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From: Chief, Naval Technical Mission to Japan.  
To : Chief of Naval Operations.

Subject: Target Report - Japanese Ammunition Primers.

Reference: (a)"Intelligence Targets Japan" (DNI) of 4 Sept. 1945.

1. Subject report, covering Target O-20 of Fascicle O-1 of reference (a), is submitted herewith.

2. The investigation of the target and preparation of the target report were accomplished by Comdr. G.R. Dolan, RN.



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Captain, USN

**RESTRICTED**

**O-20**

**JAPANESE AMMUNITION PRIMERS**

**"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945**

**FASCICLE O-1, TARGET O-20**

**FEBRUARY 1946**

**U.S. NAVAL TECHNICAL MISSION TO JAPAN**

# SUMMARY

## ORDNANCE TARGETS

### JAPANESE AMMUNITION PRIMERS

Primers in the Japanese Navy were extremely numerous in variety of nomenclature but did not vary much in design. They consisted fundamentally of a component body (which contained either the electric or the percussion initiating arrangement) screwed into an outside body either smooth to fit into the vent axial in bag guns, or screwed to fit the threads in cartridge case primer holes.

The Japanese method of using the same component body was very good from the standpoint of simplifying production. This, however, was neutralized to some extent by the unnecessarily large number of different types of primers.

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## REFERENCES

**Location of Target:**

Navy Technical Department, TOKYO.  
Kure Naval Arsenal.

**Japanese Personnel Interviewed and Who Assisted in Gathering Data:**

Technical Commander TAKAGI attached to the Navy Technical  
Department, TOKYO.

Technical Lieutenant NISHIDA, Experimental and Proof  
Section of Kure Arsenal.

## LIST OF ENCLOSURES

- (A) Table of Guns and Suitable Primers.
- (B) Typical Drawing of Electric Primer for Bag Gun.
- (C) Typical Drawing of Electric Primer for Cartridge Case.
- (D) Typical Drawing of Percussion Primer for Bag Gun.
- (E) Typical Drawing of Percussion Primer for Cartridge Case.
- (F) List of Documents Forwarded to WDC through ATIS.

# INTRODUCTION

This investigation was conducted by interrogating Captain TAKAGI who was in the Technical Department of the Navy Ministry in charge of primer design (as well as being responsible for explosives and explosive trains in fuzes, primers, etc.).

A pamphlet produced in 1943 at the Kure Experimental Laboratory which gives drawings and descriptions of thirty primers (NavTechJap Document No. ND50-3040) was studied with the assistance of Japanese officers who could speak a little English.

The chief object of this report has been to reduce to a simple classification and description the bewildering variety of types and modifications which, speaking generally, do not vary much in essentials.

## THE REPORT

In the Japanese Navy, the term "primers" was used to include both primers fitted in cartridge cases, and tubes used in the vent-axial of breech loading guns for the ignition of bag charges. There were only two main types of primers: an electric component body which was fitted inside either a tube or a primer body for screwing into a cartridge case, and a percussion component body fitted inside either a tube or a primer body for screwing into a cartridge case.

### A. ELECTRIC PRIMERS

The component body of the electric primer whether used in a tube or in a primer body for a cartridge case consisted of an electric pole and a bridge wire secured at the center to the pole and with two ends secured to the body. In effect, there were two bridges each with a resistance of 1.6 ohms so that the total resistance of the two bridges which were in parallel was 0.8 ohms. The bridge wire was made of platinum-silver alloy and was surrounded by gun cotton dust. The primer was designed to fire with a current not less than two amps. and the voltage at the primer should not be less than two volts. In the case of primers for bag guns, when the gun cotton dust was ignited, the flash passed through a paper disc to loose black powder, and this in turn flashed through the center holes of two black powder pellets and down the vent-axial hole through the breech block. At the same time, it ignited and broke up the black powder pellets, blowing the burning grains on to the bag igniter. Insulation of the central pole was effected partly by ebonite and partly by asbestos. The ignition time between initiation of the gun cotton dust and the main propellant was 0.002 seconds.

In the case of electric primers used in cartridge cases, the flash passed direct from the gun cotton dust to loose black powder dust of medium grain size in the brass container, and from that through the flash holes to the propellant charge.

