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From: Chief, Naval Technical Mission to Japan.
To : Chief of Naval Operations.
Subject: Target Report - Japanese Bomb Disposal Methods.
Reference: (a) "Intelligence Targets Japan" (DNI) of 4 Sept. 1945.

1. Subject report, Target O-06 of Fascicle O-1 of reference (a), is submitted herewith.
2. The investigation of the target and the target report were accomplished by Comdr. J.B. Green, USNR.



C. G. GRIMES
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O-06

JAPANESE BOMB DISPOSAL METHODS

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945
FASCICLE O-1, TARGET O-06

JANUARY 1946

U.S. NAVAL TECHNICAL MISSION TO JAPAN

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O-06

SUMMARY

ORDNANCE TARGETS JAPANESE BOMB DISPOSAL METHODS

In this report an effort has been made to present the organization and the general disposal methods employed by the Japanese in bomb and projectile disposal. Enclosure (A), a report by Lt. NISHIDA, IJN, gives a general picture of the Japanese disposal work, including organization, methods of disposal, opinions of the author on the effectiveness of U. S. bombs and projectiles, and some general data as to the efficiency of U. S. bomb and projectile fuzes based on percent of unexploded ammunition recovered by the Japanese.

NTJ-L.O-06

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REFERENCES

Location of Target:

Kure Naval Arsenal and Base.

Yokosuka Naval Arsenal and Base.

Japanese Personnel Interviewed:

Technical Lt. K. NISHIDA, IJN, Ordnance Experimental Department,
Kure Naval Arsenal.

Comdr. J. ICHINOI, IJN, and Associates, Yokosuka Naval Arsenal.

LIST OF ENCLOSURES

- (A) "Reports on Bomb or Shell Disposal in the Japanese Navy." (Translation)

INTRODUCTION

This investigation covers the Japanese organization for the disposal of bombs and other explosive ordnance, and the effectiveness of this organization.

Until Lt. NISHIDA was first interrogated there were no really qualified personnel to answer questions which arose in connection with this problem. It is apparent that very little organized effort had been made by the Japanese toward the disposal and technical study of U. S. explosive ordnance.

No records were maintained by those who actually engaged in disposal work, so actual figures on "duds" are unavailable.

Lt. NISHIDA's report is submitted in its original form. It is considered sufficiently clear for the purpose of this report and it is thought that the uniqueness of expression may be appreciated.

THE REPORT

1. Bomb and Projectile Disposal - General

The necessity for bomb or projectile disposal was not realized by the Japanese until a serious crisis had developed, demanding immediate action. Their negligence in this matter allowed damage that could have been avoided by more systematic and careful methods of disposal.

The fundamental purpose of their bomb disposal was to remove bombs that dropped into localities of military importance and which were suspected to be time bombs. The secondary purpose was to obtain intelligence information from a study of unexploded bombs by technical personnel. The intelligence objectives were twofold: (a) to evaluate the strength of enemy arms, and (b) to incorporate into Japanese ordnance whatever was considered to be valuable. However, since organization and training were poor, the secondary purposes were seldom accomplished.

2. Organization

Disposal personnel were members of Bobitai—or coast defense units. It was reported that there were one officer and about ten men engaged in disposal work with each unit. They were considered ordnance rather than disposal specialists and were trained as such.

There apparently was no central organization for control of field units or for collection and dissemination of intelligence, although research was carried on in regard to U.S. ordnance.

3. Training

Disposal personnel were trained at the Naval Gunnery School at the Yokosuka Naval Base in principles of general ordnance and ordnance components. It is not definitely known that they received special training in disposal techniques, but experts in related subjects believe that some such training was supplied.

The gunnery school did not maintain any central organization to govern the activities of the individual disposal units. Apparently the units lost connection with the school when their training was completed.

4. Bomb Disposal Techniques

The methods used by the personnel of the Bobitai in disposal of UXB are reported to be of the simplest possible type. They consisted of two operations:

a. Destroy "in situ"

This was considered the best method of disposal because of its comparative safety. Three methods of "in situ" disposal were used:

- (1) Thermite burning charges, MK 1, were used to dispose of the explosive charge in bombs. The results were reported as being either a burning of the explosive charge in the bomb case, or a detonation of the charge, either high or low order. Results were not considered predictable.

