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JAPANESE AMMUNITION

C.I.AMM. TECHNICAL REPORT

No. 28

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AMMUNITION

FOR THE

TYPE '96, 25_{MM.} NAVAL AA/AT., Q.F., GUN.

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JANUARY, 1945.

AMMUNITION FOR THE JAPANESE,
TYPE '96, 25-MM. NAVAL A.A./A.T. Q.F. GUN.

G E N E R A L.

Two rounds of the above ammunition were received here in November 1944 from the S.W.P. Area. Before describing the rounds in detail it will be useful to review briefly some general details of the ammunition for this equipment based on information available here.

The ammunition is fired from a multiple barrelled full automatic high angle gun and is primarily for A.A. use. The gun is described as a 25-mm. A.A./A.T. gun, Type '96, Model 2. No reports can be traced, however, of any A.P. ammunition being found for this gun. The projectile has obviously a very high velocity and if of an A.P. type should be effective against light tanks and similar armour.

2. The cartridge cases may be of steel or brass and according to American reports those examined so far were for Naval use which conforms with the general report that the equipment is purely Naval.

3. The following different types of ammunition have been reported:-

- (a) H.E./T. Shell - 0.16" green band below the fuze, remainder of the body painted orange, down to the driving band.
- (b) H.E./T. Shell - As above, but the colour of the body is nearer red than orange.
- (c) H.E./T. with self-destructing element. - Red body and green band below the fuze. Full details are not available.
- (d) H.E./Incendiary - Green body.
- (e) H.E. - Maroon colour. 0.16" green band below the fuze; remainder of body painted chocolate or dark maroon, down to the driving band.

NOTE:- It is possible that the only difference between (a) and (b) is actually in the body colour. Different shades of paint used in manufacture or weathering may account for the slightly different body colour.

4. The two types of rounds critically examined at Kirkee were:-

- (i) H.E./T. Shell (orange coloured body).
- (ii) H.E. Shell (chocolate or dark maroon coloured body).

Except for the shell, all components of the two rounds are the same, and the description below applies equally to both types.

D E S C R I P T I O N .

C A R T R I D G E .

5. Details of this are clearly shown in Plates B & C. External appearance is shown in Plate D. It is a solid drawn brass case of the rimless S.A.A. type. The case is heavily necked and attached to the shell by squeezing or rolling the neck round the rear driving band with the mouth of the case coned tightly at the rear of the forward driving band. The markings on the base of the case are reproduced in the plates. The 'anchor' is the Japanese Naval manufacture sign and between this mark and the date of manufacture (Arabic numbers) is the Inspection mark. The 'S' is believed to indicate a particular batch of cases while the 7-17 and 11-17 refer to the 7th and the 11th month of the 17th year of the Showa era, i.e. July and November, 1942. - The other character in front of the S 11-17 and S 7-17 is believed to refer to the shell used i.e. common shell. This character has been omitted in error from Plate B.

Dimensions of the cases are given in the plates. The cubic capacity for ballistic purposes is 129 c.cs. The internal walls of the case were lacquered or varnished with a heat resisting black finish.

Propellant:-

6. The propellant is loose in the case, similar to an S.A.A. cartridge. The charge consisted of 3.7-ozs. of a graphited tubular N.C. powder. - See chemical analysis below. No decoppering material was found.

Primer:-

7. This is made of brass throughout and the details are clearly shown in Plate A. It is of the "push in" type and is firmly fixed in the cartridge case. The case had to be cut away before the primer could be removed. The cap is of the loose anvil Boxer type and contains about 1 3/4 grains of cap composition, see chemical analysis below. The magazine of the primer is filled with a perforated pellet of gunpowder, weighing 11 grains. American reports state the weight to be 12 grains; the difference is small and is probably due to methods of weighing or filling tolerances.

F U Z E .

8. Details of construction and dimensions of the fuze are shown in Plate A. The assembly sequence of components is shown in Plate D. It should be noted that in this plate the centrifugal bolt is described incorrectly as a detent.

