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JAPANESE AMMUNITION

C.I.AMN. TECHNICAL REPORT

No. 11 (SECOND ISSUE)

(This supersedes *First Issue* of Supplement No. 3 to Technical Report No. 11, which should now be destroyed)

**FUZE, PERCUSSION, D.A., TYPE '93 (SMALL)
FOR
37-MM. AMMUNITION, H.E., NOSE FUZED,
WITH 16-MM. FUZE HOLE.**

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AUGUST 1945

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G E N E R A L

This fuze is believed to be used in all 37-mm. H.E. nose fuzed shell and has been found fitted in H.E. shell for the following equipments:-

- (a) 37-mm. Type '94 Anti-Tank Gun,
- (b) 37-mm. Type '94 Tank Gun,
- (c) 37-mm. 11 Year Type (Taisho 11) Infantry Gun,
- (d) 37-mm. Type '97 (Rainmetaru) Anti-Tank Gun.

According to reports it is also used in 20-mm. ammunition for the Types '97 and '98 Machine Guns but this cannot be confirmed from experience in Kirkee. All fuzes found in ammunition for these machine guns examined here were different from the Type '93 fuze.

D E S C R I P T I O N

2. Detailed construction is shown in the drawing in Plate A while the general appearance and assembly sequence of components is shown in the photograph at Plate B. For convenience of description, the fuze can be divided into three main parts:-

- (i) Body Upper Half. The body upper half (1) is made of brass, with a recess to act as a guide for the striker head (2) and is screw-threaded (R.H.T.) internally to screw onto the body lower half (3). The striker consists of an aluminium head (2) and oil blackened steel needle (2A). Three vent holes are provided in the striker head; see para. 3 (c) below.
- (ii) Body Lower Half. The body lower half (3) which forms the main part of the fuze, is also made of brass. It is machined to form a raised platform which is threaded externally (R.H.T.) at the top to screw into the body upper half (1). The body (3) is also threaded externally (R.H.T.) to screw into the projectile. A central hole in the body forms a guide for the striker needle (2A). A transverse recess is formed in the body (3) to house the centrifugal bolt (5) and spring (6). The recess is threaded internally (R.H.T.) at one side to receive the brass closing plug (4) and has at the other end a centring stud machined in the body to locate the bolt spring (6). The plug (4), after fitting, is secured by two punch stabs. At the base, the body (3) is bored to receive the shutter assembly and is threaded below to take the gaine (13). Tommy holes are drilled in the body to facilitate insertion or removal of the fuze.
- (iii) Gaine. The gaine (13) is made of brass and is of Japanese standard design. It is screw-threaded externally

to screw into the fuze body lower half (3) and internally to take the gaine closing plug (12). The latter holds a 0.46-grs. perforated gunpowder pellet and the gaine contains 11.42-grs. of C.E. with a central pressing of 2.7-grs. of lead azide.

3. Safety Devices. The following safety devices are incorporated:-

- (a) A Centrifugal Bolt (5) and Spring (6). The brass centrifugal bolt (5) is a cylindrical plug hollowed at one end to house the bolt spring (6) and is stepped and slotted at the other, to lock the striker needle (2A) in the safe position.

The striker, during transport and handling, and in the bore during acceleration, is held off the detonator, by this bolt (5).

(b) Shutter Assembly. The shutter assembly comprises:-

- (i) A cylindrical cup (11) which may be made of brass or a white metal alloy.
- (ii) A spring loaded shutter (10) which rests in the bottom of the cylindrical cup (11) and acts as a flash seal. This shutter may be made of brass or a white metal alloy. Above the shutter (10) resting on a flange in the cylindrical cup (11) is a detonator holder (7).
- (iii) The detonator holder (7) which may be made of brass or of plated brass.

The cylindrical cup (11) is centrally perforated to allow the flash from the detonator to pass down the gaine (13) when the shutter (10) has unsealed the flash hole. Two pins are fitted in the cylindrical cup (11), one to act as a pivot for the shutter and the other as a stop when the shutter is in the closed position. In addition to the pivot pin hole in the shutter (10) there is a lateral recess which acts as a guide for the shutter spring (9) and the shutter spring pin (8). Resting on a flange formed in the cylindrical cup (11) is the detonator holder (7) which is centrally perforated to allow the flash from the detonator to pass down to the gaine (13). The detonator comprises a copper shell holding fulminate of mercury closed by a small copper closing cup. The detonator is secured in the detonator holder (7) by turning over the mouth of the holder.