(2) Explosive charges of various sizes were placed on bombs with the purpose of blowing bomb charges with a high-order detonation. The charges varied with the judgement of the operator. No set procedure seems to have been prescribed.

(3) There were reports of a standard shaped charge for use in disposal work. The intention was to obtain a low-order detonation of the bomb charge. However, low-order detonation was considered to be the exception rather than the usual result. No specific reports of the use of this shaped charge were available.

b. Fuze Extraction

Extraction of bomb fuzes was considered practical only when because of surrounding installation it was impossible to detonate the bomb. Extraction was accomplished manually.

5. U. S. Time Fuzes

Time fuzes were considered to be very dangerous. A waiting period of about 100 hours was observed after air raids, and all UXB were considered to be time fuzed in that period. At the end of that period, the bombs were detonated. It could not be determined whether any attempts had been made to extract time fuzes.

6. Research

U. S. bombs and fuzes were studied at the First Air Technical Arsenal Branch at KANAZAWA, north of YOKOSUKA, by the head of the Design Sub-section of the Bomb Section, Comdr. HAYAKAWA, and a translator, Lt. NOMURA. Neither of these men was available for interrogation.

First information on American ordnance was given to the Japanese by the Germans at the beginning of their alliance. It was in the form of three thick volumes indicating a fairly extensive coverage. Later information was received occasionally from the Japanese Ambassador at Berlin.

7. "Dud" Percentage in U. S. Bombs

No specific data was available on this question, of course, but the Japanese considered the percentage of UXB to be large among G. P. bombs.

Japanese considered incendiary bombs to be most effective and most feared. The Japanese experts were highly impressed by them.

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ENCLOSURE (A)

(TRANSLATION)

REPORTS ON THE BOMB - OR SHELL -

DISPOSAL IN JAPANESE NAVY

(Recollected from my personal memory)

BY

Technical Lieutenant

KIKUO NISHIDA

(A member of the Ordnance Experimental
Department at the Kure Navy Yard)

1 Oct. 1945

*ENCLOSURE (A), continued*C O N T E N T S

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ENCLOSURE (A), continued

1. Historical Description with Criticism in General.

a. The necessity of the bomb - or shell - disposal can not be realized until the appearance of serious circumstances. Frankly speaking, our negligence of this fact sometimes made us face with difficulties which were born from the deficiency of systematic plans of those disposal and the formality of the regulation and method about them.

The principal purpose of our bomb-disposal is to remove those bombs which lie in the most important places and are suspected to be the time bombs, not to make any disturbance and damage on the workings and institutions there. The next purpose is to prevent any careless accidents which are caused by those unexploded bombs (U.X.B.) left in indispensable places. The other purpose which seems to our technicians rather more important than the above mentioned is the intelligence from those U.X.B. about the faculties of enemy's arms in active service and the tendencies of their technicians behind them.

But as our disposal was not yet conscious of this purpose, we have often missed our ways and had to devise temporarily some counter-measures at the face of those explosives, except such cases that could be dealt with regular methods. Even in those cases, the first aim was always placed on the security from danger and we often lost so many precious matters in vain without picking up them as objects of technical investigation.

b. As the investigation and experiment on ammunition was strictly restricted within the military circles, its disposal was also given in charge of them. In our Navy, we had some parties of bomb-disposal which were distributed among the locations of official institutions, and they used to have training for the techniques of disposal periodically by a central party appointed by The Naval Station. For example in KURE district there were many parties -- The Naval Barracks composed the central party and other institutions, The KURE Navy Yard, The HIRO Navy Yard, the 11th Arsenal and The Submarine School, etc., had their own parties which were trained by the former once a month.