9. For convenience of description the fuze may be divided into seven main components:-

- (i) Nose portion of the body (18), which is made of brass and houses the striker (17).
- (ii) Main body portion (16) made of brass. This is threaded externally at the upper end (R.H.T.) to take the nose portion, while the lower half is threaded externally (R.H.T.) to screw into the shell. It is also threaded internally (L.H.T.) to take the gaine (5) which secures in position the holder for the detonator and shutter assembly (8).
- (iii) Striker (17), which comprises the head made of duralumin and a steel needle, parkerised finish.
- (iv) The centrifugal bolt (13), and steel spring (14).
- (v) Holder (8) made of white metal or plated brass, which houses the detonator and safety shutter (11).
- (vi) Gaine (5), made of a light alloy.
- (vii) Brass booster plug (7), which boosts the flash from the detonator and initiates the gaine.

10. Following usual Japanese practice, the detonator has a fulminate of mercury composition filling, below which is a small perforated pellet of G.P. to boost up the flash from the detonator. The main gaine filling is C.E. into which is pressed a small pellet of lead azide. Details of fillings are given in the chemical analysis below.

Safety Devices:-

- 11. (a) A centrifugal bolt (13) which under pressure of the spring locks the striker (17) and prevents it from impinging on the detonator during handling and transport, and in the bore of the gun during acceleration.
- (b) The safety shutter (11) which masks the flash hole in the fuze diaphragm until it is opened by centrifugal force on deceleration after firing.

NOTE:- The shutter swings completely clear of the flash hole in the diaphragm, unlike the shutter in British type fuzes which usually has a stemmed C.E. channel and on opening of the shutter this is brought into line with the detonator and helps to boost up the flash.

Action:-

12. On firing, the striker (17) sets back on to the centrifugal bolt (13) which also sets back on to its seating in the fuze. This prevents the bolt (13) from opening under the action of the centrifugal force and retains the striker locked. Similarly the safety shutter sets back and continues to mask

the flash hole in case of any failure such as in the centrifugal locking device. On deceleration the centrifugal bolt flies out against the pressure of its spring thus releasing the striker. At the same time the shutter opens exposing the flash channel. The striker is now free to be driven by impact on to the detonator.

NOTE:- The striker is extremely light and presumably creep action is sufficient to retain the striker away from the detonator. No spring is used and fuze must be very sensitive. It may function on heavy graze.

S. H E L L.

H.E./T. (Orange coloured body):-

13. Details of construction and dimensions of the shell are shown in Plate B. External appearance of the shell is shown in Plate D.

The shell body is machined from steel bar and is streamlined, the angle of taper being approximately 10° . It follows usual small arm H.E./T. construction. The dimensions of both cavities are given in Plate B. Internal walls have a black lacquer or varnish finish. The two driving bands appear to be made of a copper alloy both having about the same degree of hardness. The steel washer closing the tracer cavity is secured in by the base of the shell being spun over.

Owing to one shell only of each type being available, it has not been possible to arrange for metallurgical analysis of the shell body and driving bands. The filling consists of three prepressed blocks of T.N.T./Aluminium, the total weight of the three pellets being 145 grains; chemical analysis of the filling is given below.

The charge weight percentage is approximately 3.85% for the H.E./T. shell against 6.65% for the H.E. shell.

The tracer cavity contains 135 grains of priming and tracing composition. These are pressed in two increments, one of tracing composition followed by a topping of priming composition, +- see chemical analysis below.

H.E. Shell (dark maroon coloured body):-

14. Details of construction and dimensions of the shell are shown in Plate C. External appearance of the shell is shown in Plate D. Note that in this plate the colour is described as 'chocolate'. Actually it is difficult to describe the colour accurately. It is really dark maroon to chocolate.

The shell body is generally similar in construction to the shell described in para. 13 above. The following are the main differences.

- (i) The body is longer by nearly .2-in.
- (ii) The H.E. shell has no tracer cavity; it is drilled out from the nose to its full length to take an H.E. filling.

- (iii) The weight of the H.E. filling is 257 grains against the 145 grains of the H.E./T. shell.

METALLURGICAL ANALYSIS.

