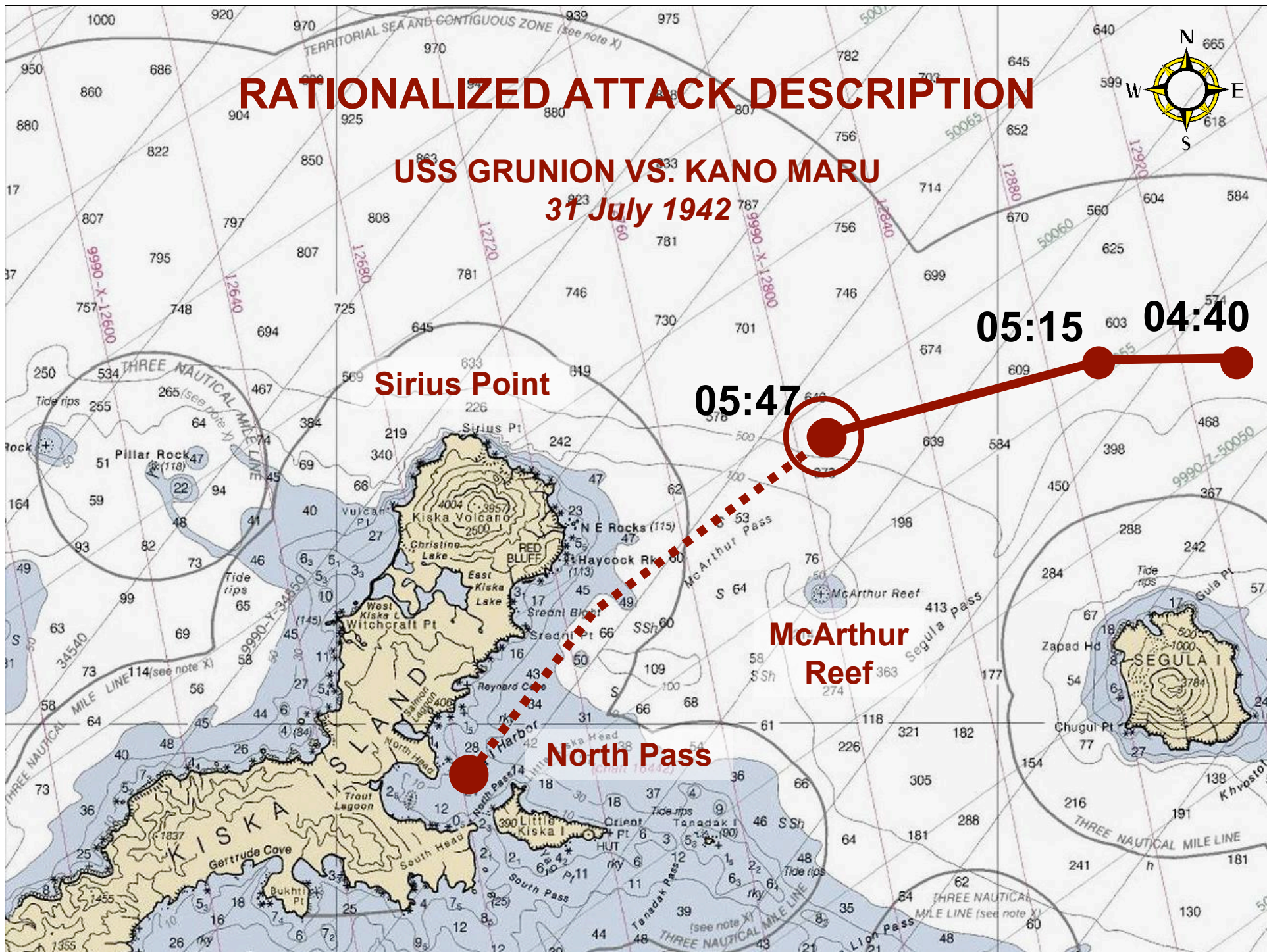
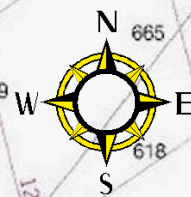


RATIONALIZED ATTACK DESCRIPTION

USS GRUNION VS. KANO MARU

31 July 1942



Sirius Point

05:47

05:15

04:40

McArthur Reef

North Pass

RATIONALIZED ATTACK DESCRIPTION

July 29, 1942

Lost contact with escorting subchaser (CH-26) in fog at nightfall. KANO MARU went on alone toward KISKA.

July 30, 1942

08:00 - Reached the north of Kiska Is. about 20 nautical miles distance. KANO MARU forced to drift due to dense fog for the entire day.

15:30 - Seaplane fighter (Pete) (NOTE: This was likely a RUFÉ) ditched near us and KANO MARU picked up both plane (using ship's derrick) and pilot. At evening the fog still dense, and the KANO MARU was alert for enemy submarine attack.

17:15 - Headed to open ocean, at 15 knots, maneuvering a zigzag course, and decided to enter the KISKA harbor next morning.

July 31, 1942

“Early Morning” - Reached offshore position from KISKA harbor but the fog was still dense. KANO MARU again drifted and waited for fog to lift.

RATIONALIZED ATTACK DESCRIPTION

July 31, 1942

04:40 - The fog thinned, and we located our position by astronomical observation. We confirmed the altitude and latitude, and set course toward Kiska Island.

05:15 – ***KANO MARU is proceeding to Kiska Island at 15 knots.*** KANO MARU was avoiding “MacArthur’s reef”, and at 158 degrees, 12 nautical miles distance of Segula Island changed course to 255 degrees.

05:47 - ***KANO MARU is proceeding to Kiska Island at 15 knots.*** Two torpedo with overlapping wakes are spotted at 1000 meters distance, starboard forward, crossing the KANO MARU’s course at a 45 degree angle. “Full turn starboard” is ordered.

NOTE: 100 meters distance given in original account is obviously in error. A Mk 14 torpedo traveling at 46 knots would cover this distance in 4.23 seconds

RATIONALIZED ATTACK DESCRIPTION

05:47 thru 05:48 - *KANO MARU is maneuvering.* The ship changed course rapidly toward starboard. One torpedo passed the stem, but other one hit the machinery room starboard side with a large explosion. The main engine stopped, the machinery room was flooded, generator, radio, the aft 8cm gun damaged, and other auxiliary machinery knocked out.

The crew and soldiers prepared for anti-submarine combat and prepped the seaplane for launching.

NOTE: If the torpedoes were first spotted at 1000 meters, the KANO MARU would have travelled approx. 1140 ft. before impact, 44 seconds after sighting.

05:48 thru 05:57 - *KANO MARU drifting under momentum. GRUNION is maneuvering.* Periscope is spotted very close, right fore. Immediately 8cm gun and 13mm machine gun started shooting. The 13mm machine gun fire was useless against the submerged submarine, but the splash aids the aim of 8cm gun crews. The periscope gradually moved to right aft.

RATIONALIZED ATTACK DESCRIPTION

05:57 - KANO MARU drifting under momentum, and swinging to starboard. GRUNION is firing. From the starboard at 157 degrees, 300m distance, the sub fires second salvo.

- One torpedo from right aft passes below the ship bottom at the bridge.

05:57 thru 06:07 – KANO MARU drifting. GRUNION is maneuvering for firing position. GRUNION opens the range by crossing KANO MARU's stern and moves to firing position off her port side. The periscope appears sporadically and moves from the stem to the port.

06:07 - KANO MARU drifting. GRUNION is firing. From port at 220 degrees, from "very close range", the sub shoots a third salvo. Three torpedo wakes came toward us.

- One torpedo struck forward of the bridge, at No.2 cargo hold. The torpedo failed to explode, and the body floated tail down with about 0.5m sticking from the water.
- The second torpedo struck amidships portside, but was also a dud.
- The last torpedo missed, passing near the stern.

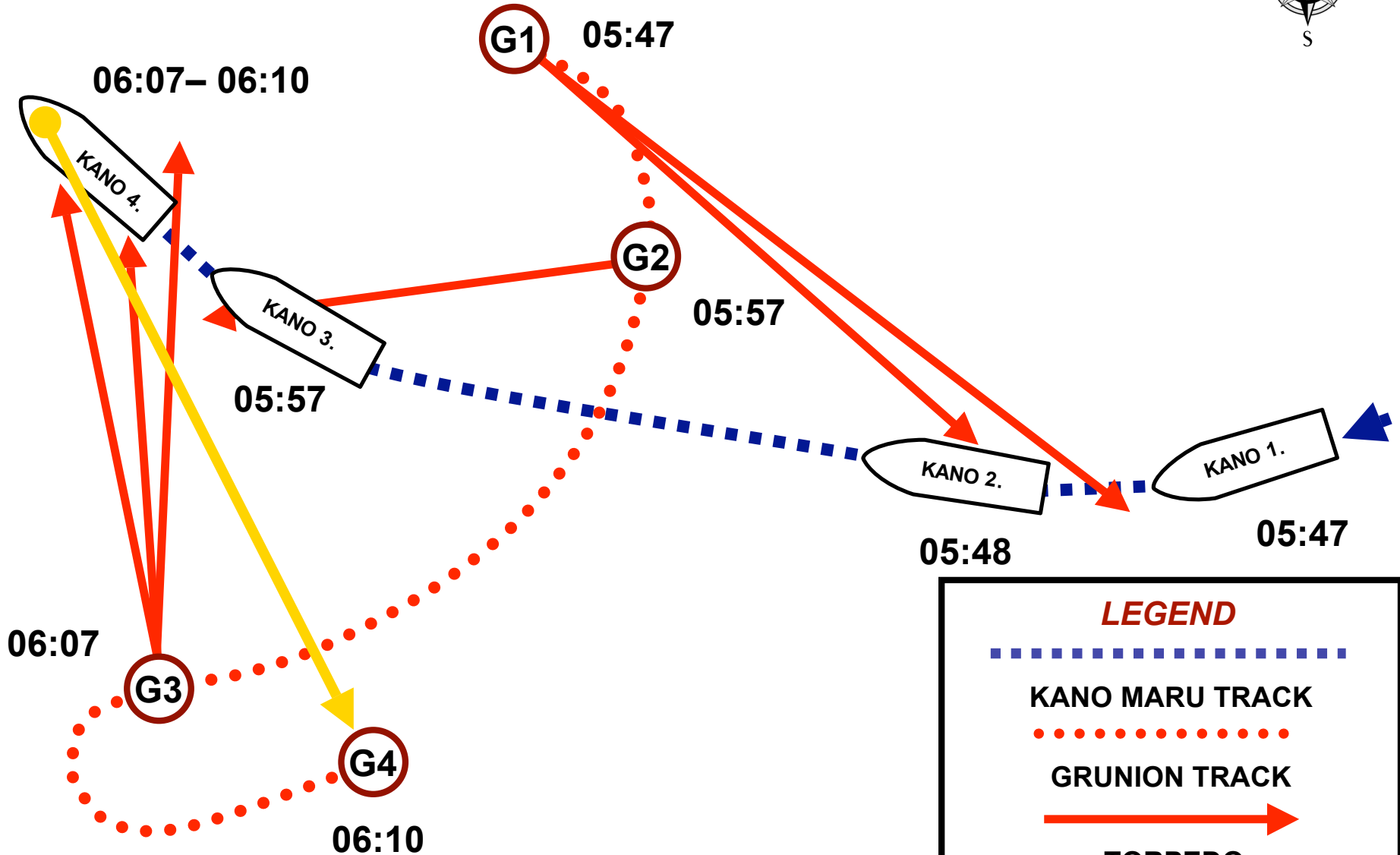
RATIONALIZED ATTACK DESCRIPTION

06:10+ - *KANO MARU drifting. GRUNION is maneuvering.* The periscope is spotted port at about 135 degrees, about 400m distance. The forward 8cm gun and 13mm machine gun again started firing. The sub kept its periscope up and moved calmly, ignoring the damaged KANO MARU. Then the sub seemed to begin to surface. The conning tower made a ripple on the surface and the waves began washing the conning tower.

Then a 8cm shell hit the washing wave, making a water column and a dull water explosion sound. Also we saw the swell of heavy oil.

NOTE: This timeline derives from the account of Capt. Aiura, the IJN Supervisor in command of the KANO MARU. Some information was erroneous, and some information was extrapolated from the accounts.

