wrench. It is true that many of these tools give the operator more mechanical advantage to use and many BDO's think some of them are more convenient to use than hand tools.

Another example is the attack on VT fuzes. Many operators believe that these fuzes are safe enough to pick up to carry away and prove it by instances in which they have done this. Granted their luck was good in the particular cases referred to, still the law of averages always seems to be a more dominant influence in the end than Lady Luck. The School has issued safe and tested methods of removing the factor of luck from VT fuze disposal, but it is up to the operator whether he cares to protect himself by using the safe method.

BD tools were developed in the hope of making the job either easier or safer for the operator. It is up to each operator to review in his own mind the best method of attack from those available to him.

The greatest aid in teaching new students how to attack problems, is the reports coming in from the field. These reports tell us what is actually being used. They help to keep research on the right track.

# MODIFICATION OF BU-ORD REQUEST

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A Bureau of Ordnance confidential letter F41-6 (L) dated 19 August 1944 requested the Bomb Disposal School to initiate a program which would enable field officers in bomb disposal work to remove the fuzes from dud ammunition and strip these fuzes so as to determine the reason for malfunctioning.

One need only refer to recent field reports to see how this request has been carried out. Thousands of United States projectiles have been recovered and stripped and complete reports sent to the Bureau.

Another BuOrd letter dated 10 November 1944 superseded the above letter and requested that only those

fuzes set forth in the letter of 10 Nov. 1944 be examined.

Since that time the Bureau has obtained sufficient information on certain of the fuzes and has requested a further modification of the original request.

The following letter contains a list of those fuzes in which the Bureau of Ordnance has a current active interest in determining the reason for malfunctioning.

Examination of fuzes other than those listed is not desired because of **either danger or security reasons**. Therefore, the fuzes listed, and only those listed, shall be stripped for examination purposes.

NAVY DEPARTMENT  
BUREAU OF ORDNANCE  
WASHINGTON, D. C.

F41-6 (18)  
(Re2b)

14 July 1945

From: The Chief of the Bureau of Ordnance.  
To: Officer-in-Charge, Bomb Disposal School, Navy Yard, Washington, D. C.  
Subject: Examination of Dud Fuzes to Ascertain Causes for Failures.  
Reference: (a) BuOrd conf ltr F41-6 (L) (Re2b) dtd 10 Nov 44.

1. Sections (a), (b), (c), and (d) of paragraph (1) of reference (a) are hereby changed to read as follows:

(a) *U. S. Navy Projectile Fuzes*

1. Point Detonating Fuzes Mark 29, 30.
2. Base Detonating Fuzes Mark 28-15 and higher Mods, Mark 36, 48, 64.
3. Auxiliary Detonating Fuzes Mark 43, 44, 52, 54, 55.

(b) *U. S. Navy Rocket Fuzes*

1. Mark 31, 100, 137, 145, 146, 147, 149, 152, 154, 155, 157, 159, 161, 163, 164, 165.

(c) *U. S. Navy Bomb Fuzes*

- I. Mark 219, 243, 228, 230.

(d) *AN and U. S. Army Bomb Fuzes*

1. AN-M100A2, AN-M102A2, AN-M103, AN-M103A1, AN-M101A2, AN-M110A1, M112, M113, M114, M115, M116, M117, AN-M120A1, AN-M126A1, AN-M139A1, AN-M140A1, M160, M161, M162, M163, M164, M165, M170, M154, M157.