Owing to one round only of each type being available no detailed analysis has been possible. Hardness figures taken on the brass case showed:-

	V.P.N.
1-in. from base	154.
2-in. from base	152.
$\frac{3}{8}$ -in. from base	110.
Centre of coned shoulder...	117.
Neck $\frac{1}{8}$ -in. from mouth. ...	125.

CHEMICAL ANALYSIS. (By C.I.M.E., Kirkee.)

Propellant (in both cases):-

N.C. and graphite.	89.8%
D.N.T.	7.4%
Diphenylamine	2.8%

Graphited tubular cords, size 0.2" X 0.1",
internal diameter 0.025".

Primer (in both cases):-

Cap Composition.

1.74 grains of a composition of:-

Mercury fulminate)	Quantitative examination not carried out, the quantity being too small.
Potassium chlorate)	
Antimony sulphide)	

Magazine.

11 grains of mealed gunpowder (sulphur present).

Fuze (in both cases):-

Detonator

Black composition containing fulminate of mercury.

Booster pellet (perforated).

1.54 grs. of compressed mealed gunpowder (sulphur present).

Gain

Filling consists of Lead Azide (2.5 grs.), embedded in a C.E. pellet (11.88 grs.), as shown in the drawing.

Shell H.E./T. (orange coloured body):-Filling

T.N.T. Grade I	...	...	...	60%) 145 grs.
Aluminium	...	...	...	40%)

Tracing composition:-

Barium nitrate	...	...	...	35.3%)
Barium peroxide	...	...	...	24.5%)
Magnesium	...	...	...	34.0%) 135.32 grs.
Wax	...	...	...	5.8%)
Iron	...	...	...	0.4%)

Shell H.E. (dark maroon coloured body):-Filling.

	<u>Top</u>	<u>Bottom</u>
T.N.T.	61.2%	59.9%) 257 grs.
Aluminium	38.8%	40.1%)

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

(Economic, manufacture, and development aspects).

The ammunition follows generally S.A.A. design as is used in the British Service for the larger calibres. In the form of case, depth of bullet seating etc. it conforms very closely to our 15-mm. **BESA** cartridge. The standard of workmanship and finish is high and comparable with British standards.

S U M M A R Y O F D A T A .Complete round (fuzed):-

Overall length	...	...	...	9.2-ins.
Weight	24-ozs.	(H.E./T.Shell);	24.27-ozs.	(H.E.Shell).

Cartridge Case:-

Length	...	...	...	6.43-ins.
Diameter over rim	...	...	...	1.68-ins.

Propellant:-

Weight	...	...	...	3.7-ozs.
Nature	...	...	...	Tubular graphited N.C. with D.N.T. and Diphenylamine.

Primer

Overall length	...	...	...	0.69-ins.
Diameter over body	...	...	...	0.49-ins.
Diameter over rim	...	...	...	0.63-ins.
Weight (filled)	...	...	...	195.6 -grs.
Nature and weight of magazine filling....	...	...	...	(Pressed perforated (G.P. pellet 11 grs.
Nature and weight of cap composition.				Mercury fulminate,) potassium chlorate,) 1.3/4 Antimony sulphide.) grs.

Shell (without fuze):-H.E./T.H.E.

Length.	3.37-ins.	3.56-ins.
Weight (filled)	7.11-ozs.	7.37-ozs.
Weight of H.E. filling	145 grains.	257 grains.
Nature of filling.	T.N.T./Aluminium	T.N.T./Aluminium.
Weight of tracing composition.	132.32 grs.	-
Nature of tracing composition.	Barium nitrate.	-
	Barium peroxide.	
	Magnesium.	
	Wax.	
	Iron.	

Colour of body and
band markings.

Orange. Dark maroon.
with 0.16" green band at the mouth.