- (c) Three holes, each .03-in. in diameter, are formed in the aluminium striker head (2) the purpose of which is believed to be to equalise air pressure under the head of the striker.

ACTION

4. On firing, the striker sets back against the centrifugal bolt (5) tending to lock it in position; at the same time the shutter (10) sets back and continues to mask the flash hole. On deceleration, pressure of the striker on the centrifugal bolt (5) decreases and centrifugal force causes it to overcome the pressure of the spring (6) and to fly out to release the striker. The

striker is now free to move onto the detonator and would normally do so if it were not prevented by the inward rush of air through the three small holes building up pressure under the head (2) of the striker and thus equalizing pressure. The striker remains forward owing to creep action. At the same time the shutter (10) opens owing to centrifugal force exposing the flash hole and leaving a clear path from the detonator to the gaine (13). On impact the striker is driven onto the detonator. The flash passes down to the perforated gunpowder booster pellet to function the gaine (13).

P A C K I N G

5. See photograph at Plate C. These fuzes are issued with an aluminium cover turned over the skirt of the fuze and a pull-off cotton tape attached to facilitate quick removal. The fuzes are packed each in a tinned plate cylinder with recessed wooden packing pieces. The cap joint is sealed with a shellacked paper strip. The use of screw lid type cylinders also has been reported. Fuzes in cylinders are usually packed in the same box as the projectiles. Some fuzes have also been found wrapped in blue waxed paper over the aluminium cover.

CHEMICAL ANALYSIS

(Chief Inspector of Military Explosives, Kirkee)

- | | |
|----------------------------------|---|
| 6. Detonator | .. Fulminate of Mercury. |
| 7. Booster in gaine closing plug | .. 0.46-grs. of mealed gunpowder.
Quantity insufficient for quantitative estimation. |
| 8. Gaine | .. 11.42-grs. of C.E. and 2.7-grs. of lead azide. |

A P P R E C I A T I O N

(Economic, manufacture and development aspects)

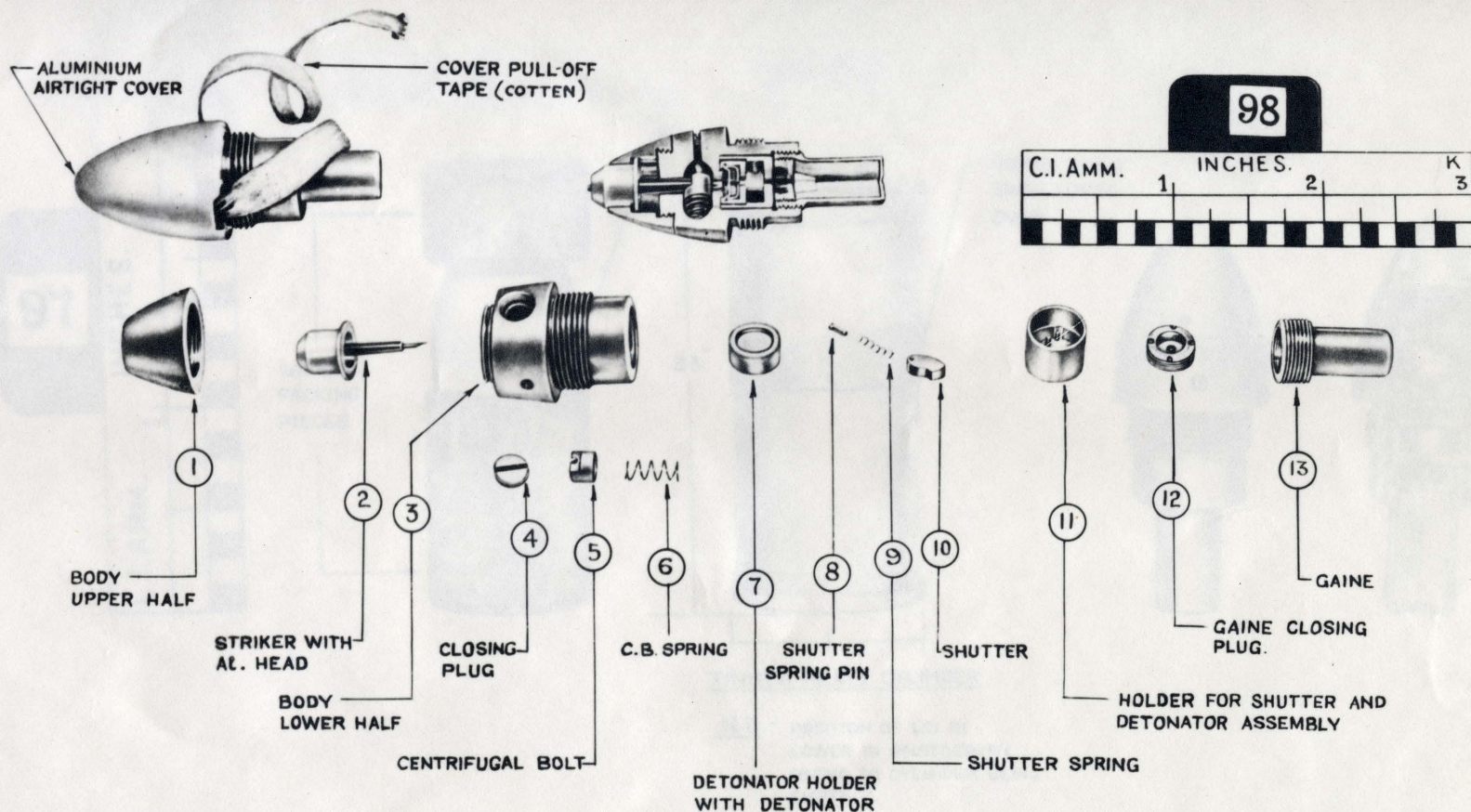
9. The fuze is well made and no effort appears to have been spared in producing an efficient combination. All components are accurately machined and appear to be interchangeable. The manufacture and assembly must be intricate operations owing to the small size of the components, the maximum length of the shutter being, for instance, little more than a quarter of an inch. There is nothing to lock the shutter in the armed position and it is thought that this may be a source of blinks as very little movement is sufficient to mask the small flash hole which is only 0.04-in. in diameter.