GRUNION ATTACK PLOT



NOT TO SCALE

LEGEND

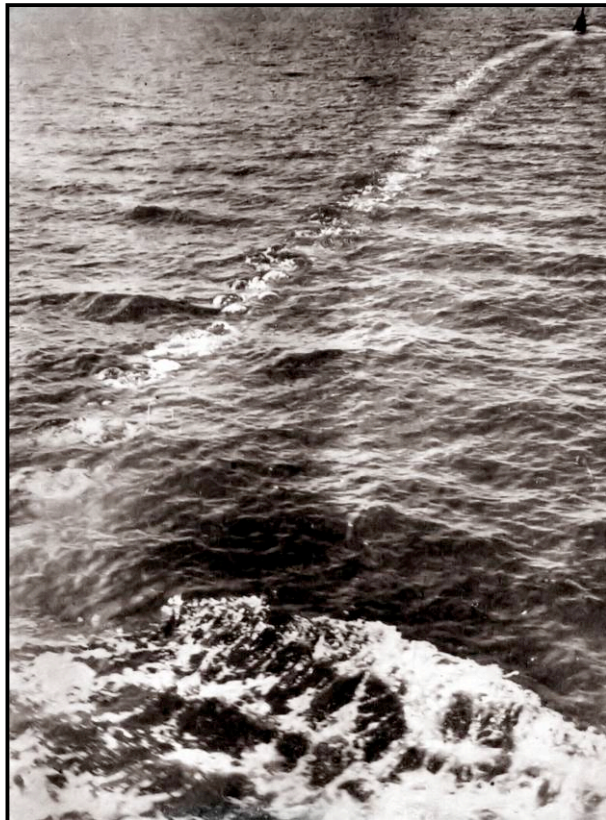
- KANO MARU TRACK
- GRUNION TRACK
- TORPEDO
- GUNFIRE

Heading 130°
Approximate
05:47
Range: 1000M

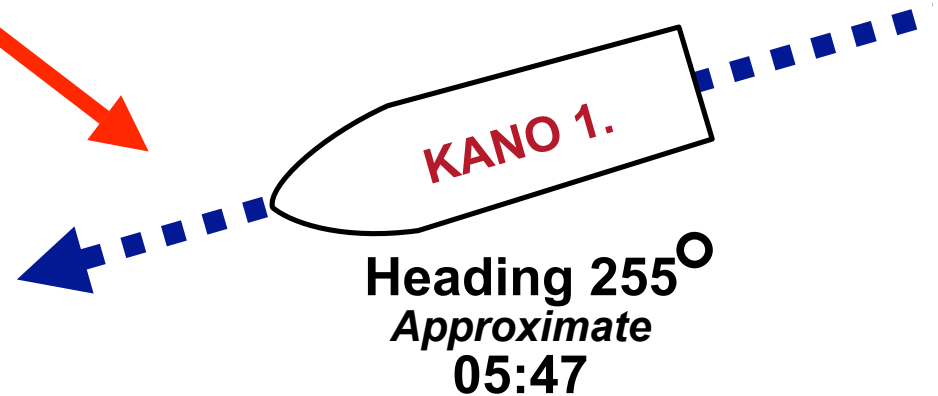
G1



KANO MARU is proceeding to Kiska Island at 15 knots.
05:47 - Two torpedo with overlapping wakes are spotted at 1000 meters distance, starboard forward, crossing the KANO MARU's course at a 45 degree angle. "Full turn starboard" is ordered.



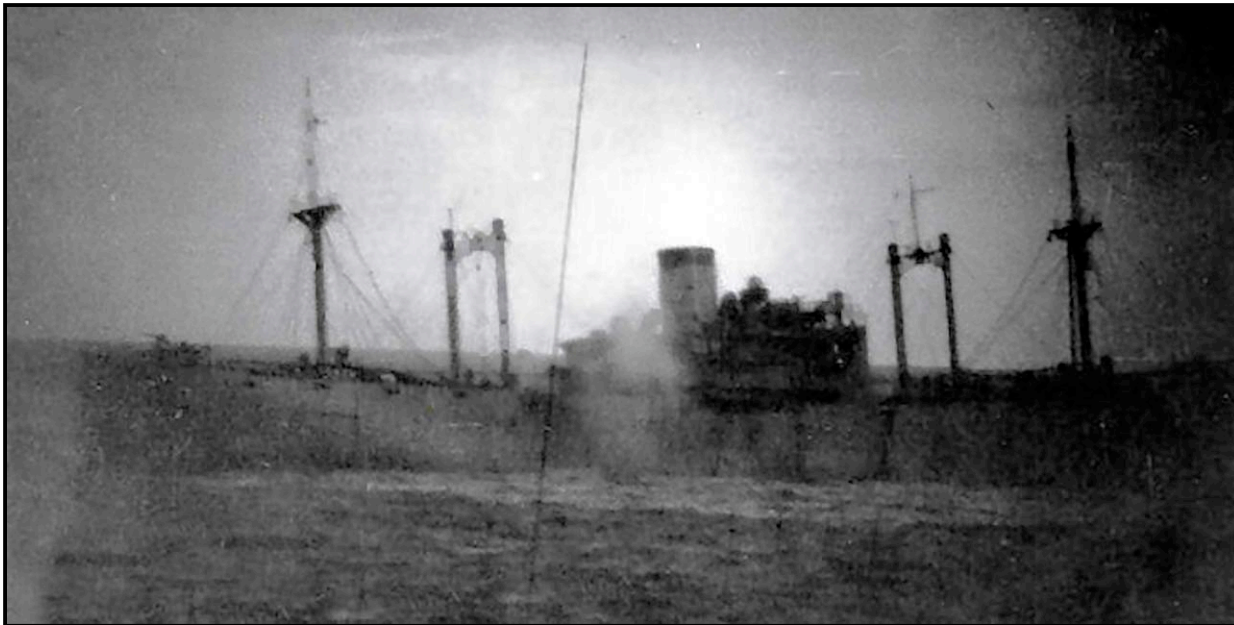
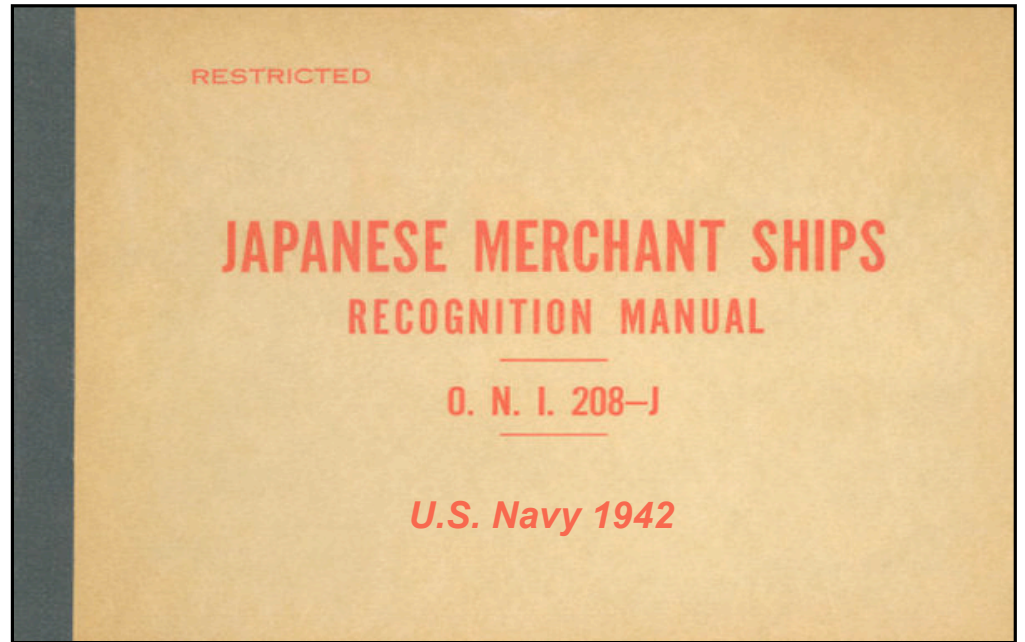
NOT TO SCALE



NOTE: 100 meters distance given in original account is obviously in error. A Mk 14 torpedo traveling at 46 knots would cover this distance in 4.23 seconds

GRUNION's view of the KANO MARU

*RECOGNITION
MANUAL in use by
GRUNION Attack Party*



*Periscope view of
similar vessel from
USS PLUNGER*



JAPANESE MERCHANT SHIPS; O.N.I. 208-J / USN 1942

KANO MARU

Gross tonnage: 8,572.

Length: (w. l.) 454' (o. a.) 477'.

Beam: 61'.

Draft: (loaded) 28' (light) 11½'.

Speeds:

Normal cruising—16 knots.

Maximum—19 knots; 106 RPMs at 16 knots.

Built: 1934.

Machinery: Diesel, single screw, 2,187 NHP, 7,600 BHP.

Fuel:

Type—oil.

Capacity—2,450 tons including deep tanks.

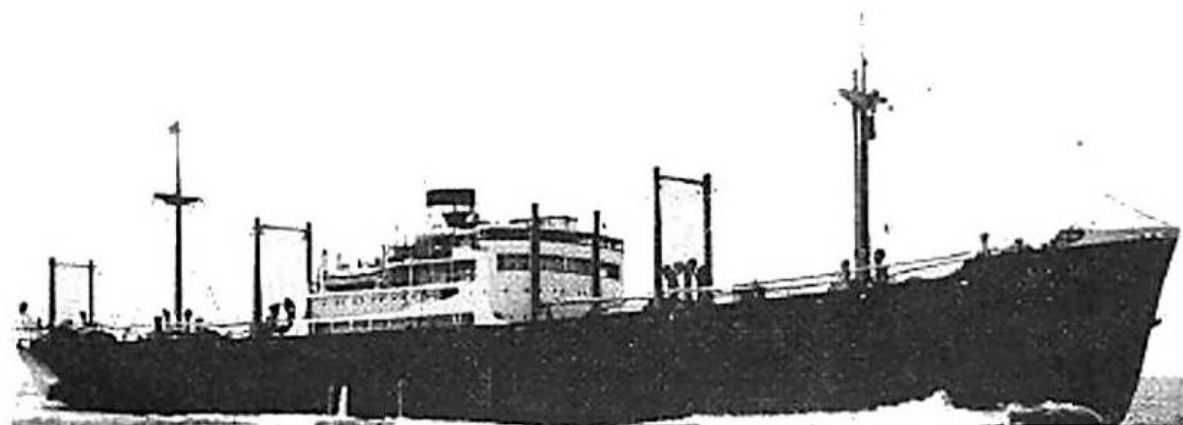
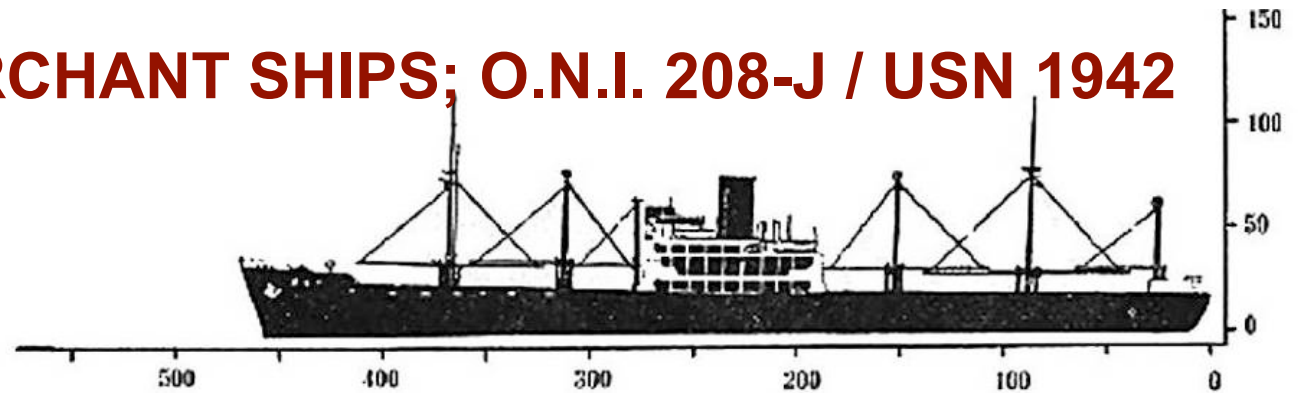
Radius: 29,000 miles at 16 knots.