The composition of these parties had been accomplished when I came to KURE three years ago, but we had no training actually even in this War until the deprivation of Guadalcanal. It is in these one or two years since the beginning of air-raid to our native land that we were trained earnestly.

c. Now the disposal of U.X.B. or U.X.S. can never be performed without any technical knowledge about them, but those parties were only collections of amateurs except a few special persons. I would permit that the majority of a great party would be only workers except its leader; but even for those small parties to special purpose, some persons in another system of order were appointed not withstanding their personal faculties by the authority of non-technical system of order. So they were sometimes occupied with the ignorance of even the most fundamental techniques, not to mention the experimental trainings, because of the frequent alteration of their positions.

d. As I was a member of research in The Ammunition Section of The Ordnance Experimental Department for a comparatively long time in the same position, I was quite aware of those defects above mentioned and had hoped to improve those circumstances since I was appointed a leader of a party

ENCLOSURE (A), continued

about one year ago. But I could not myself make training on the members of my party sufficiently, because we were all engaged in our own professions. I could not also be satisfied with the courses of training which were given to us by the central party, and wished to mechanize those primitive methods so far as our party concerned, but could never realize my idea in consequence of the deficiency of matter. So I chiefly intended to make investigation from the technical point of view into some arms which fortunately fell in my hand, instead of the training for an effective disposal.

In the followings, after I will have mentioned the organization of the party and its standard operating procedure, I will make explanation about some examples that I dealt with.

Of the organization of those parties in the Army, I am scarcely aware, but I can not prefer it above ours as a more effective one as far as I have ever heard.

2. Organization and Personnel.

a. The party of bomb-disposal is in the system of order under the chief-commander of anti-air-raid in every district, belonging to the anti-air-raid quarters of each official institution. The unit of actual mover is a squad of ten or twelve men including its leader. Two or three squads are composed to a section. Every chief-commander of anti-air-raid has a few sections which are distributed to separate areas and in charge of them. They perform their duty voluntarily in their areas as long as they are called to assist other squads by the upper commander. Accordingly they are only concerned with their offices or arsenals within their charge, and all other places under the Naval Station's control, ie, cities, villages and countries, are in charge of The Naval Port Bomb-Disposal that is the central party above mentioned. (This principle was altered in such a way that a distant city belonged to the squad of neighboring offices.)

b. As the chief duty of these squads, as mentioned in Par 1a, is to remove the U.X.B. to other places where this can be disposed safely, the organization of their members and tools is aimed for digging, transportation and disposal of those bombs.

As for the constitution of men, a squad has a leader, an assistant and eight or ten workers. Their tools are so primitive as followings:

For digging:	Pick axes, Shovels
For hanging:	Cross supporters, Chain-blocks
For transportation:	A hand car
For disposal:	Solid explosives, incendiary tubes, Electric ignition fittings
For auxiliary purpose:	Notice-boards or ropes, Carpenter tools, Gas masks

c. The central party such as The Naval Port Bomb-Disposal which is in charge of a wide area has a truck upon which all tools and instruments are carried and a small crane is attached. But every squad has no mechanical power for digging and hanging, and no ability of rapid disposal.

ENCLOSURE (A), continued

3. Principle of Disposal.

a. Our principle depends entirely upon those new described conditions which are rather the consequence of the absence of scientific mind than that of the deficiency of materials. It is as followings:

(1) As soon as an air-raid is over, we must establish some restricted regions for precaution on finding U.X.B. or receiving its reports (which are delivered to The Naval Port Bomb-Disposal by civilians through the police and The Naval Station.

(2) Considering the ability of his party, the leader of a squad must settle the order of disposal, assuming as a rule every bomb as a time bomb.

(3) We must begin digging as soon as we can and remove the bombs found in the most important regions. (Afterwards this principle was altered not to touch any U.X.B., until 40 hours after an air-raid and then to begin dealing without any suspicion of time bombs. This alternation is caused, I hear, by some instructive tragedies in the Army.)

(4) The most desirable disposal of the removed bombs is to throw into the sea, and the next one is to burn or explode those bombs, if not otherwise.

(5) The disposal at the actual spot is prohibited as a rule, but only permitted under condition that its removal is impossible and the restriction of damage can find its way available.

(6) The U.X.B. with few suspicion as a time bomb in a trivial place can be buried at the spot dipping in water.