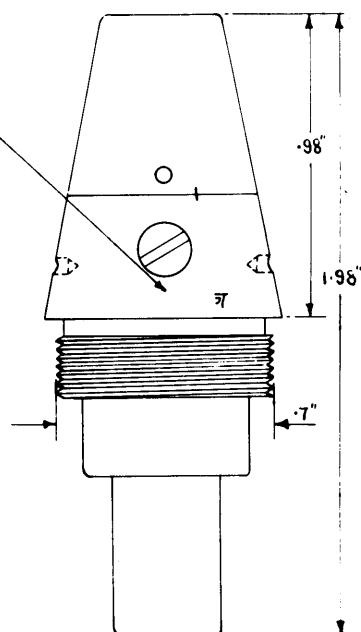
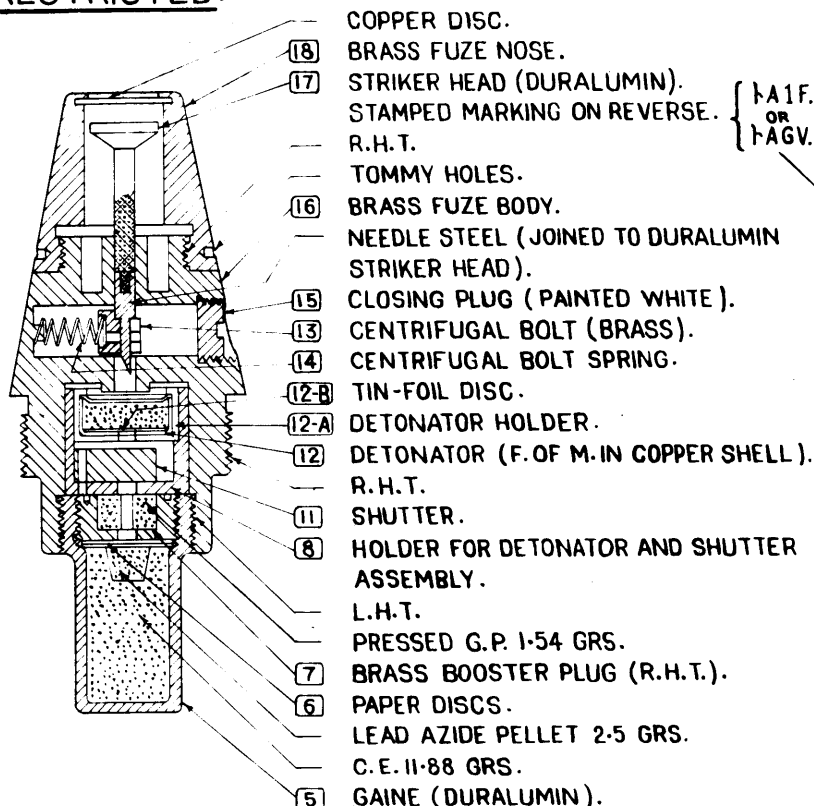
Fuze:-

Length	...	...	...	1.98-ins.
Weight (filled)	1.48-ozs.
Weight of gaine filling	47.89-grs.

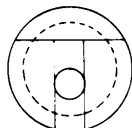
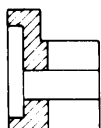
CHIEF INSPECTORATE OF AMMUNITION,
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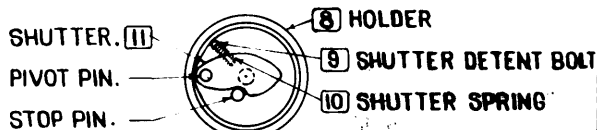
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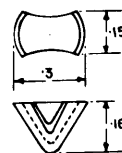
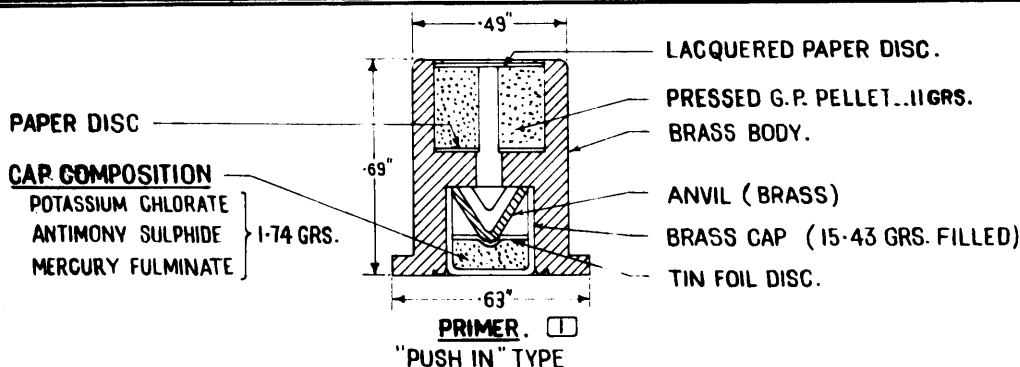
WEIGHT OF FUZE COMPLETE WITH GAINE 1.48 oz.