Complement: (crew) 50 (pass.) 12.

Owners: Kokusai Kisen Kaisha.

Potential naval value: XAV, AP, AK, raider, XCL.

Remarks: Guns: Capable of mounting two 6" and two 5" guns.



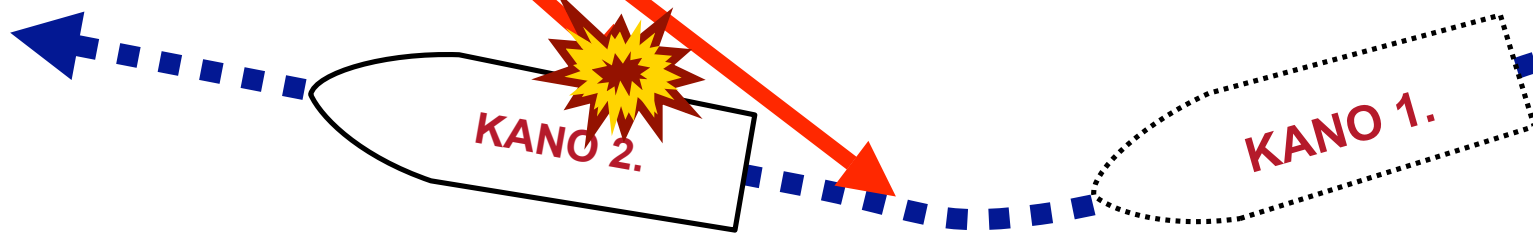
Heading 130°
Approximate
05:48+/-
Range: 1000M

G1

If the torpedoes were first spotted at 1000 meters, the KANO MARU would have travelled approx. 1140 ft. before impact, 44 seconds after sighting

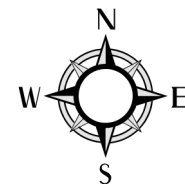
KANO MARU is maneuvering.
05:47 thru 05:48 - The ship changed course rapidly toward starboard. One torpedo passed the stem, but other one hit the machinery room starboard side with a large explosion. The main engine stopped, the machinery room was flooded, generator, radio, and other auxiliary machinery knocked out.

The aft 8cm gun was also damaged by the shock of the torpedo explosion. The crew and soldiers prepared for anti-submarine combat and prepped the seaplane for launching.



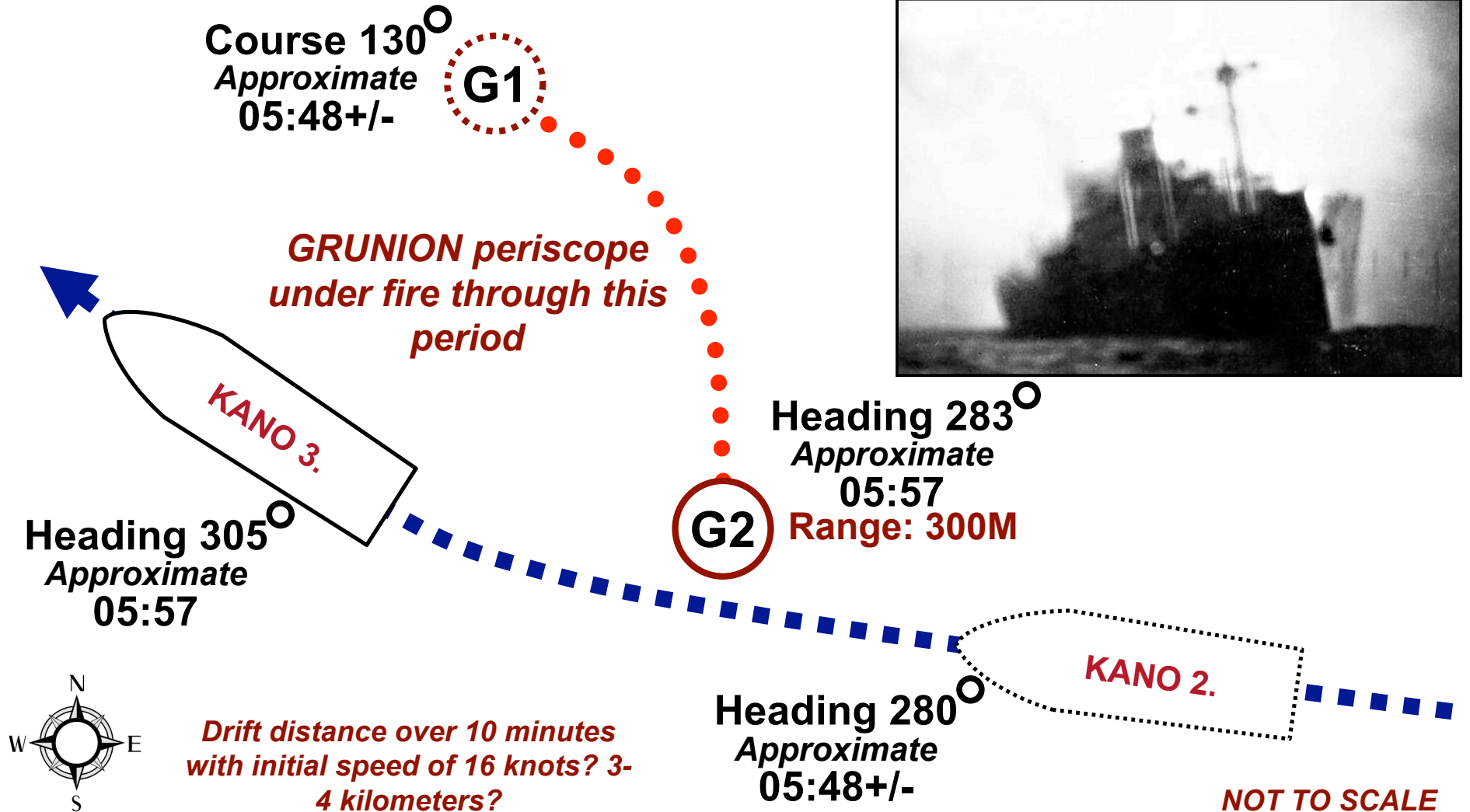
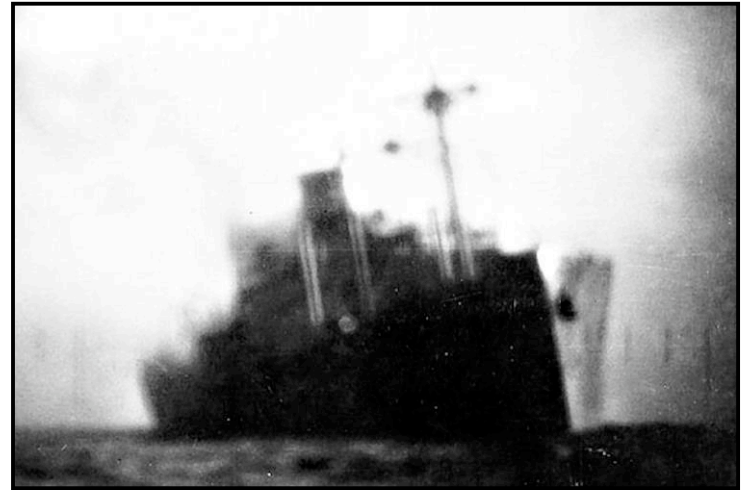
Heading 280°
Approximate
05:48+/-

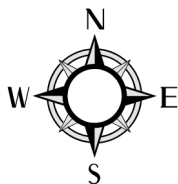
NOT TO SCALE



KANO MARU drifting under momentum. GRUNION is maneuvering.

05:48 thru 05:57 - Periscope is spotted very close, right fore. Immediately 8cm gun and 13mm machine gun started shooting. The 13mm machine gun fire was useless against the submerged submarine, but the splash aids the aim of 8cm gun crews. The periscope gradually moved to right aft.

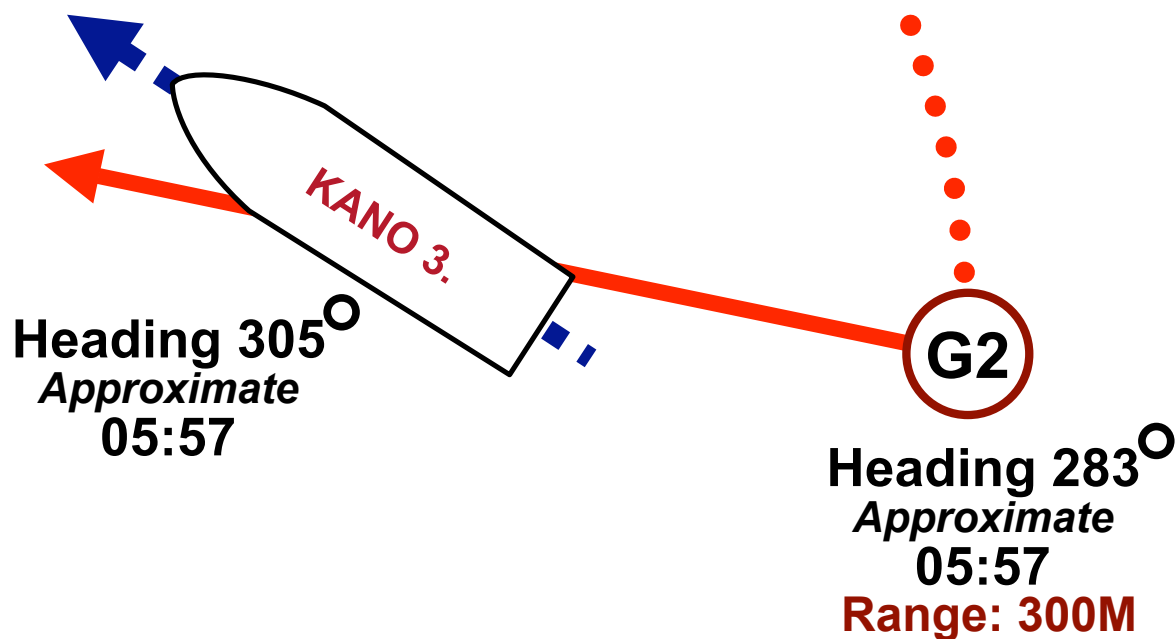




***KANO MARU drifting under momentum, and swinging to starboard.
GRUNION is firing.***

05:57 - From the starboard at 157 degrees, 300m distance, the sub fires second salvo.

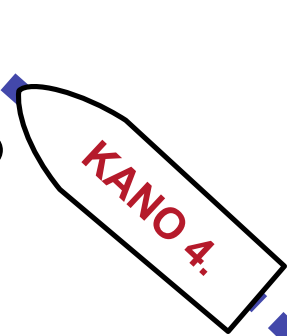
- One torpedo from right aft passes below the ship bottom at the bridge.



NOT TO SCALE



Heading 305°
Approximate
06:07



Base Course
227°
Approximate
05:57



***KANO MARU drifting.
GRUNION is maneuvering for
firing position.***

**05:57 thru 06:07 – GRUNION
opens the range by crossing
KANO MARU's stern and moves
to firing position off her port
side. The periscope appears
sporadically and moves from
the stem to the port.**

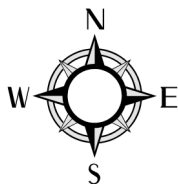
Heading 305°
Approximate
05:57



Heading 350°
Approximate
06:07
Range: 400M

***GRUNION periscope
under fire through this
period***

NOT TO SCALE



Heading 305°
Approximate
06:07

***KANO MARU drifting.
GRUNION is firing.***

06:07 - From port at 220 degrees, from “***very close range***”, the sub shoots a third salvo. Three torpedo wakes came toward us.

- One torpedo struck forward of the bridge, at No.2 cargo hold. The torpedo failed to explode, and the body floated tail down and about 0.5m sticking from the water.
- The second torpedo struck amidships portside, but was also a dud.
- The last torpedo missed, passing near the stern.