### B. PERCUSSION PRIMERS

The two main types of percussion primers in service differed only in the outside primer body. The #1 percussion primer extended to the rear of the cartridge case by 2mm while the #2 percussion primer fitted below the surface of the base of the cartridge case.

In these percussion primers, the striker struck a cap containing a mixture of:

Mercury fulminate .....	20%
Lead azide .....	40%
Potassium perchlorate .....	40%

which was compressed on to an anvil. The flash passed through two holes in the anvil. From there it passed through a gas check to black powder similar to the black powder fillings in electric primers. These fillings are shown in detail for all classes of primers in Enclosure (A) and Enclosure (B).

### C. GENERAL REMARKS

There are more than thirty types of primers named in the Japanese Navy but the differences between them are very largely differences in the shape of the outside body or differences in the arrangement of the gas check and the channels between the component body and the outside body. In Enclosure (A) is given a list of the primers in use at the end of World War II and the guns in which they were used. It will be noted that percussion firing is shown as



the alternate method of firing for major caliber guns. From interrogations and answers to questions given by Japanese technical officers and gunnery officers of ships, it appears that percussion firing was going out of favor as an alternate method. The electric current for electric firing was supplied from batteries.

The ignition charges for cartridge cases are contained in the brass container forming an integral part of the outside primer body, while in the case of bag guns the ignition charge is in the form of a pad secured to the bag charge. These ignition charges are, in each case, black powder. When ignition charges were secured to bag charges, they used to be contained in a wool bag. It is believed that since 1942, after the supply of wool was cut off, silk was substituted.

The primer cap for 20mm, 13mm, 7.9mm, and 27.7mm ammunition was of simple anvil type using mercury fulminate 20%, lead azide 40%, and potassium perchlorate 40%. The flash passed through two holes in the anvil to the main charge.

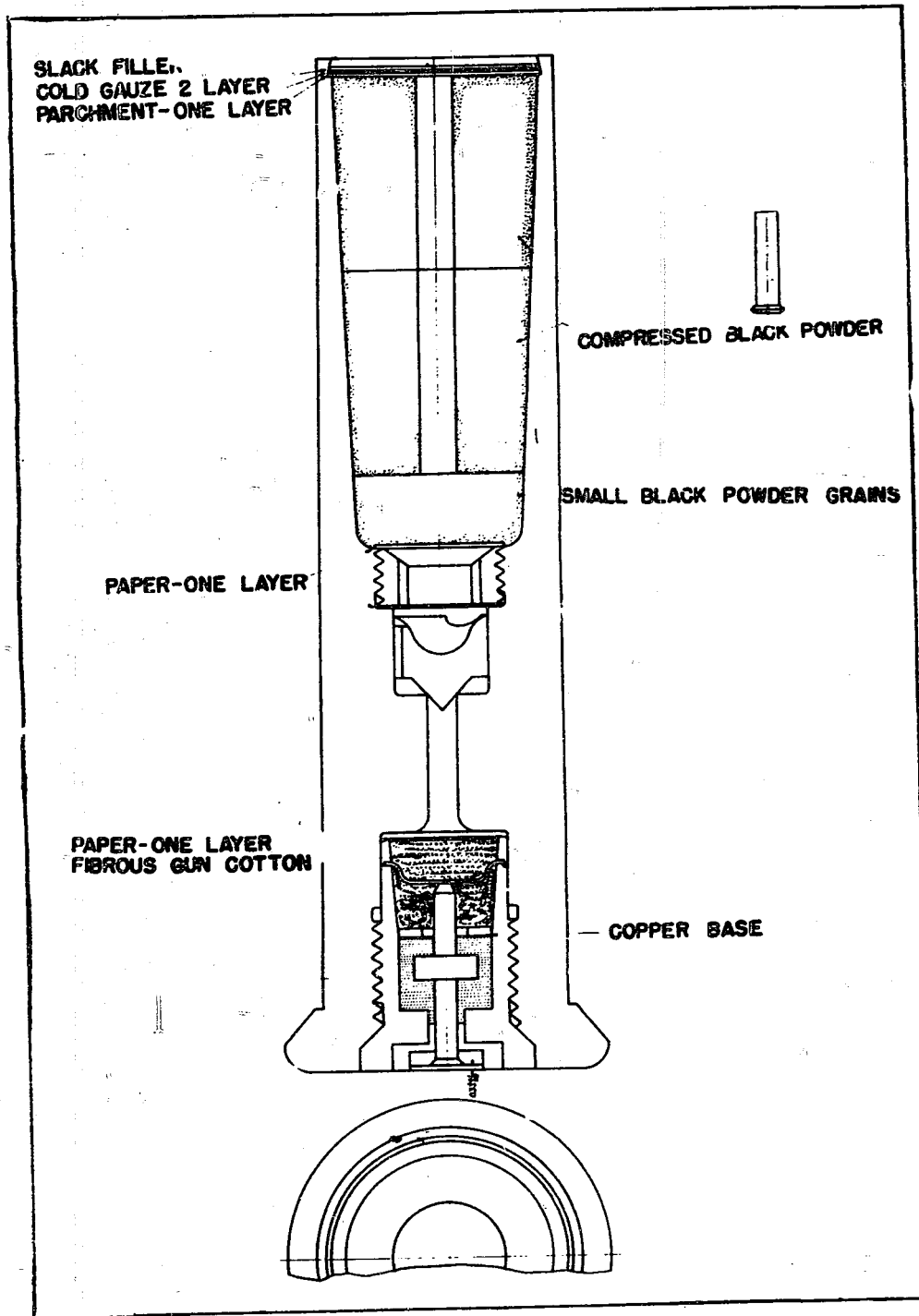
40mm, 30mm, and 25mm ammunition all used the 25mm percussion cap except that the flash from the cap passed to a black powder "lead in" and then to the main charge.