CENTRIFUGAL BOLT. 13



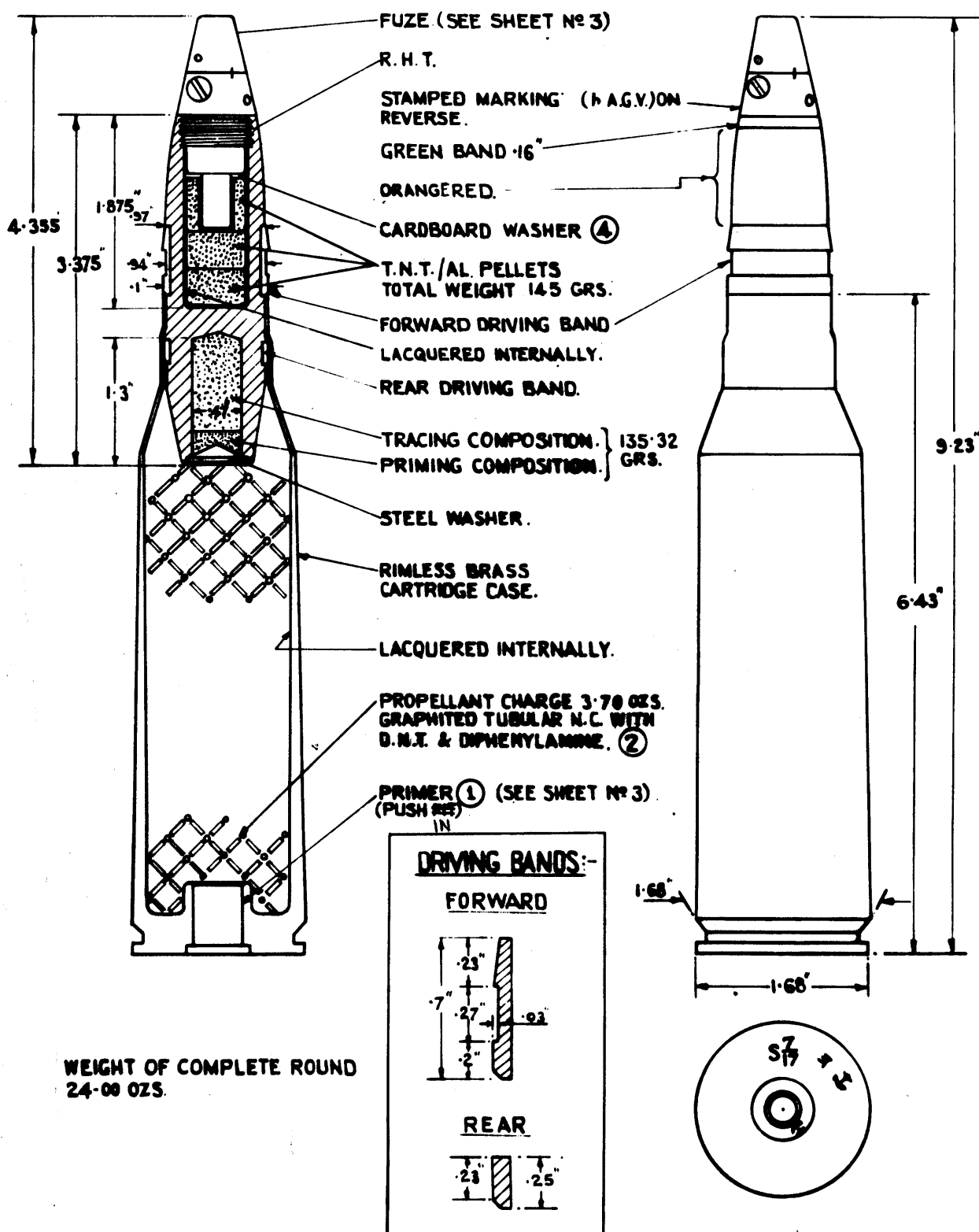
SHUTTER ASSEMBLY IN HOLDER.



