

MODERN NAVAL WARFARE

A. Nose section (sensors) C. Control section (guidance) E. Hydraulics section G. Pump-jet propulsor
 B. Warhead section D. Fuel tank section F. Engine section

PERFORMANCE DATA	
Powerplant	Swash-plate (500 HP) Otto fuel 2 Pump-jet propulsor
Guidance	Wire (8 nmi) Autonomous
Sensors	Common Broadband Advanced Sonar System (CBASS) active and passive
Speeds	Max 65 kt Transit 55 kt Attack 40 kt
Max depth	2 650 ft / 800 m
Max range	27 nmi
Warhead	Mk 107 warhead PBXN-105 explosive (650 lb / 295 kg)



Sonar sensor

Wire dispenser

Control planes

Otto fuel II monopropellant

Control wire

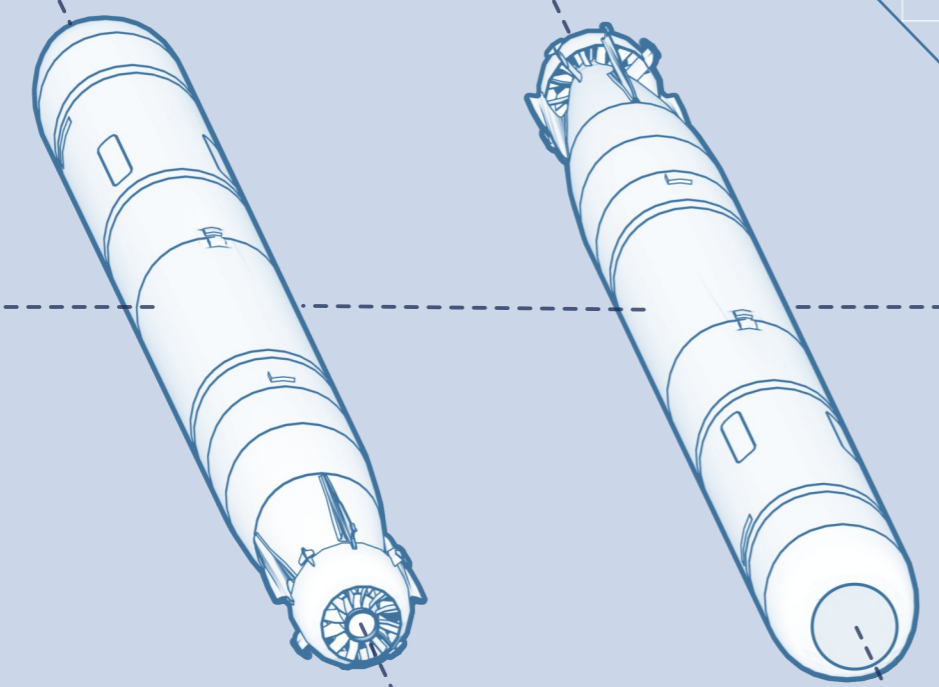
SIDE

TOP

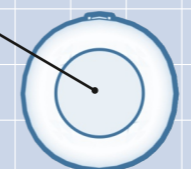
Mk 107 warhead

Swashplate piston engine

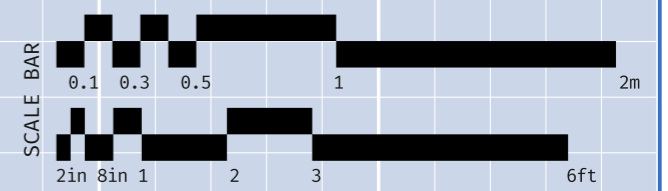
ORTHOGRAPHIC PROJECTION



Sonar sensor fairing



Pump-jet propulsor



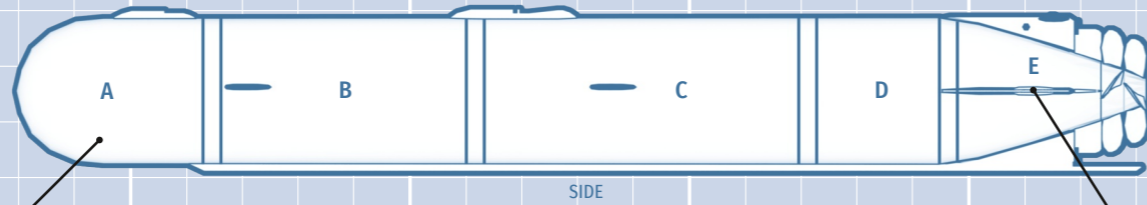
GAMEPLAY NOTE:
 The maximum speed of the Mk 48 ADCAP is estimated to be 65 kt. However this is not an established figure. In the game we limit the fast transit speed to 55 kt which is the most widely approved figure.