NOT TO SCALE



Heading 350°
Approximate
06:07

Range: “***Very Close***”



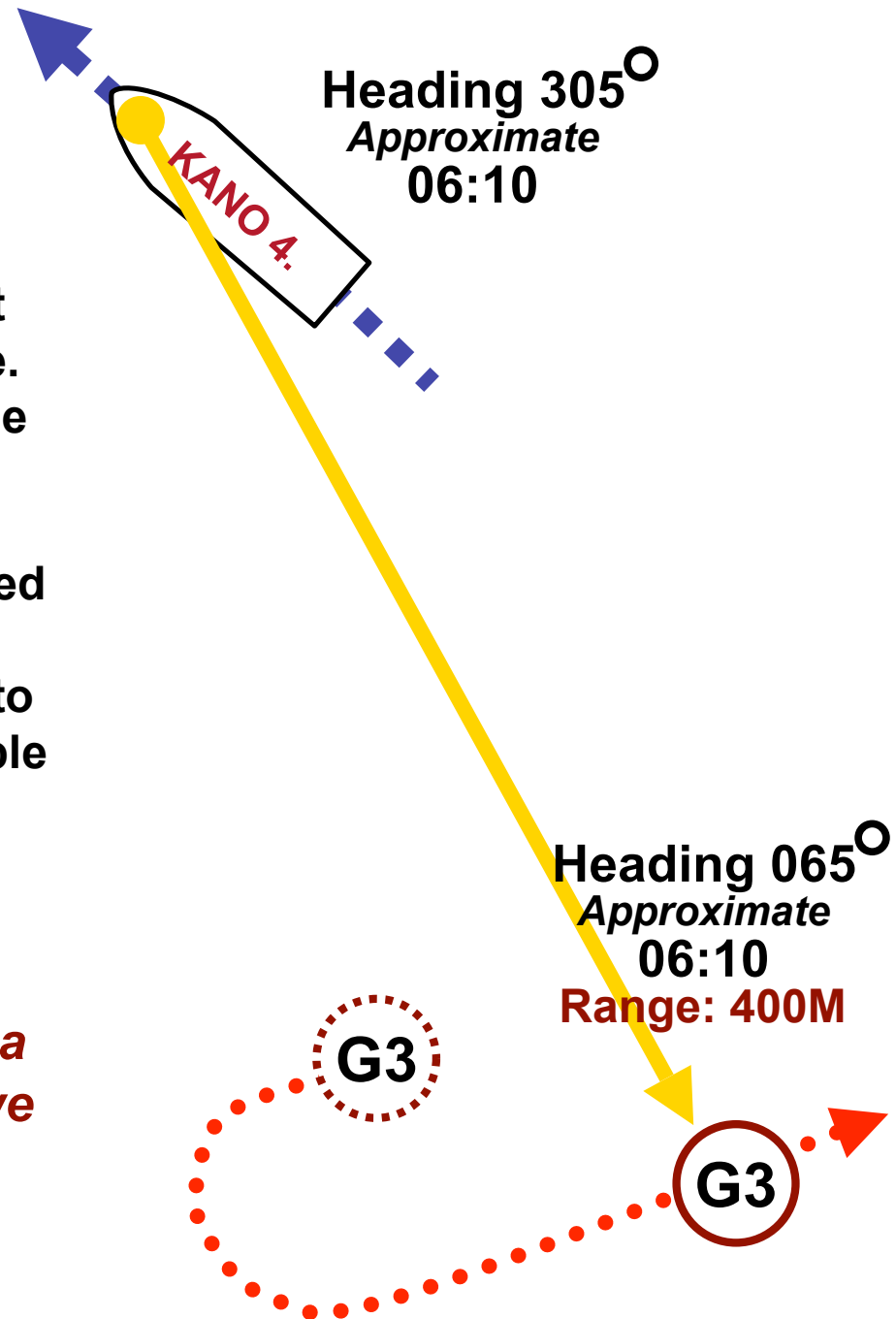
***KANO MARU drifting.
GRUNION is maneuvering.***

06:10+ - The periscope is spotted port at about 135 degrees, about 400m distance. The forward 8cm gun and 13mm machine gun again started firing.

The sub kept its periscope up and moved calmly, ignoring the damaged KANO MARU. Then the sub seemed to begin to surface. The conning tower made a ripple on the surface and the waves began washing the conning tower.

Then a 8cm shell hit the washing wave, making a water column and a dull water explosion sound. Also we saw the swell of heavy oil.

NOT TO SCALE



Underwater Torpedo Explosion



The “Explosion”

AIURA:

“Made a water column”

“Dull water explosion sound”

NAKAGAWA:

“Big black-brown water arose”

“Water column” (*from sketch map*)

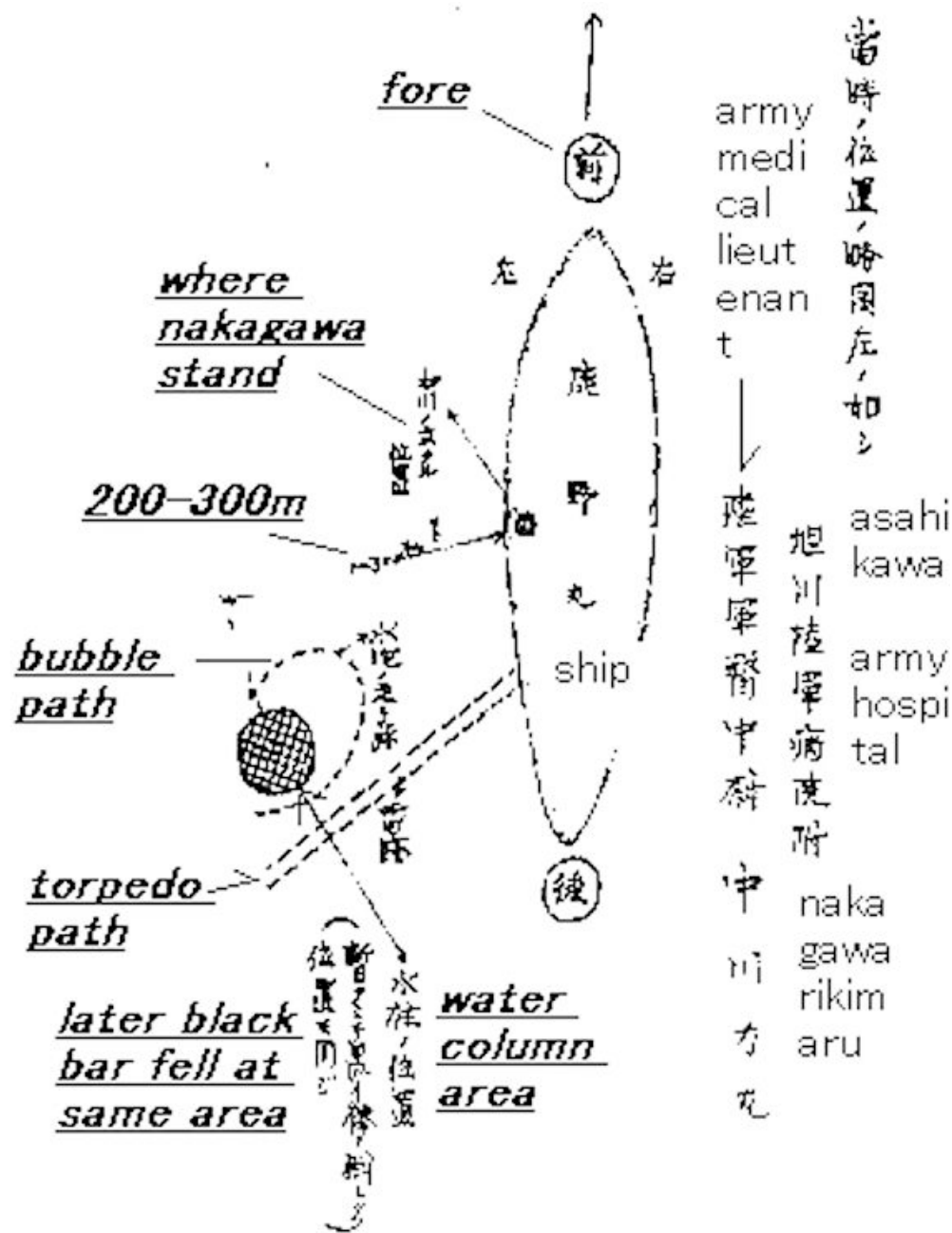
Aftermath

AIURA:

“We saw the swell of heavy oil”

NAKAGAWA:

“Something oily afloat on the surface”



WITNESS: RIKIMARU NAKAGAWA
IJA Medical Sublieutenant

While I was looking aft on boat deck(port) in front of my cabin, I saw bubble running on the surface figuring half circle just 2 or 3 hundreds meters apart from shipside. I shouted “Must be Submarine!”.

Then just at the head-end of bubble running, big black-brown water arose, something oily afloat on the surface, after a while a black thin bar appeared on the surface then fell down and submerged. I in spite of myself cried out ‘Good, You got what you deserved!’, and I am convinced the submarine was sunk by the shell. ”

WITNESS: RIKIMARU NAKAGAWA

The “Bubble Path” Nakagawa is reporting is possibly the same “ripple on the surface”/“washing wave” that Aiura addresses in his account.

If plotted based on the ship’s heading, the torpedo tracks, and adjusted for range, it is generally in accordance with the track of the major course change Aiura shows GRUNION making on his chart.

It’s possible this is the wake of the periscope/shears/fairwater breaking the surface when GRUNION broached.

“a black thin bar appeared on the surface then fell down and submerged.”

This was very possibly a torpedo air flask porpoising to the surface.

Torpedo tail section in the wreckage of the GRUNION Forward Torpedo Room

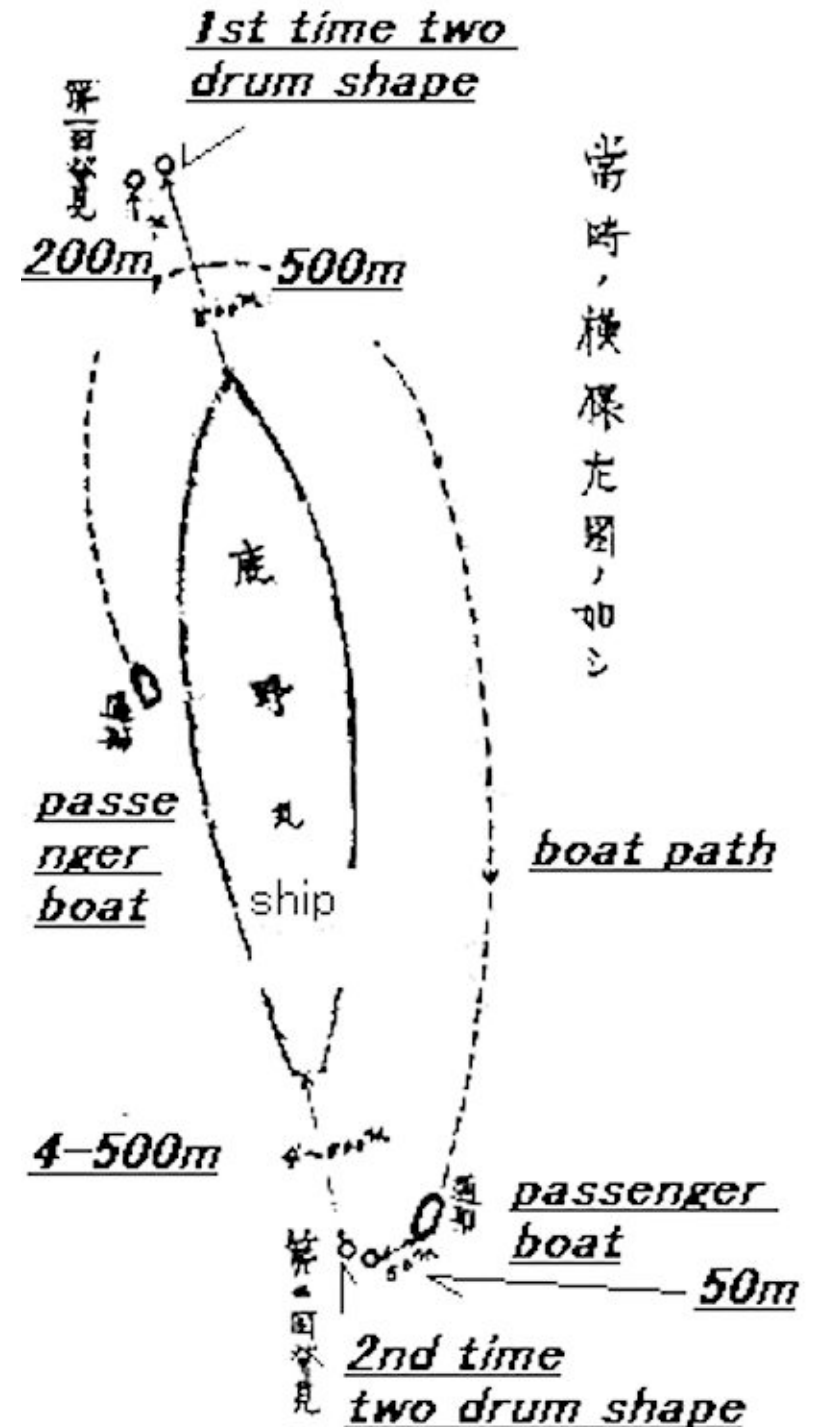


WITNESS: KENJI HAMADA

I had got on a motor launch and left KANO MARU from portboard. The boat ran over the stem and went to the starboard side of the ship.