ANVIL.

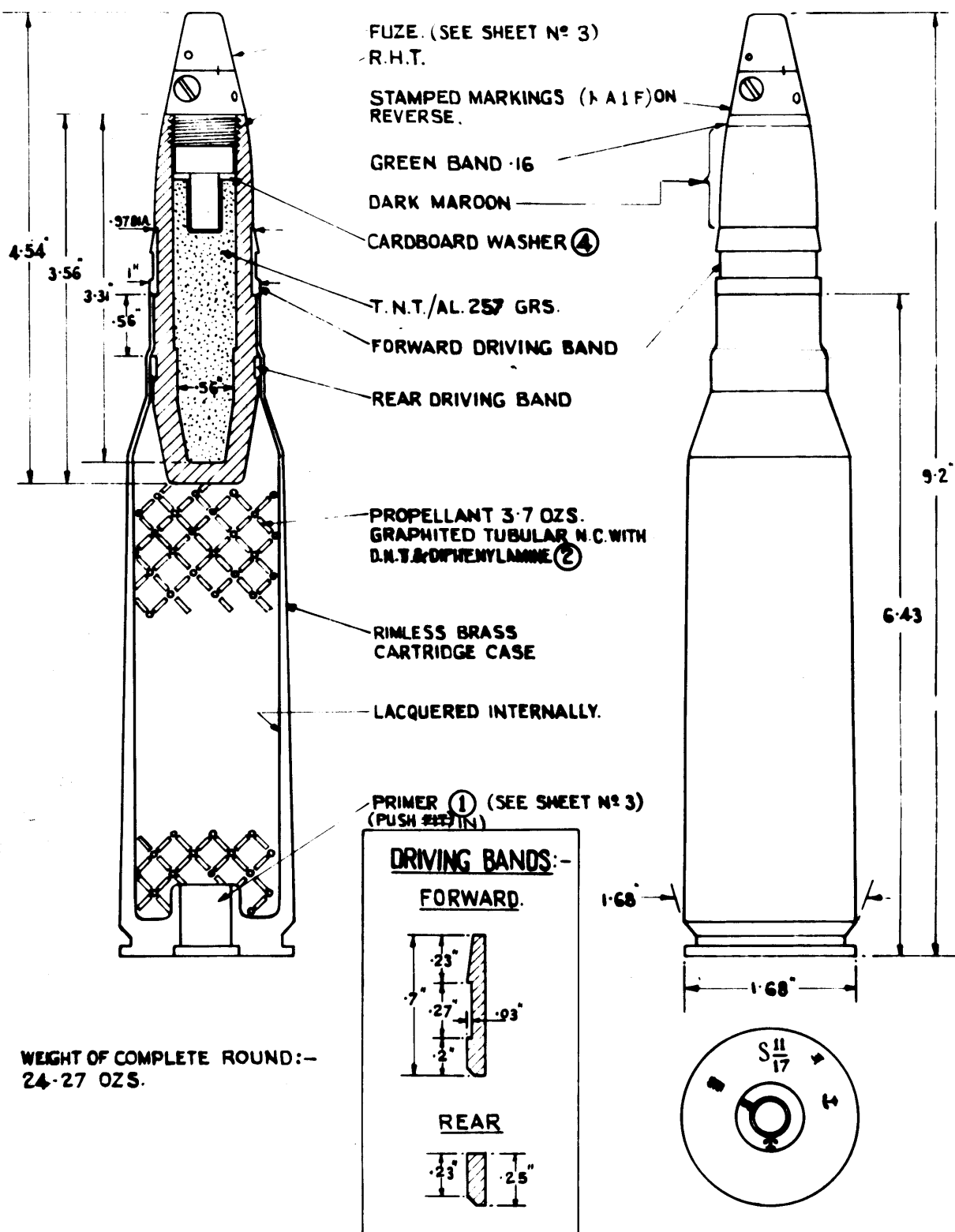
D.A. FUZE & "PUSH-IN" TYPE PRIMER
FOR

JAPANESE NAVAL A.A. CARTRIDGES 25 MM. (RIMLESS)