10. The method of countering creep action, when the fuze is armed, is of interest. So far as is known this is the only example of this principle being used in Japanese ammunition and no precedent can be traced in British or American ammunition.

S U M M A R Y O F D A T A

- | | |
|-----------------|--------------------------------|
| 11. Type | .. Type '93 (16-mm. fuze hole) |
| Length | .. 1.95-in. |
| Weight (filled) | .. 1.63-oz. |

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JAPANESE FUZE, PERCUSSION, D.A., H.E., TYPE '93

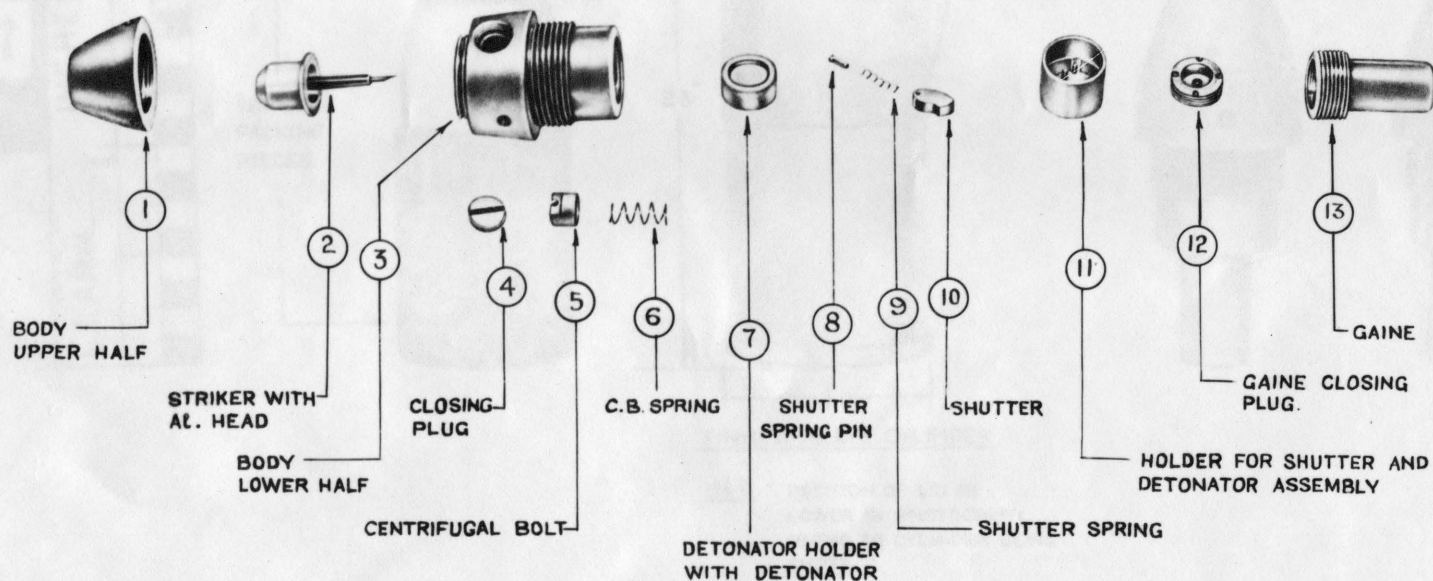
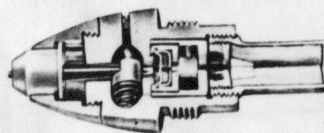
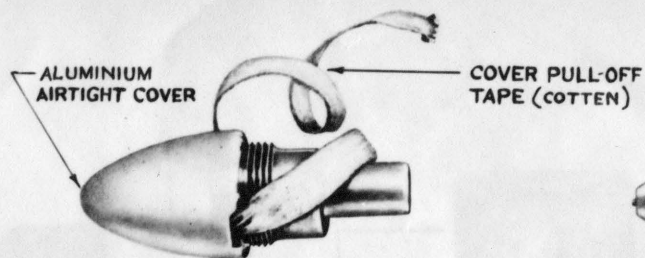
FOR