## ENCLOSURE (A)

TABLE OF GUNS AND SUITABLE PRIMERS

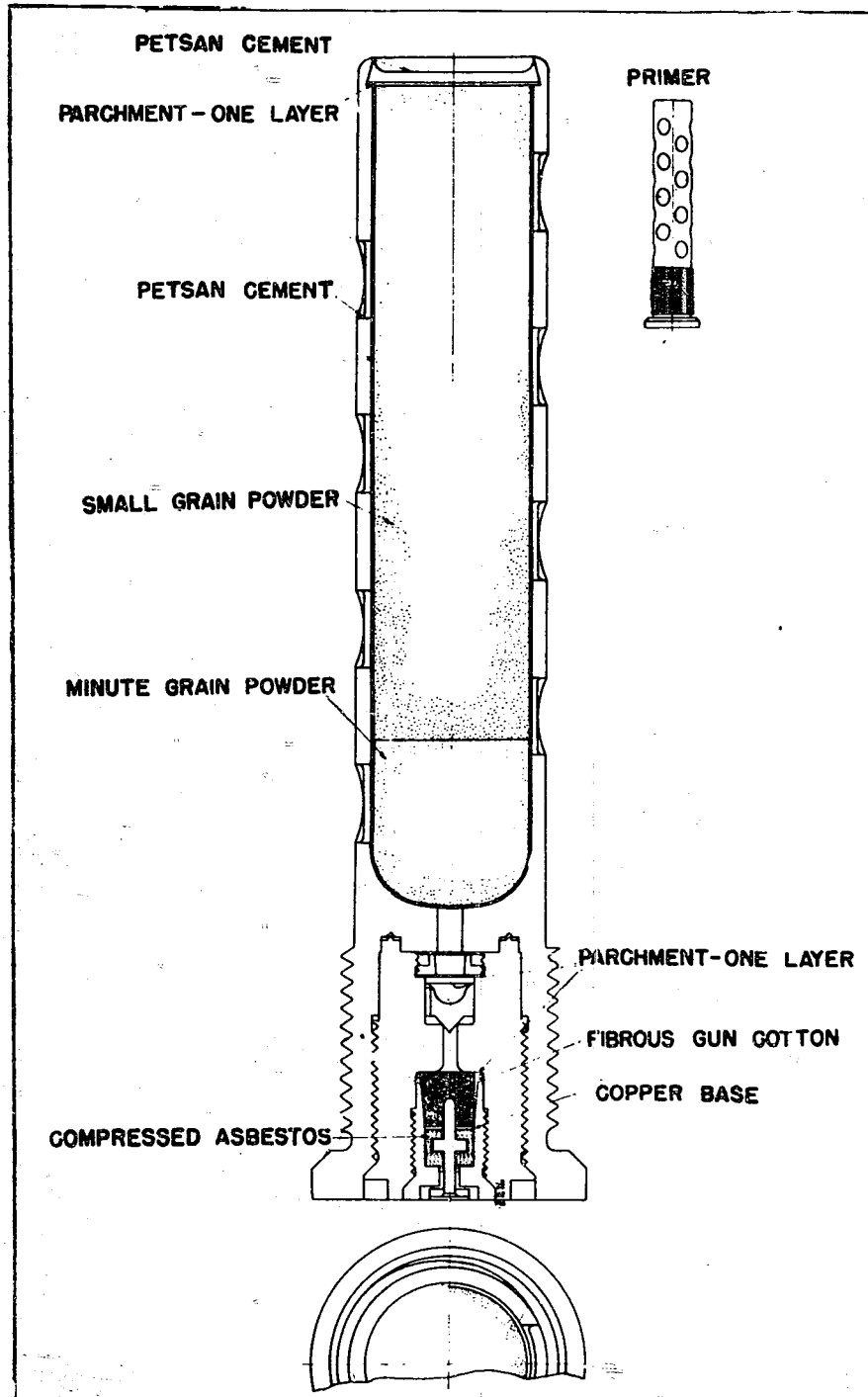
Gun	Primer	Remarks
40 cm 36 cm 20 cm 15.5 cm 15 cm/50 cal 14 cm/50 cal 12.7 cm/50 cal 12 cm/50 cal 10 cm	No. 2 cartridge electric primer	No. 2 cartridge percussion primer is subsidiary use.
15 cm/45 cal 14 cm/45 cal 12 cm 8 cm	No. 1 cartridge case percussion primer	No. 1 cartridge case electric pri- mer is subsidiary use.
12 cm H.A. 8 cm H.A.	No. 2 cartridge case percussion primer	No. 2 cartridge case electric pri- mer is subsidiary use.
40 mm 30 mm 25 mm	25mm percussion primer	
20 mm 13 mm 7.9 mm 7.7 mm	Percussion cap	

ENCLOSURE (B)