Then I saw at left side of the boat, about 200m apart from my boat, that was 500m from KANO MARU's stem, something was afloat on the surface. That were two cylinder, like oil drum, upright about 0.5m over the surface. I found that objects but couldn't approach so I didn't understand what they were.

When my boat went on to the starboard and aft side of the KANO MARU, I saw the same two objects at the front of my boat, 50m distance, that was about 400-500m from the KANO MARU's stern. Again I didn't understand what they were.



WITNESS: KENJI HAMADA
(Continued)

Later I saw a torpedo at land, that was without explosive warhead, picked up by the same(my) DAIHATSU boat. Then I heard from Navy men (about the torpedo), and I understand what I had seen were torpedoes that lost its warhead and afloating upright.



The torpedo bodies floating forward of the KANO MARU likely were from the 3rd salvo fired by GRUNION

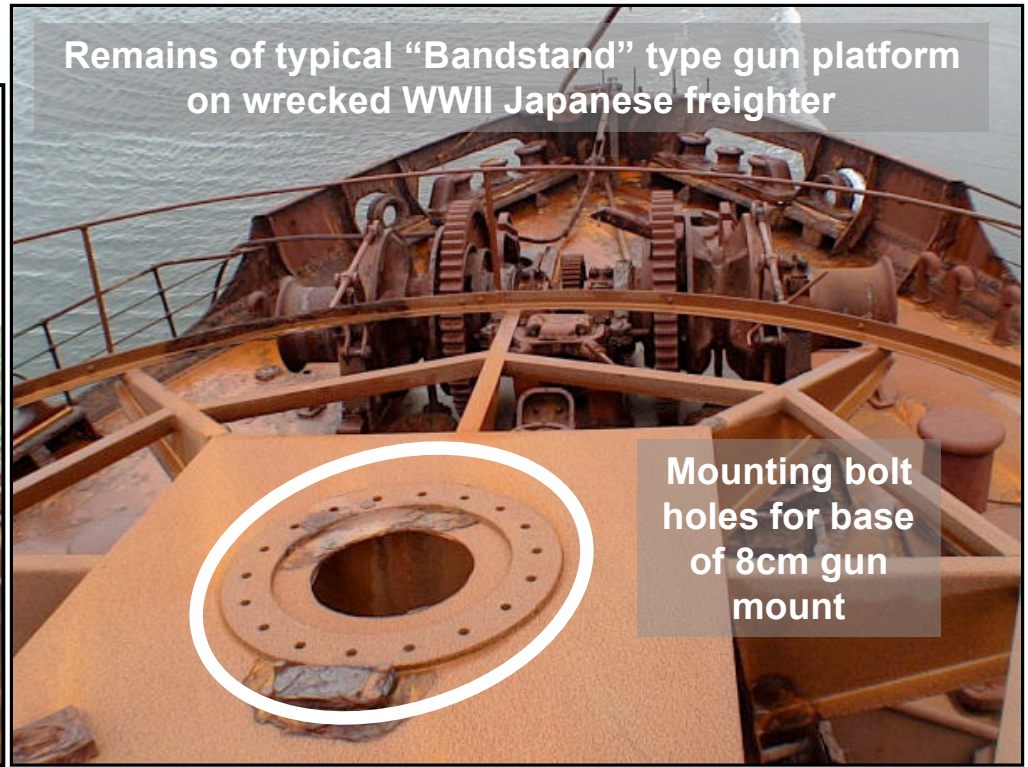
The torpedo bodies floating aft of the KANO MARU likely escaped from the wreckage of the GRUNION Forward Torpedo Room

←
Floating torpedo with warhead still attached



KANO MARU WEAPONS

KANO MARU
Weapons Mounts



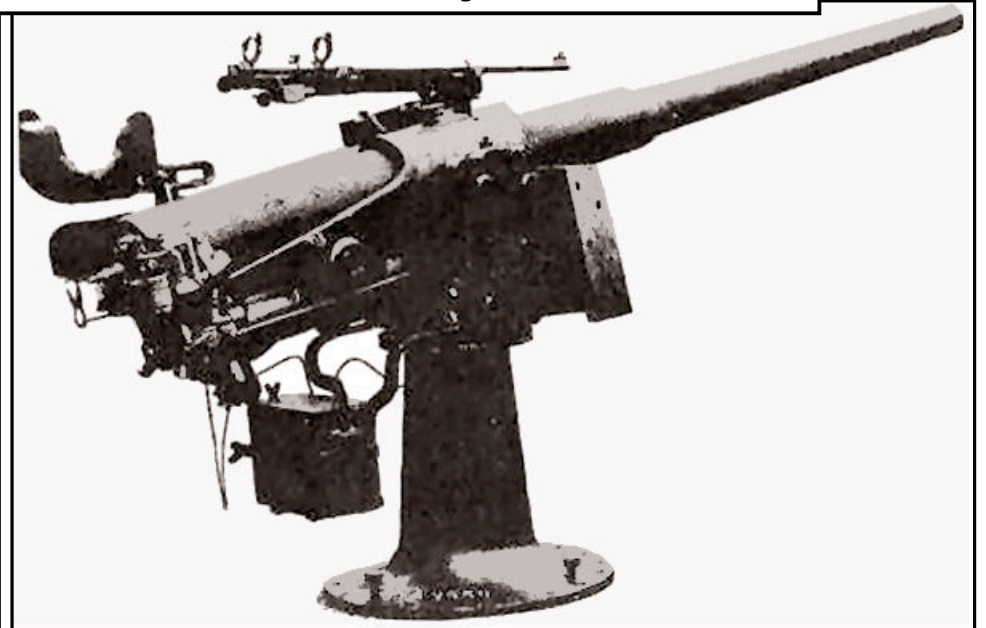
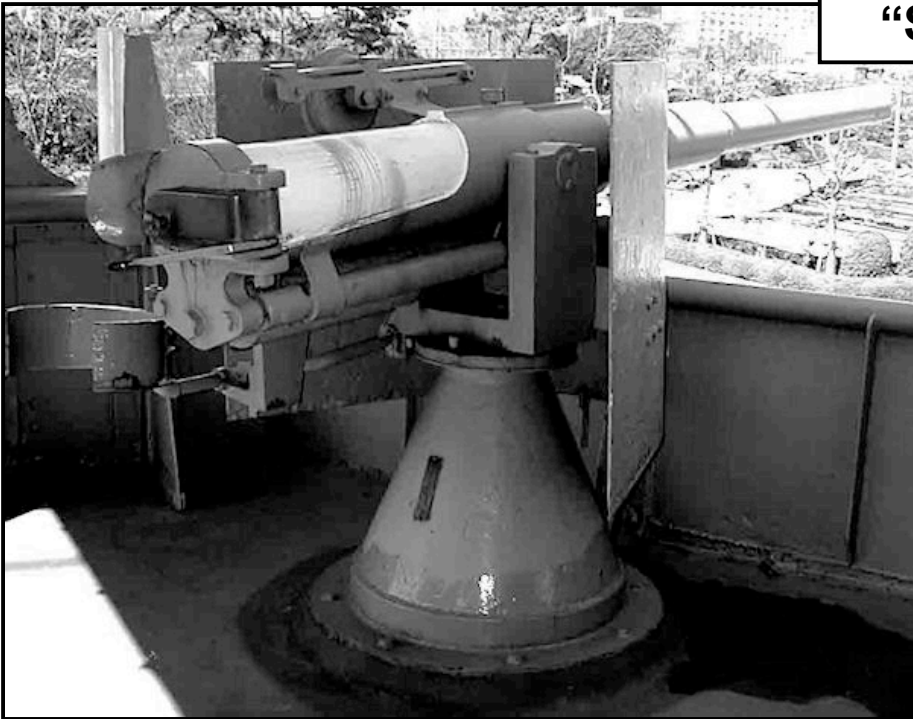
JAPANESE WEAPONS
8 cm/40 41st Year Type



“KANO MARU was only equipped with two 3-inch guns and machineguns. However, with 40 caliber guns were obsolete imitated from 1880s British Armstrong type”

Excerpted from

“Submarine Attack” by Jiro Kimata



JAPANESE 8cm GUN DATA

Armstrong "AN" Type

JAPANESE WEAPONS

8 cm/40 Naval Gun

Service Designation:	3"/40 (7.62 cm) Elswick Pattern N and Vickers Mark Z 3"/40 (7.62 cm) 41st Year Type (Model 1908) 8 cm/40 (3") 41st Year Type (Model 1908)
Date In Service:	1894
Gun Weight:	0.6 tons (510 kg)
Gun Length:	123.6 in (3.139 m)
Bore diameter:	3.0" / 76mm
Maximum elevation:	75 degrees
Firing cycle:	15 rounds per minute
Range @ 40 degrees:	11,750 yards (10,740 m)
AA Range @ 70 degrees:	19,000 feet (5,790 m)
Max Ceiling:	23,600 feet / 7200 meters
AMMUNITION	
Type:	Separate (Semi-fixed)
Ammunition type:	HE Common only
Projectile weight:	HE - 12.5 lbs. (5.67 kg)
Bursting Charge:	0.71 lbs. Picric Acid (0.75 lbs. TNT Equivalent)
Velocity:	2231 fps / 680 mps

JAPANESE WEAPONS

8 cm/40 Naval Gun

JAPANESE GUNS

DESIGNATION: Type 41 (etc.)

NOMINAL CALIBER: 8 cm Actual caliber: 7.62 cm 3 in
LENGTH, CALIBERS: 40 cm Weight with breech mechanism: 610 kg 1350 lb
Length, breech face to muzzle: 304.8 cm 120 in Overall: 313.94 cm 127 in
Type of construction: --
Type of breech: --

RIFLING:

Number of grooves: 24 Twist: Uniform, 1 in 28 calibers
Groove depth: 1.0 mm 0.039 in; width: 6.12 mm 0.241 in
Length of rifling: 261.7 cm 102.8 in
Bore cross section: _____ sq.cm _____ sq.in

CHAMBER:

Length: 39.45 cm 15.5 in Volume: 2.076 liters 127 cu.in
Powder container: --

BALLISTICS:

Muzzle vel. (-lb proj.) 680 m/s 2230 f/s
Muzzle vel. (-lb proj.) _____ m/s _____ f/s
Max. bore pressure: _____ kg/sq.mm _____ long tons/sq.in
Muzzle pressure: _____ kg/sq.mm _____ long tons/sq.in
Projectile weight (): 5.67 kg 12.5 lb; 2M/d³: 0.93
Projectile weight (): _____ kg _____ lb; 2M/d³: _____
Approximate charge weight: _____ kg _____ lb
Ignition weight: _____ kg _____ lb
Projectile travel: 265.4 cm 104.7 in
Point of complete combustion: _____ cal. from muzzle
Maximum range: _____ m _____ yards
Maximum altitude: _____ m _____ yards
Approximate life: _____ equivalent service rounds

YEAR OF DESIGN: about 1905.

SHIPS FITTED WITH: IZUMO, TOKIWA, NISSIN, KASUGA, etc.