JAPANESE NAVAL A.A. CARTRIDGE 25 MM. (RIMLESS)
WITH H.E. TRACER SHELL
(ORANGE BODY)

SHEET 2 OF 3 SHEETS
C.I. AMM. S/931
 KIRKEE. NOV. 1944

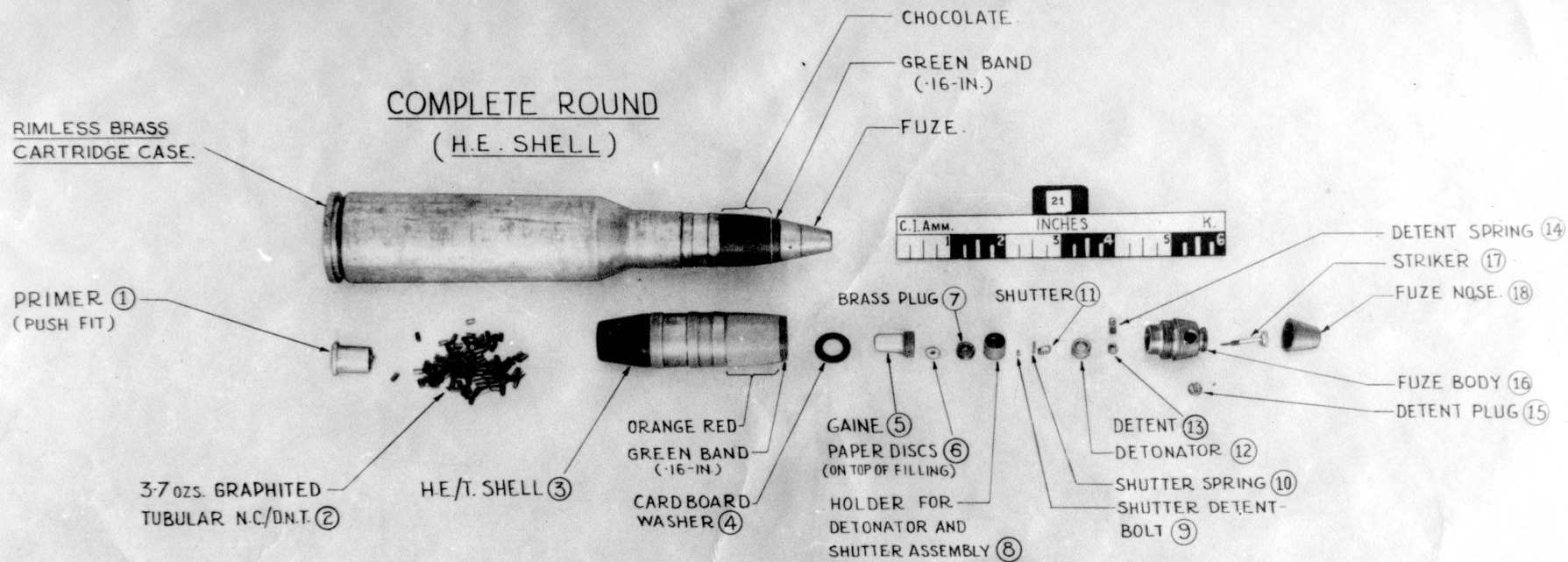


JAPANESE NAVAL A.A. CARTRIDGE 25 MM. (RIMLESS)
WITH H.E. SHELL
(DARK MAROON BODY.)

SHEET 1 OF 3 SHEETS.

C.I. AMM. S/931
KAWA, NOV. 1944

RESTRICTED



JAPANESE NAVAL A.A. CARTRIDGE, 25 MM. (RIMLESS)
(COMPLETE ROUND AND ASSEMBLY SEQUENCE)