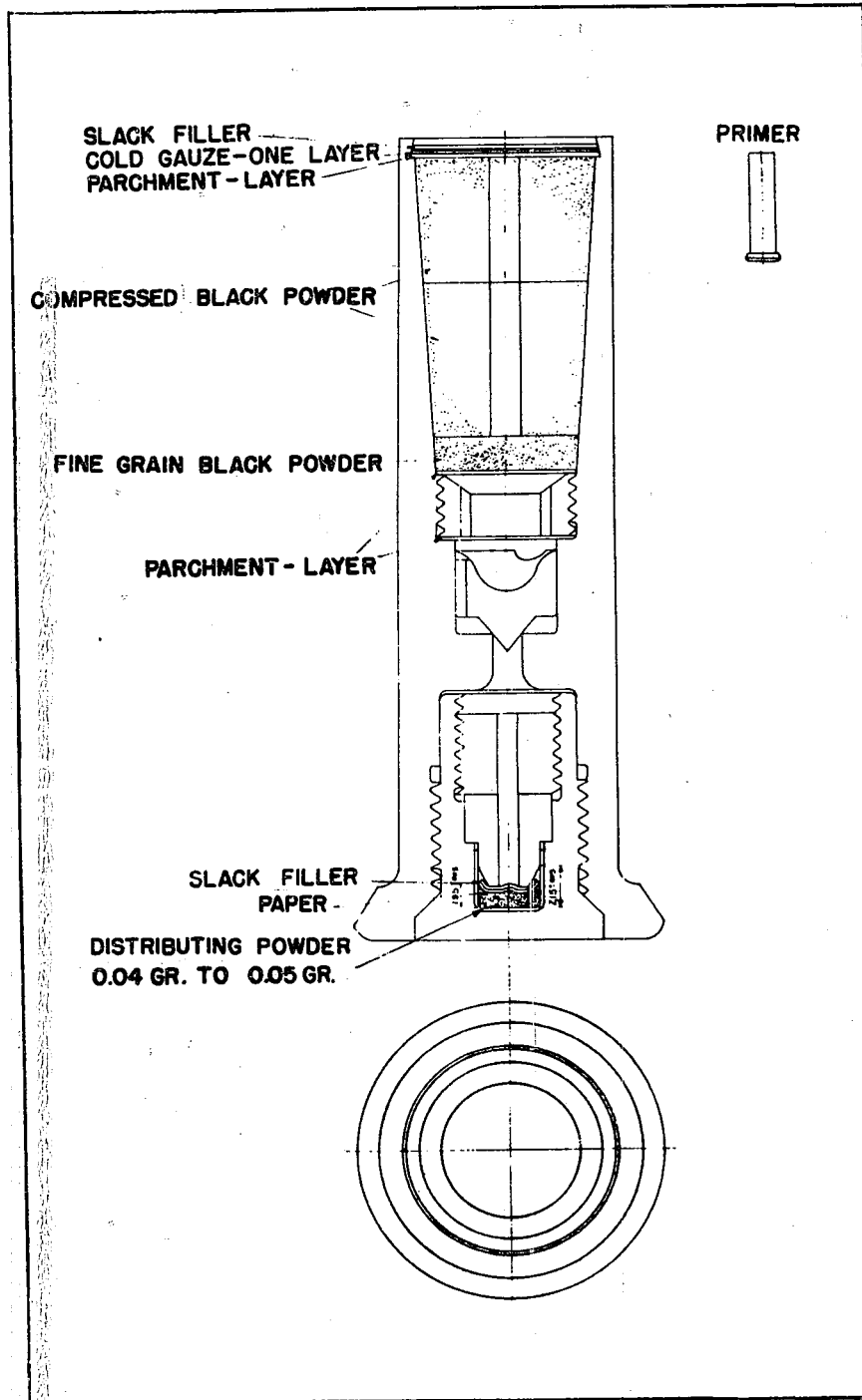
TYPICAL DRAWING OF ELECTRIC  
PRIMER FOR BAG GUN

ENCLOSURE (C)