REMARKS: Rifing as given is for Type III, IV, VII barrels; Type I and II have 16 grooves, same depth, 9.3mm (0.366 in) wide, with twist 1/30. Type IV barrel has chamber length 39.473cm (15.5 in); same volume, rifling length 262.31cm (103.2 in).

Reports of the US Naval Technical Mission to Japan

JAPANESE WEAPONS

8 cm/40 Naval Gun

8-cm (76.2-mm) (3-Inch) Complete Round (Semifixed)

Case:

Length: 15.06 inches.

Diameter at base: 4.13 inches.

Material: Brass (recovered); steel (documentary).

Weight (empty): 4.97 pounds.

Propellant:

20 3C (type 89 propellant) 1.98 pounds (0.900 kg.).

Unperforated cylindrical sticks, approximately 2-mm ($\frac{1}{16}$ — $\frac{1}{8}$ inch) by 12.75 inches, amber-colored double-base powder.

The propellant sticks are enclosed in a bag of heavy brownish silk.

Primer: Mk I case percussion primer, Model 4.

Weapon in which used: "AN" (Armstrong) type 8-cm/40 gun (low angle).

Except for minor changes, this is an exact copy of a British naval gun, and guns of both British and Japanese manufacture have been found ashore in Japanese emplacements for coastal defense.

The gun is pedestal-mounted. The breech is closed by a two-step interrupted-thread block.

TM 9-1985-5

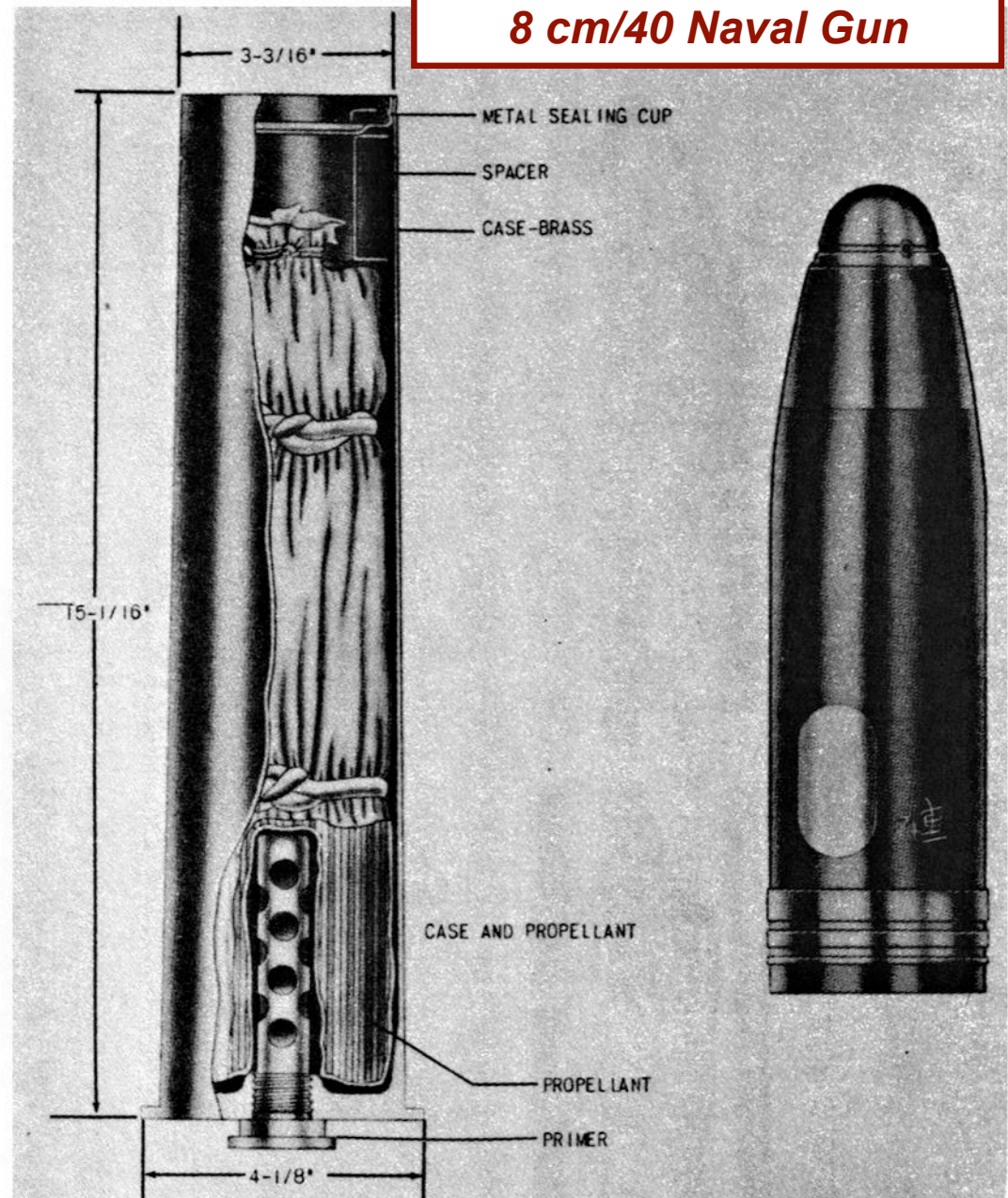


Figure 373—8-cm Complete Round (Semifixed).

8-cm (76.2-mm) (3-Inch) (Ordinary Mk 2 Mod 2) High-Explosive Projectile

Weight of filled projectile (without fuze): 11.46 pounds.
 Weight of projectile (empty): 10.75 pounds.
 Weight stamped on rotating band (sample): 4.860 kg. (varies with individual projectiles).
 Length of projectile (without fuze): 9.49 inches.
 Diameter at bourrelet: 3.0 inches.
 Distance from base to rotating band: 0.44 inch.

Width of rotating band: 1.0 inch.
 Radius of ogive: 6 cal.
 Filling: Cast picric acid (shimose): .71 pound.

The charge consists of a single block of explosive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 5-year point detonating fuze.
 Weapon in which used: "AN" (Armstrong) type 8-cm/40 gun (low angle).

JAPANESE WEAPONS
8 cm/40 Naval Gun

Type 5th-Yr. Nose Fuze

Use:

8-cm ordinary projectiles (fixed and semi-fixed).

12-cm ordinary projectiles (semifixed).

14-cm ordinary projectiles (bag).

Over-all length (with gaine): 5 1/8 inches.

Over-all length (without gaine): 1 1/16 inches.

Maximum diameter: 1 1/4 inches.

Threaded length: 3/4 inch.

Number of threads: 9 R. H.

Construction: The fuze body is of two-piece brass construction, with the upper part, or nose cap, threading (R. H.) onto the lower part. The lower portion is threaded (L. H.) internally to take the gaine. The gaine is made of light steel. A heavy striker fits against the interior top of the nosepiece, which is beveled to facilitate functioning with a low angle of impact. The lower fuze body contains a primary primer and a secondary striker.

Operation: On impact, the nose cap is sheared off or crushed, forcing the first striker into the first primer. This explosion forces the secondary striker down, shearing the shear pin and causing the gaine to function.

NOTE: 0.71 lbs Picric Acid is equivalent to 0.75 lbs of TNT

TM 9-1985-5

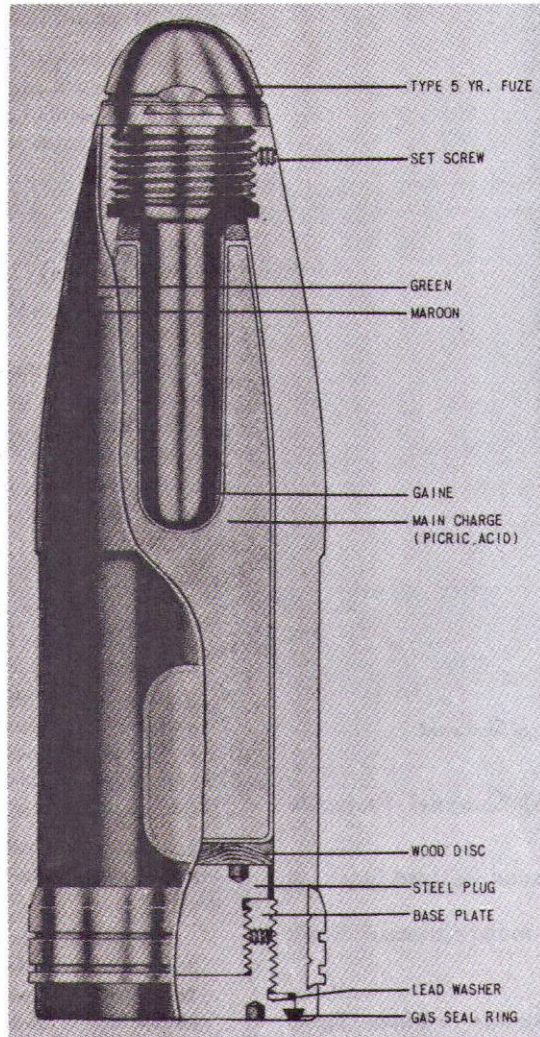


Figure 374—8-cm (Ordinary Mk 2 Mod 2) High-Explosive.

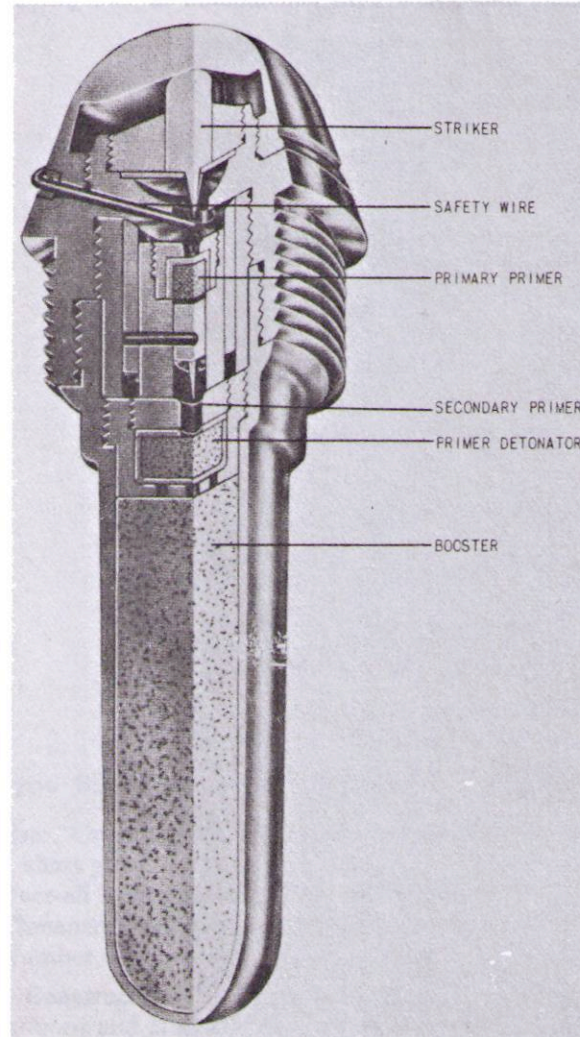


Figure 439—Type 5th-Year Nose Fuze.

Japanese 13.2mm Heavy Machinegun

Designation:	13 mm/76 Type 93
Date In Service:	1939
Gun Weight:	92.6 lbs. (42 kg)
Gun Length (OA):	55.5 in. (1.410 m)
Rate Of Fire:	450 RPM Cyclical 250 RPM Max Effective

Ammunition

Type:	Fixed / 30 rd. Magazine
Weight of Round:	4.0 - 4.2 oz (113 - 119 gms)
Projectile Types:	AP / Incendiary / Tracer
Cartridge:	13.2mm x 96
Muzzle Velocity:	2,641 fps (805 mps)

Range

@45 Degrees:	6,560 yards (6,000 m)
@50 Degrees:	7,108 yards (6,500 m)
Ceiling @85 degrees	Maximum: 14,764 feet (4,500 m) Effective: 13,060 feet (3,980 m)

JAPANESE WEAPONS

13mm/76 Type 93 Heavy Machinegun

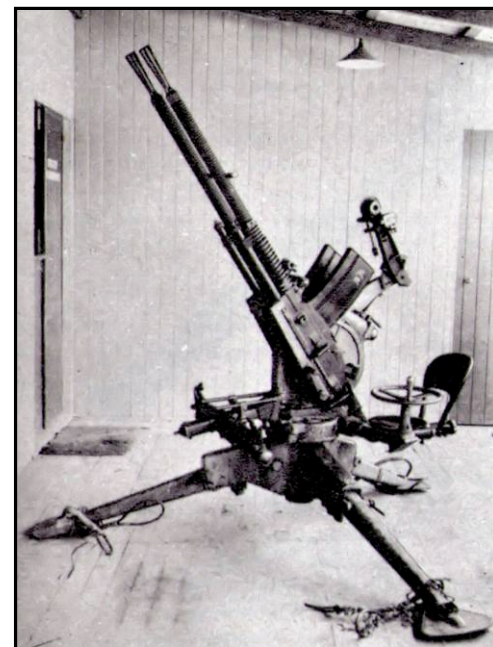
This weapon was originally designed by the French firm of Hotchkiss. These guns were generally similar to the larger Japanese 25 mm/60 AA MG.