37MM. H.E. NOSE FUZED SHELL WITH 16 MM. FUZE HOLE

ASSEMBLY SEQUENCE OF COMPONENTS.

C.I. AMM S/1095
KIRKEE MAY '45

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JAPANESE FUZE, PERCUSSION, D.A., H.E., TYPE '93

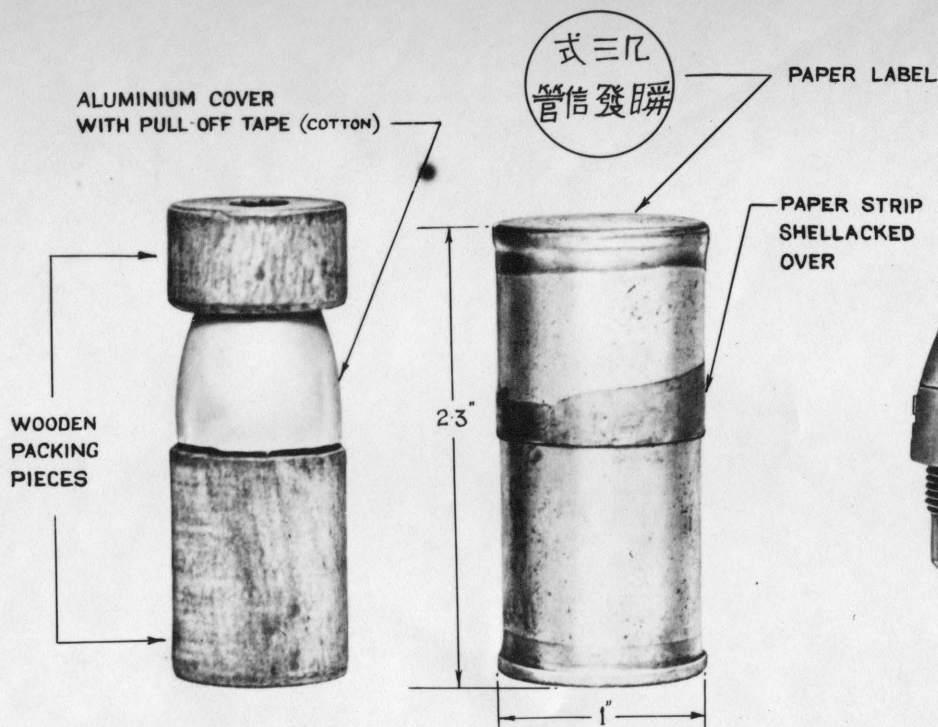
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37MM. H.E. NOSE FUZED SHELL WITH 16 MM. FUZE HOLE

ASSEMBLY SEQUENCE OF COMPONENTS.

C.I. AMM S/1095
KIRKEE MAY '45

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TINNED PLATE CYLINDER

N.B. - POSITION OF LID IS
LOWER IN PHOTOGRAPH
OWING TO CYLINDER BEING
EMPTY.

JAPANESE FUZE, PERCUSSION, D.A., H.E., TYPE '93

— *for* —

37 MM. H.E., NOSE FUZED SHELL WITH 16 MM. FUZE HOLE

METHOD OF PACKING.

C.I.A.M.M. S/1093
KIRKEE MAY '45