4. Techniques of Disposal.

a. The leader of a squad of bomb-disposal must be skilled to distinguish every kind of bomb with their appearances, but it is indispensable for this purpose to be previously aware of any obtainable intelligence of the enemy. We could know something about the British arms through our spoils but nothing about the American, except some news brought by technicians returned from the front.

b. It is not worth mentioning to describe the details of such primitive labors as digging, carrying and throwing. If I have to search for something technical in those procedures, I will adopt followings for it:

(1) The less persons in the vicinity of bombs, the better.

(2) The digging must be made from the side of the bomb, to reveal its detonator as soon as possible.

(3) As little disturbance of the bomb's pose as possible is permitted.

(4) Take out those fuzes, if we find them familiar to us.

c. The ordinary procedure of disposal is to burn up the U.X.B. For this purpose we use an incendiary tube, ie, a kind of "electron incendi-

ENCLOSURE (A), continued

ary bombs", which must be attached to the most distant part of its body from its detonator and be ignited by electric current. Using this tube adopted in service, we can be successful to make bombs explode incompletely as many times as about a third of our trials, and in other cases they explode completely. It is said that such an unsatisfied percentage of success is owing to the too much rapid heating of bombs; and recently is made another type of incendiary tube burning more slowly, but I do not know its improved percentage if successful. Nothing will be added any more for making bombs explode with a solid explosive than the fact that we must use it as near as possible to the detonator of bombs.

d. These methods of disposal are very unsuitable from the technical point of view, because they always imply some explosion even if successful. Some ideas -- boring holes on the bomb body and blowing out its explosives by hot steam, or cutting away the detonating part from the body with a certain easy method -- have ever been proposed but not realized without taking any notice. (The former idea has been already adopted by the Army for disposing bombs which fall in the Imperial Castle, I hear.)

5. Explanation of some Examples.

Explosive Bombs

a. I have no experience of dealing with the time bomb which is the most interesting object of the bomb-disposal.

Among common bombs which were used for The KURE Navy Yard at the air-raid on 22nd of June (1945), there were some U.X.B. But as I was in charge of the other area not attacked then, I can not explain the details of disposal. I have only heard that the damages and casualties were so enormous that everybody alive indulged perfectly to help those who were buried in caves and almost forgot the bomb-disposal. The most of those U.X.B. was thrown into the sea by the members of the Naval Port Bomb-Disposal. I never saw some of those 250 kg bombs, but their fuzes had always been taken off and could not be found out. (These samples still remain in KAMEGAKUBI.)

b. I saw the bombs with parachutes used in NAGASAKI but fuzes had been also removed and broken up by the officers there. Now I can not call to my mind their mark numbers, only remembering that their construction was a contact firing system with a delay of several seconds and very dangerous. It is unexpectedly a good fortune that those officers did not be removed to the other world by removing the fuzes quite innocently. This fortune was favored with the casually depressed sensitivity of detonating caps all of which had a mark of needle.

c. The general type of bomb fuze which has a set of reduction gears is too much delicate to assure its function against accidentally appearing resistances. We used to find this fuze on an U.X.B. being interrupted its releasing action of safety device.

It seems very strange to us that most of those bombs attacking Japanese cities could make only a great crater but so little damage, even in cases supposed using non-delay with no doubt, so we almost wondered its faculty of instantaneousness.

Incendiary Bombs

a. I am aware of only two kinds of them, 100 lbs and 6 lbs, which were

ENCLOSURE (A), continued

sent to out Chugoku Districts. They always contained a kind of jelly. After the air-raid on the KURE city, we found a great number of U.X.B., several hundred 100 lb bombs and several thousands 6 lbs bombs, but I do not think this number as a too great percentage of blindness for a fuze, considering the total number of bombs which were scattered. The cause of blindness of 6 lb bombs is the incompletely spread tail of them, because they have always some marks of irregular impact. All U.X.B. were gathered by The Naval Port Bomb-Disposal, and some of them were thrown into the sea. But afterwards we utilized most of them for the re-collection for some precious materials, gasoline, metallic soap and etc. This gasoline was useful for automobiles -- even for motor fire-engines.

b. We could not be satisfied with those re-collections only because, as we appreciated the air-raid, we became realized that the flame of this incendiary bomb was so poor as we can conquer it with some previous intelligence about it.