13.2mm x 96 Cartridge



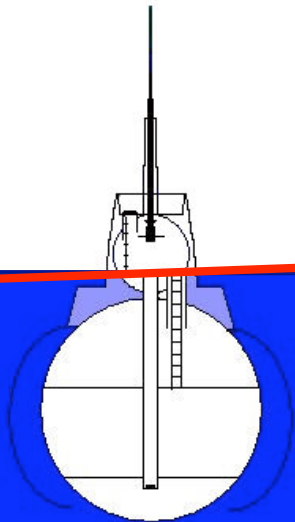
Model 93 (1933) 13-mm heavy MG
 Caliber..... 0.519 inch
 Principle of operation..... Gas-operated, full-automatic only
 Ammunition..... Ball, tracer, and armor-piercing
 Total weight of each gun..... 87 pounds
 Muzzle velocity:
 Ball ammunition..... 2,210 feet per second
 Armor-piercing ammunition..... 2,280 feet per second



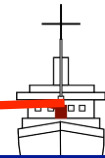
Model 93 (1933) 13-mm heavy machine gun (dual mount).

Gun-target Line

Gun Height Above Water = 11.5 meters
Range = 400+ meters



DIRECTION OF FIRE

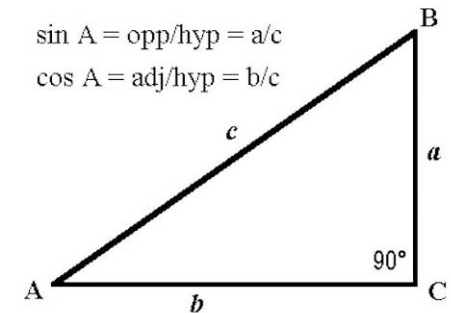


Projectile Angle of Fall = 1.6 degrees

GUN-TARGET LINE

$$\sin A = \text{opp/hyp} = a/c$$

$$\cos A = \text{adj/hyp} = b/c$$



Side a	<input type="text" value="11.5"/>	Units Of Length
Side b	<input type="text" value="400"/>	Units Of Length
Side c	<input type="text" value="400.2"/>	Units Of Length
Angle A or B	<input type="text" value="1.6"/>	Degrees
Angle C	<input type="text" value="90"/>	Degrees
Angle 3	<input type="text" value="88.4"/>	Degrees
Decimal places	<input type="text" value="1"/>	

Periscopes Exposed



Periscopes Shears Exposed

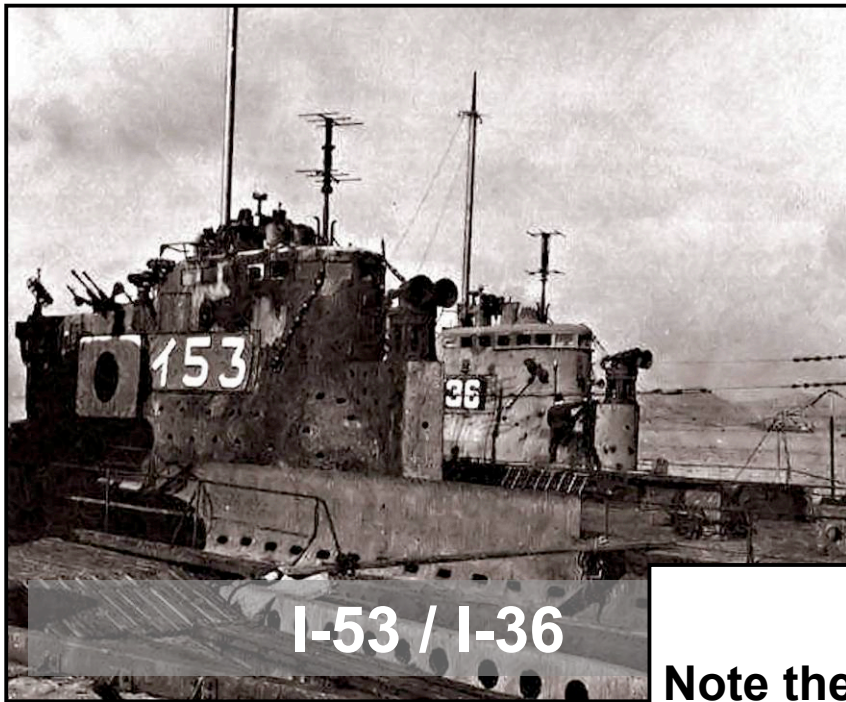


The “Washing Wave”

Deck Awash



USN Fleet Boats



I-53 / I-36



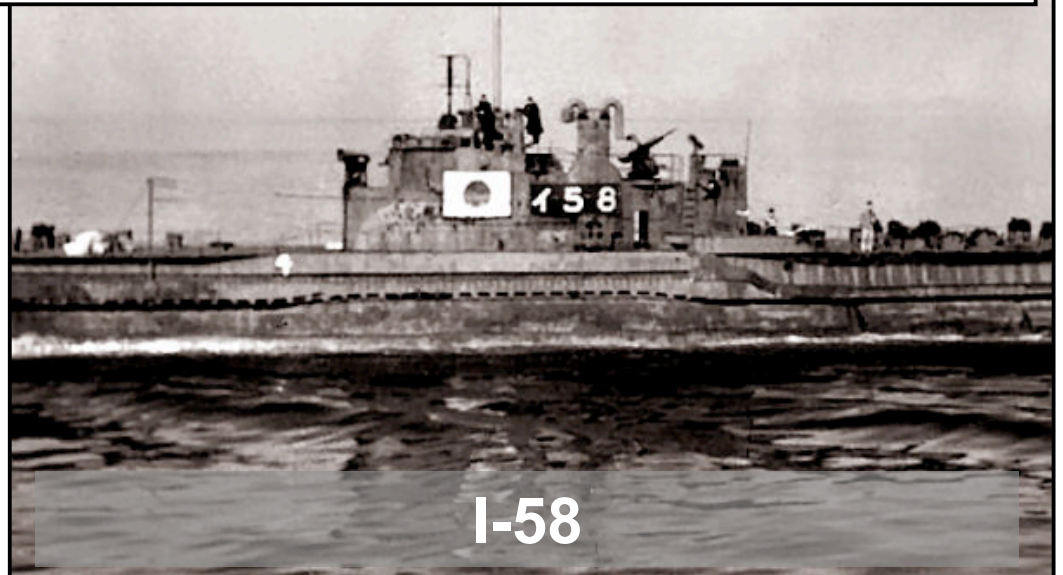
RO-58 / I-369

Typical IJN Submarines

Note the “flat” topped Fairwater/bridges, and the lack of the tall, distinctive, fully plated periscope shears of USN fleet boats.



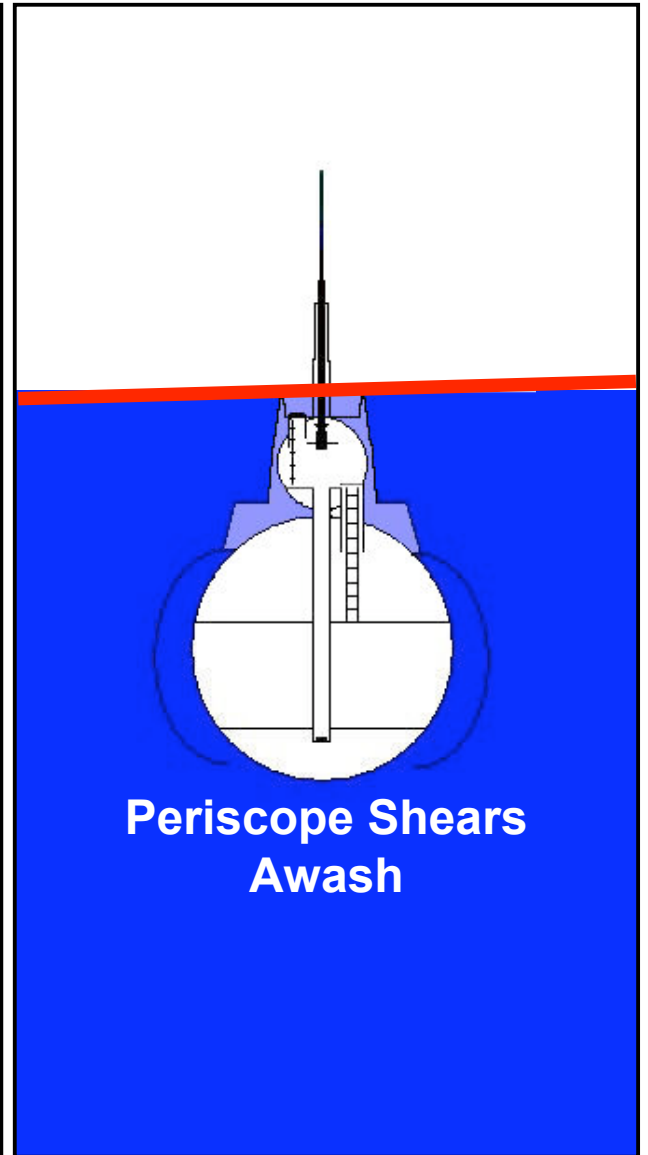
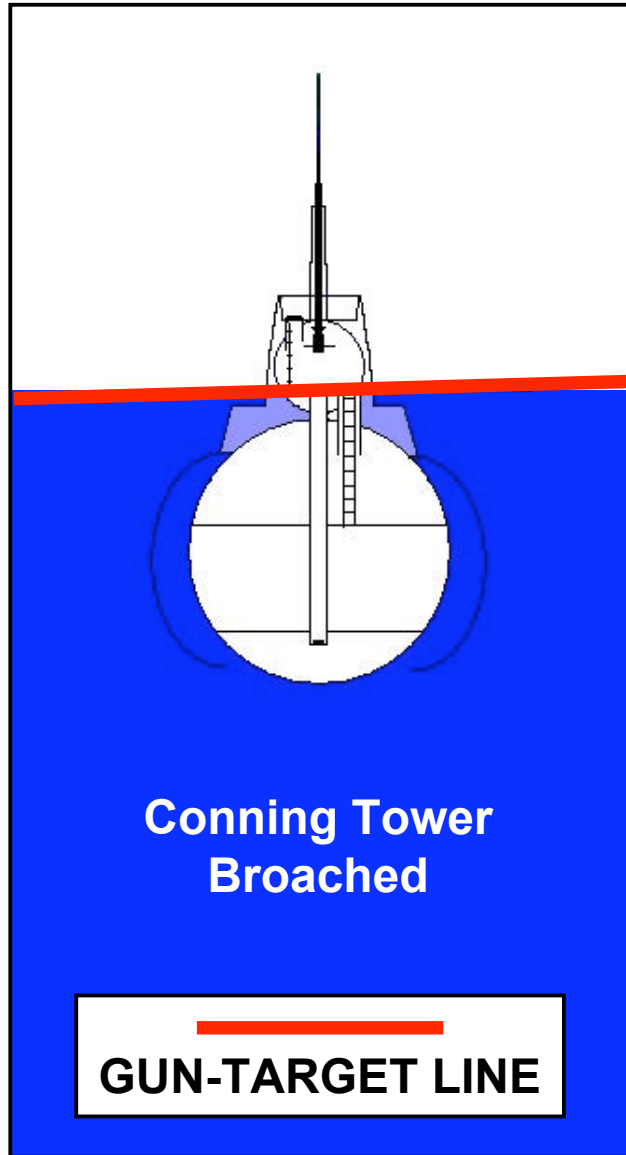
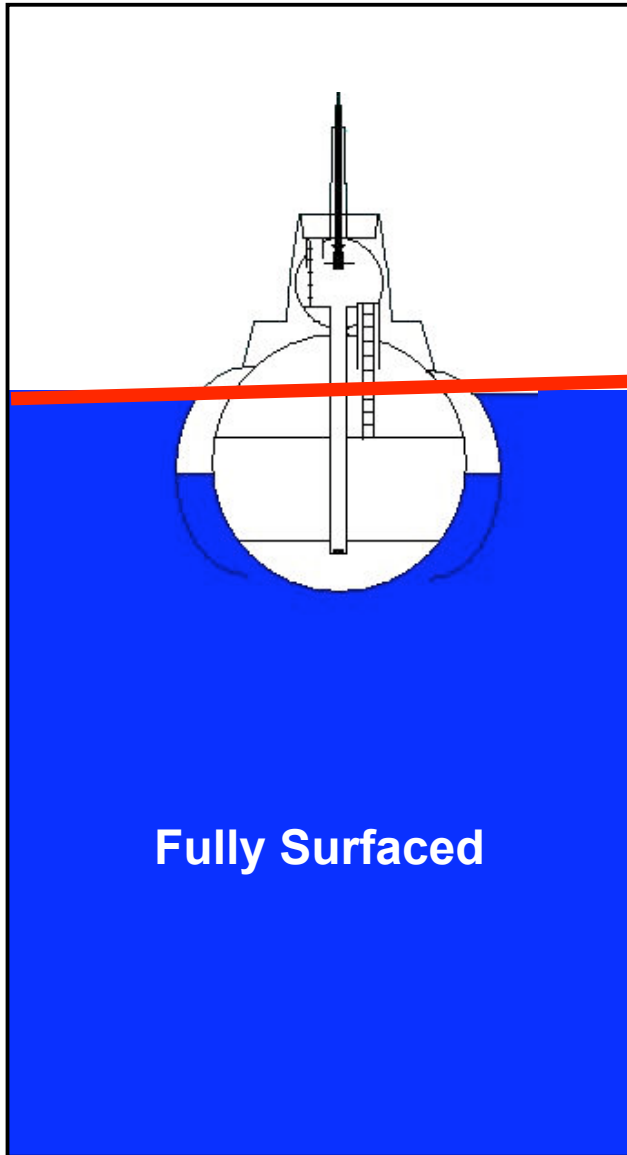
Original USN GATO