G. F. flussEy, Jr.  
M. L. MATHSEN  
*By direction.*

ALD/jgs

# ACKNOWLEDGMENTS

Alleva .....	7-10	7-16	Henry (Rpt) .....	6-23	7-2
Andrews .....	6-25	6-30	Henry .....	7-2	7-5
Barclay .....	6-20	6-23	Henry (Rpt) .....	7-3	7-10
Barclay .....	7-5	7-7	Jacklin (Rpt) .....	6-20	6-25
Barry .....	6-18	6-25	Jeter .....	7-5	7-6
Barry .....	6-20	6-25	Jennings .....	7-10	7-13
Barry (Rpt) .....	-	6-26	Knox (Rpt) .....	5-31	6-25
Bartlett (Rpt) .....	7-11	7-18	LaVoy .....	6-16	6-23
Beecher, W .....	7-11	7-16	Locke .....	6-27	6-30
Bennett .....	6-30	7-2	McAlister (Rpt) ....	6-10	6-21
Benoit .....	7-4	7-6	McCabe .....	6-25	7-2
Boardman .....	7-8	7-18	McKenna (Rpt) ....	6-1	7-9
Boone .....	4-31	6-23	Manning .....	6-22	7-2
Braddy (Rpt) .....	6-14	7-5	Martin J. (Rpt) ....	7-5	7-18
Brubaker .....	6-28	6-30	Merriman (Rpt) ....	7-4	7-16
Brubaker (Rpt) .....	7-3	7-10	Norris (Rpt) .....	6-10	6-21
Brubaker .....	7-9	7-11	Norris .....		7-2
Bruggink .....	6-25	6-30	Norris .....	6-26	7-4
Bruggink (Rpt) .....	7-2	7-13	Norris .....	6-30	7-13
Casadev all .....	6-26	6-30	Norris (Rpt) .....	6-28	7-46
Chamberlain (Rpt) .	6-7	7-5	Patton (Rpt) .....	6-5	6-21
Clarke (Rpt) .....	6-19	6-27	Patton (Rpt) .....	5-31	6-21
Colburn .....	6-26	7-2	Patton .....	6-11	6-23
Conway .....	7-11	7-12	Porter .....	7-2	7-16
Dawson .....	7-3	7-14	Proctor .....	7-2	7-9
Dehnel (Rpt) .....	6-30	7-12	Riley .....	6-16	6-22
Dixon (Rpt) .....	6-15	7-3	Rook .....		6-25
Ethridge .....	6-6	6-30	Rutherford .....	6-22	7-9
Faass .....	6-17	6-25	Schmidt .....	6-28	7-3
Franklin, G. (Rpt) .	7-10	7-12	Schumann .....	7-1	7-9
Fuhrman .....	6-12	6-21	Spitzfaden .....	6-26	7-2
Gilbert .....	6-23	7-5	Stitt (Rpt) .....	7-11	7-14
Gould .....	6-19	6-24	Sturken (Rpt) .....	7-1	7-12
Graham, E. (Rpt) .	6-30	7-12	Terry .....	6-2	6-21
Guyer (Rpt) .....	7-4	7-16	Terry (Rpt) .....	6-3	7-3
Hamilton (Rpt) .....	7-1	7-16	Thompson .....	7-5	7-6
Hanson (Rpt) .....	6-5	6-21	Torrey (Rpt) .....	6-24	7-17
Hanson (Rpt) .....	5-31	6-21	Trezona .....	6-16	6-25
Heise (Rpt) .....	6-7	6-21	Tuttle (Rpt) .....	6-30	7-10
Heise (Rpt) .....	6-26	J-5	Wilcox .....	7-5	7-17
Heidman (Rpt) .....	6-13	7-2	Witte (Rpt) .....	7-8	7-18
Hendrix (Rpt) .....	5-27	6-25	Wright .....	6-23	6-27
Henry .....	6-23	6-28	Wright .....	7-13	7-18

## CORRECTION

Delete "Type 3 No. 25 Mk. 4 Rocket Bomb" from the caption bottom of

page 6 USN BDIB Vol. II No. 2.  
Caption should read "Integral Type Bomb Pusher."

## **.JAPANESE**

### **SABOTAGE DEVICES** *(Continued from page 24)*

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percent mineral oil and wax. The total weight of the filling is 4.23 ounces.

The igniting system consists of an igniting composition, a delay and a detonator. The ignition system consists of a brass plug in which is housed a brass cup carrying the igniting composition. The brass cup and pellet protrude slightly above the surface of the brass plug. The composition of the igniting composition is not known as this was destroyed in the break-down. The brass plug is

screw-threaded externally to receive a safety cap, and internally in the base, for the insertion of the delay container. The delay container housing a delay train of gunpowder, consists of a brass tube with an enlarged head to screw into the brass plug. The bottom of the delay tube is opened and is crimped to a brass detonator tube, 2.2 inches in length. The detonating composition consists of a layer of mercury fulminate below which is tetryl.

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### **Additional Notes on Sabotage Devices**

The following information was obtained too late to be incorporated in the article on Japanese sabotage devices, contained in this issue, but is inserted here for reference.

According to further reports from the CBI theater, the incendiary brick, reported in the above article, is made up of potassium chlorate, sulphur, ground coal or sugar, iron filings and wax. The substances are mixed using

sufficient wax to mould them into a brick.

The brick is ignited in various ways all alike in principle. One method used is to pour sulphuric acid and glycerine into a thin rubber tube which is weakened at one point to allow the acid to burn through quickly. When the acid has burned through the rubber tube, it drips onto a small deposit of potassium permanganate and ignites the brick.

### **NOTICE**

Bomb Disposal Units requesting air shipment of technical tools, publications, and items necessary to Bomb Disposal, must make such requests by dispatch. The school is not authorized air transportation for material going to the field, unless the request is received in the form of a dispatch.

### **NOTICE**

Training film MN-5007 "Reporting Unexploded Munitions" is now available at all BuPers Training Film libraries. Activities interested may obtain the film by applying to the BuPers Training Film Library in their area.