We organized many parties of instruction about this bomb and went round through every city in our districts, making everywhere some exhibition and experiment with those U.X.B.

But generally speaking, we only succeeded to diminish somewhat the instinctive horror of citizens. As for the actual effect, it was proved that nothing was improved essentially without the systematic leadership of authorities in charge of the practical anti-air-raid service.

Shells

a. I have ever made a inquiry into the fuzes of Mk XIX and Mk XXI (manufactured by W.N.Y. in 1943) which were taken from the 6 inch unexploded armour piercing shells of the cruisers of U.S.N.

The former (Mk XIX) was attached to a shell which penetrated the funnels and other structures of AOBA, a Japanese cruiser, and stopped on the deck-armour. Among several tons of direct shots only one or two could explode! We wondered if they were made intentionally blind; and I was ordered to detect it. I and only one assistant engaged this task.

As the shells were so little deformed, we tried successfully to screw out the fuze from the tail plug. Then I found the first and second detonators already ignited, but the black powder pellet below the delay fitting still remained. I suppose that the aluminum of delay fitting was seriously affected by black powder through the reaction between aluminum and B.P. under a certain humidity. Because we have ever experienced the same reaction in our certain fuze under the humidity of Japan.

b. The latter (Mk XXI) was the fuze of the shell which attacked NACHI (a Japanese cruiser). This shell was stopped on the armour of opposite side and dropped into the engine-room, piercing several thin plates at first. It dropped its cap on impact of these plates and attacked the armour with its shoulder, as it lost already the ballistic stability. The detonator of this fuze was pierced by a needle but not exploded perhaps by the reason of either diminished impact energy or casual depression of detonators sensitivity.

We used a lather of special service to cut off the shell body, as it was much deformed.

ENCLOSURE (A), continued

c. The shells which were shot by U.S. submarines to HOKKAIDO had two fuzes, nose and base, but still became blind. These fuzes had been destroyed by someone before I received them.

Fuze of "Hedgehog"

a. This fuze for anti-submarine projectile was found to be blind on the deck of a Japanese submarine which was attacked in the water by a "Hedgehog". Perhaps it will not be necessary to describe such constructions as propeller to release the cramp of the inertia body or all direction firing device with a inertia body, balls, plunger and its springs. The blindness was caused by the propeller-retainer which did not set back when fired. I measured the shearing strength of a pin keeping the retainer and could find that the safety factor of operation was too near to 1, considering the allowable maximum acceleration of projectile, which could be estimated approximately through its construction. I wondered also if the safety pin was removed previously, but it could not be found when I received this fuze.

Mines

a. It was a great sensation when some mines with parachutes were dropped in the city from B-29 by mistake. The Naval Port Bomb-Disposal which was trained for digging and transportation of bombs was so quite at a loss, that the order of disposal was given to our laboratory in the KURE Navy Yard.

Technical Lieutenant Y. NUMATA was appointed for it. He managed to take off its mechanical box at first. The watch mechanism for safety seemed to be for danger. After the discovery of a soluble salt as a safety device, they -- he and few assistants -- performed their task successfully with confidence through a quarter of a day.

Afterwards a committee for mine-disposal was composed to research the counter-measures.

6. Epilogue.

a. As I have said already, the actual methods of bomb-disposal are primitive that I should be suspected to have an intention in covering all descriptions with a veil of obscurity; but I have now confessed everything I know. Though these descriptions, to my neglect will not be able to serve as any technical references, I can assert with the least compunction of technician's conscience that they are quite free from any exaggeration or ostentation.

b. It might be permitted to add my opinion at last. I think that a reflection must be called for on the bold novelty of U.S. fuzes, which can be compared with the conservatism of British, the mannerism of Japanese and the steadiness of German. Because still we conceive a superstition that "An ammunition is an organic creature which, though we make it, insists always upon his own independence betraying sometimes our selfish expectations."