I-58

Gun-target Line

DIRECTION OF FIRE





UNDERWATER PROJECTILES

Underwater Trajectories

*“When an ogival-headed projectile, traveling in air, strikes water, it deviates from its trajectory in a violent and uncertain manner. **At small angles of fall it tips up, runs parallel with the surface for a short distance and then, if it still has sufficient velocity, emerges and again takes to the air. This is called a ricochet.** Practically all shells ricochet to the right of the line of fire. At large angles of fall, it is liable to deviate in any irregular direction or sink.”*

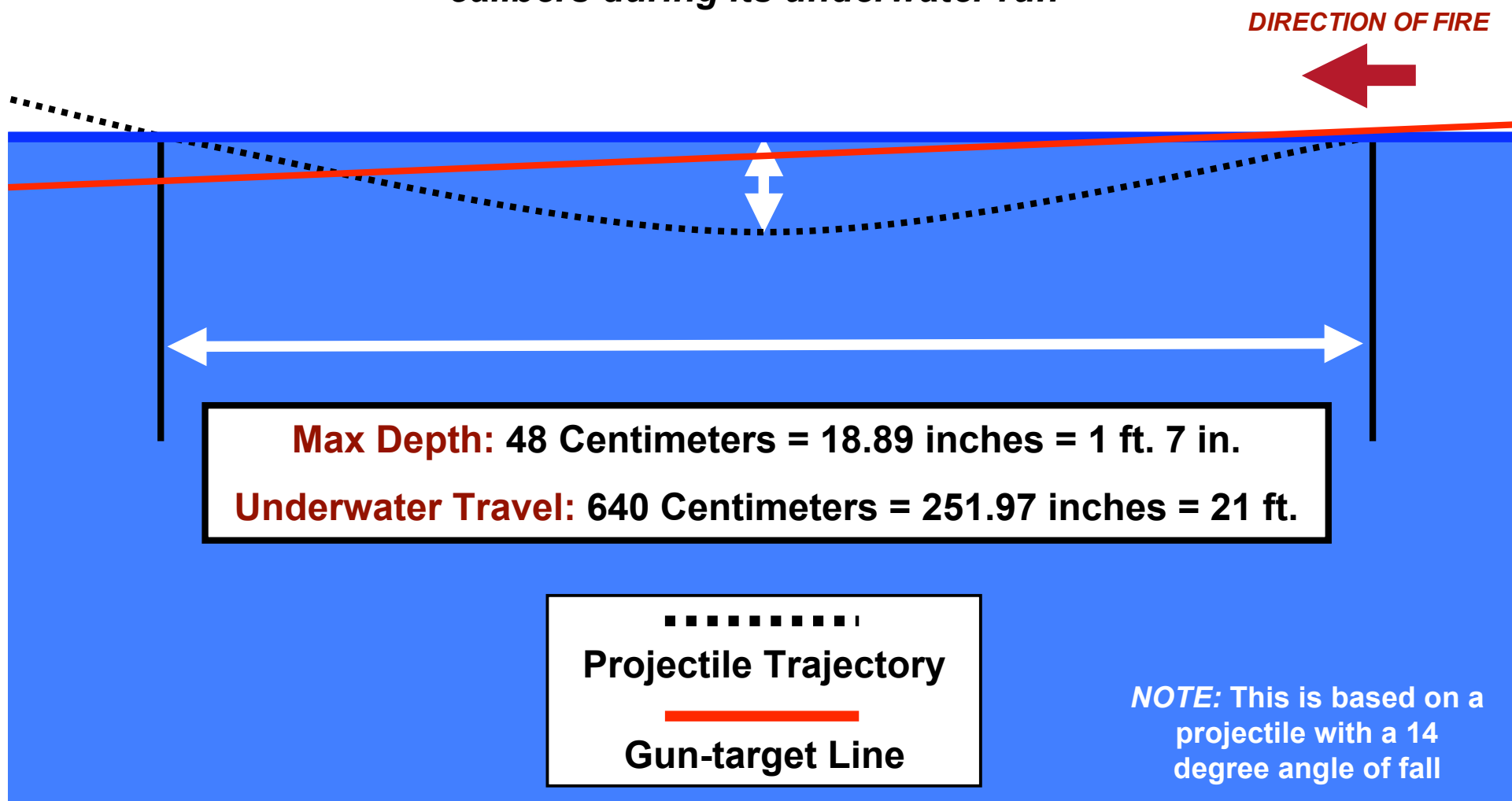
NAVAL ORDNANCE 1937, CHAPTER XIII; PROJECTILES

*“Although the detailed underwater trajectory of any individual projectile remains difficult to predict with any precision, the general principles governing the underwater trajectories of most standard projectile types are relatively well understood. **The usual tendency of an ogival headed projectile impacting the water at an angle of fall of about fourteen degrees would be able to travel about eighty calibers submerged in an upwardly curving path, and to re-emerge once again with its velocity greatly diminished. The projectile would normally penetrate to a depth of about six calibers during its underwater run.**”*

http://www.navweaps.com/index_inro/INRO_Hood_p3.htm

Underwater Trajectories

“would be able to travel about eighty calibers submerged in an upwardly curving path, and to re-emerge once again with its velocity greatly diminished. The projectile would normally penetrate to a depth of about six calibers during its underwater run”



IJN "Suichu Dan" Anti-submarine Projectiles

Considerable effort was directed by the IJN to develop projectiles which would continue an undisturbed trajectory after striking the water. The IJN decided as a result of experiment that a flat-nosed projectile in which the area of the flat front was equal to half the area of the base was most effective.

Such a projectile striking at an angle of fall of 12° would typically be expected to penetrate to a depth of about 18-20 calibers after an underwater travel of about 110 calibers. At that point it would be expected to have retained about half of its original striking velocity.

NOTE: A specially designed fuze was required for this projectile.

NOTE: Minimum range required because of the tendency for projectiles to ricochet from the water surface at low angles of fall.

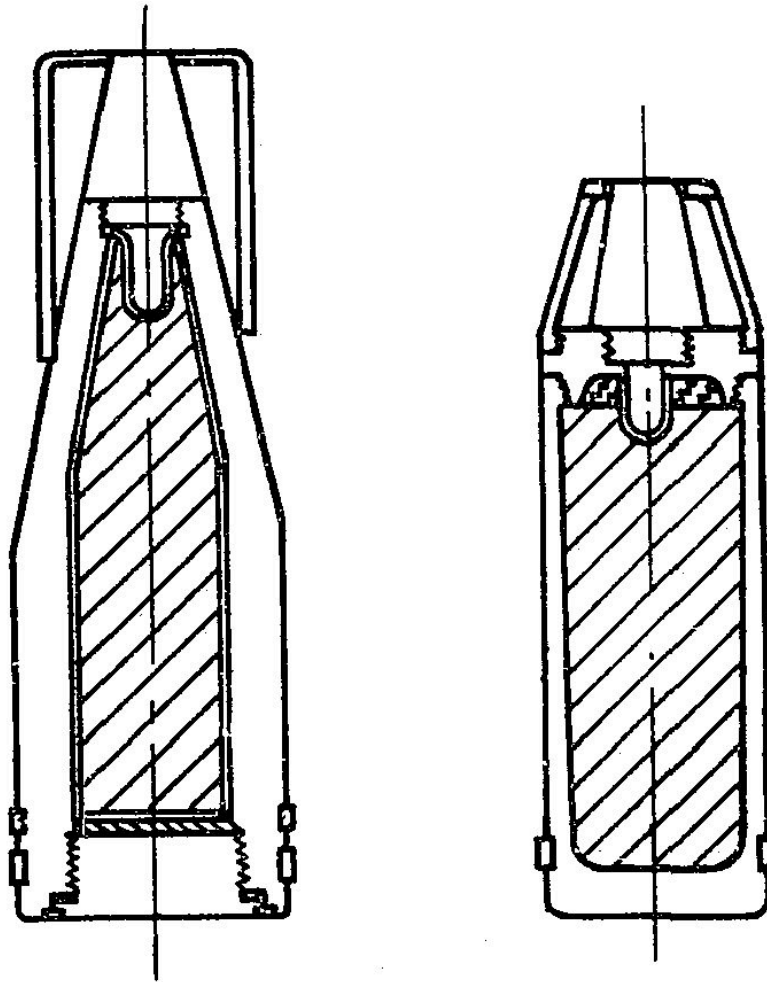
Shell Type	Dia.	Length	Weight	Bursting Charge	Muzzle Velocity	Max. Range	Min. Range
B	75.6mm 2.98"	285mm 11.23"	5.3kg. 11.66 lbs.	0.668kg. 1.47 lbs.	250 mps 820 ft/sec	3200m @40 degrees	700m

NOTE: Projectile was not produced for the Armstrong "AN" IJN Type 41 Naval Gun.

NOTE: The 3"/8cm ASW projectile did not go into service until at least late 1943.

NOTE: Will penetrate 0.453 in (1.15 cm) Ducol Steel @26 feet (8 meters) depth.

IJN "Suichu Dan" Anti-submarine Projectiles



The first type (**Figure A**) was an adaption of an HE Common projectile, onto the shoulder of which a water penetrating cap was screwed.

Production was later switched to a type (**Figure B**), which was designed solely as an anti-submarine shell. This projectile was designed with a specially weakened windshield and armor-piercing cap which broke away upon impact with the water. This presented the flat nose designed for effective underwater penetration.

NOTE: The "Type B" shell was produced for the 3rd Year Type (Model 1914) and the 11th Year Type (Model 1922) 8cm/40 Naval Guns

DIAGRAM "A"

DIAGRAM "B"