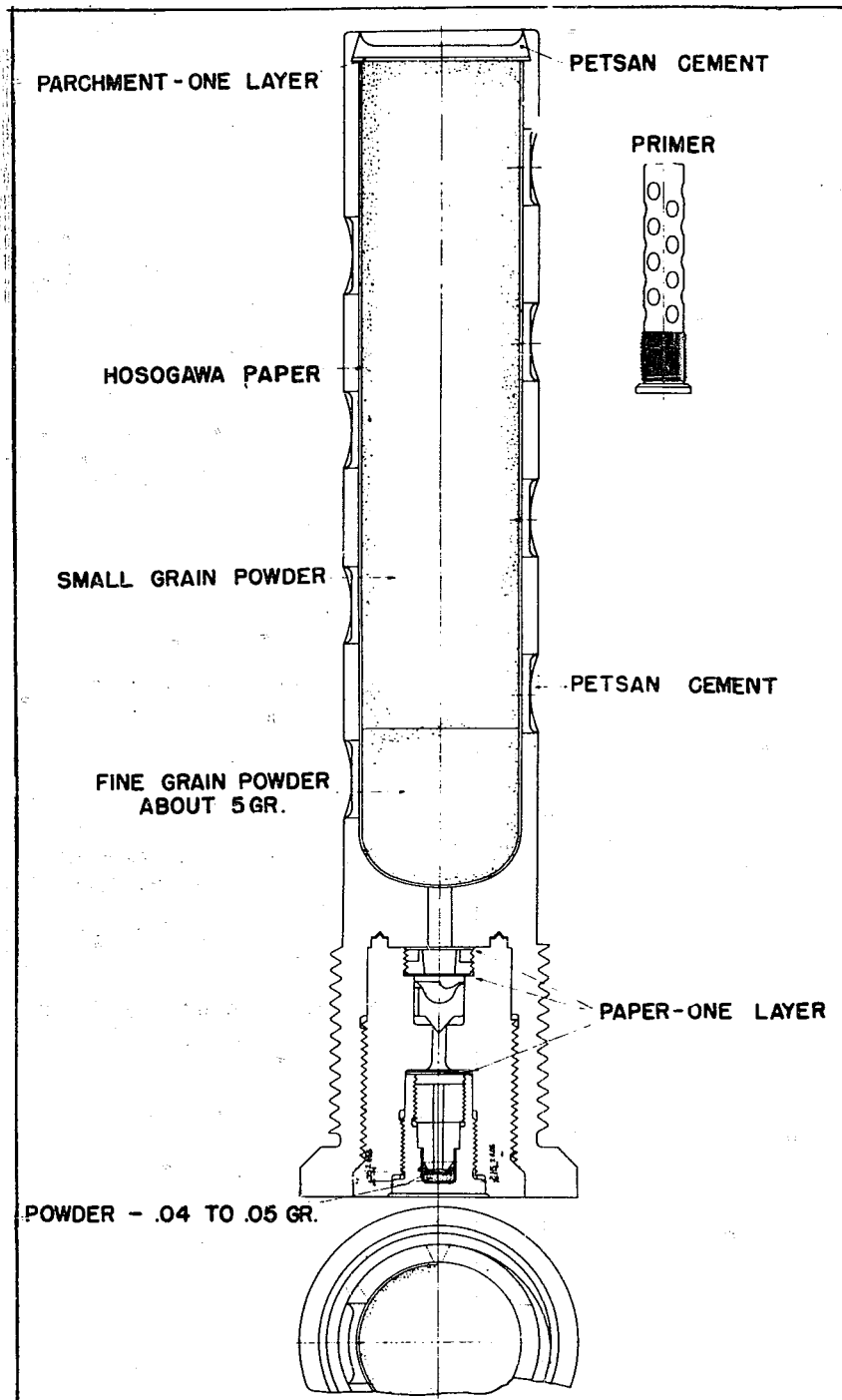
TYPICAL DRAWING OF ELECTRIC  
PRIMER FOR CARTRIDGE CASE

### ENCLOSURE (D)



TYPICAL DRAWING OF PERCUSSION  
PRIMER FOR BAG GUN

### ENCLOSURE (E)



TYPICAL DRAWING OF PERCUSSION PRIMER FOR CARTRIDGE CASE

## ENCLOSURE (F)

## LIST OF DOCUMENTS FORWARDED TO WDC THROUGH ATIS

<u>NavTechJap No.</u>		<u>ATIS No</u>
ND50-3949	Experimental Report on Igniting Force of Mk II Electric Primer	4159
ND50-3950	Tests of Mk I, Model 3 Electric Primer	4160
ND50-3951	Experiments on Mk II Percussion Cap Primer	4161
ND50-3952	Electric Primer Model 4 Modification 2	4162
ND50-3953	Operation of Filling the Fixed Mk 3 Percussion Cap	4163
ND50-3954	Experimental Use Mk 2 Percussion Primer	4164
ND50-3955	Casing Mk II Percussion Cap Model III - Casing Mk II Percussion Cap Model III, Modification II - Loading Procedure	4165
ND50-3956	Electrical Currents Used For Testing Primers	4166
ND50-3957	Report on Experiments of Temporarily Designated Mk II, Model 5 Electric Cap	4167
ND50-3958	Report on Experiments of Temporarily Designated Mk II, Model 5 Electric Primer	4168
ND50-3959	Report on Test of Primer Used for Bag Guns	4169
ND50-3960	Experimental Report on Vickers Type Primer	4170
ND50-3961	Miscellaneous Drawings of Naval Primers Components Showing Manufacturing Tolerances and Arrangements	4171
ND50-3540	Collection of Drawings of Primers for Various Guns (1943) Kure Experimental Laboratory	4517
ND50-3541	Miniature Drawings of Ammunition Components (Primers) YOKOSUKA, 1936	4518