DWG NO. W 01	TITLE Mk 48 ADCAP TORPEDO
DATA	
Type Heavyweight submarine launched torpedo	1989 - MOD 5 (ADCAP) 2006 - MOD 7 (CBASS)
Dimensions Length 19 ft / 5.8 m Diameter 21 in / 53.3 cm	Operators United States Navy Brazilian Navy Royal Australian Navy Royal Canadian Navy Royal Netherlands Navy Republic of China Navy
Weight 3 695 lb / 1 676 kg	
Manufacturer Lockheed Martin, SAIC (previously Hughes)	
Commissioned 1971 - MOD 1	
DRAWINGS FROM GAME MODELS	REV. 20260410184700
	SHEET 1 of 5



MODERN NAVAL WARFARE

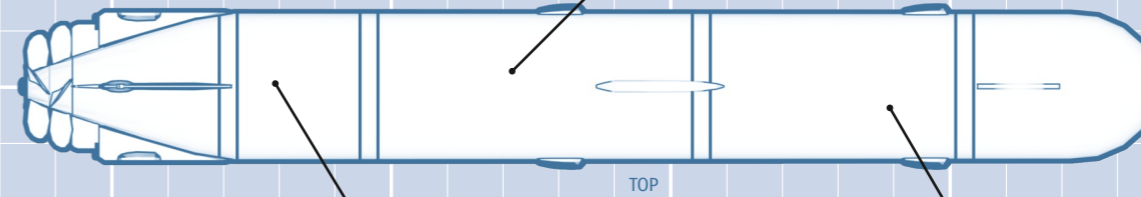
A. Nose section (controller and TDD device)
 B. Warhead section
 C. Battery section
 D. Electric motor section
 E. Propellers



Auxiliary controller

Control planes

Silver-zinc battery



Electric motor

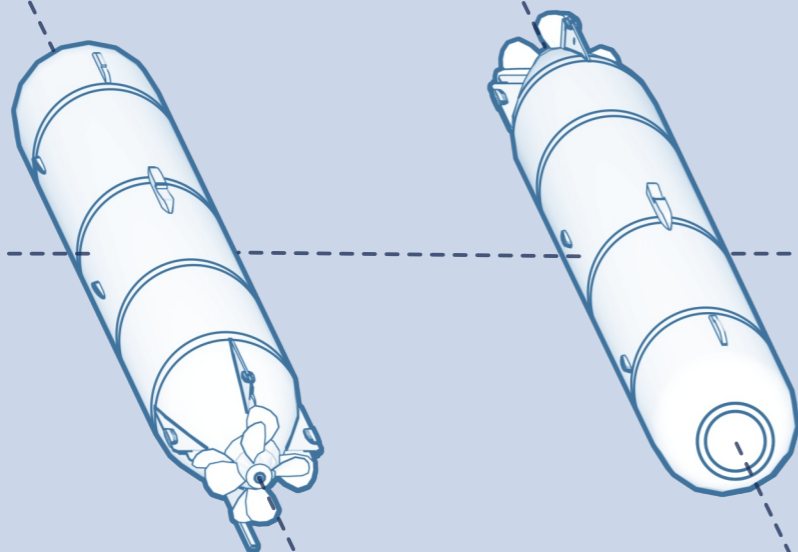
Mk 13 warhead

GAMEPLAY NOTE:

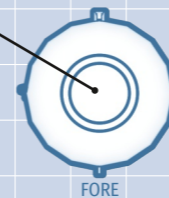
The Mk 67 SLMM uses an analog controller which is only compatible with the SSN-688 Los Angeles class submarines' fire control system. It is not compatible with the fire control system of the SSN-774 Virginia class submarines.

However since the Improved SLMM program (based on the Mk 48 torpedo), which was designed for Virginia class submarines, was cancelled the Mk 67 is kept in game for gameplay and mission design purposes.

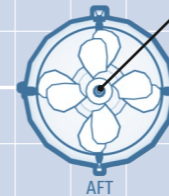
ORTHOGRAPHIC PROJECTION



Controller and TDD fairing



4 blade contra-rotating propellers



PERFORMANCE DATA

Powerplant
 Electric motor
 Contra-rotating propellers

Speeds
 Transit 17 kt

Max depth
 600 ft / 183 m

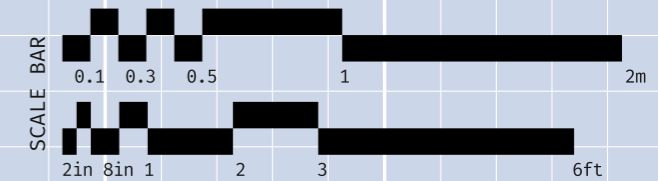
Max range
 7 nmi

Operation
 Autonomous

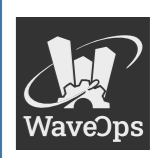
Target Detection
 Mk 71 Target Detection Device (TDD) with magnetic, seismic and pressure sensors.

Warhead
 Mk 13 warhead
 PBXN-103 explosive (330 lb / 150 kg)

Operational Endurance
 6 months (Mk 71 TDD with Mk 176 battery)



DWG NO. W 02	TITLE Mk 67 SLMM MOBILE MINE	
DATA Type Submarine launched mobile mine Center for the conversion to Mk 67		HYBRID METRIC/IMPERIAL DRAWING CAN BE SCALED
Dimensions Length 13 ft / 4 m Diameter 19 in / 48.5 cm		Commissioned 1979 Operators United States Navy
Weight 1 765 lb / 800 kg		
Manufacturer Raytheon (previously Alliant) for the Mk 37 torpedo Naval Undersea Warfare		
DRAWINGS FROM GAME MODELS	REV. 20260410184700	SHEET 2 of 5



MODERN NAVAL WARFARE

Powerplant
Solid-fuel booster for sub launch
Teledyne J402-CA-400 turbojet for cruise

Speed
Cruise 0.85 Mach

Cruise altitude
50-100 ft / 17-35 m

Max range
70-85 nmi

Navigation
Strapdown three axis inertial navigation system (INS)

Radar altimeter

Sensor
Texas Instruments Ku-band frequency agile radar

Warhead
High explosive semi-armor piercing (488.5 lb / 221.5 kg)

Attack modes
Sea-skimming
Pop-up

PERFORMANCE DATA

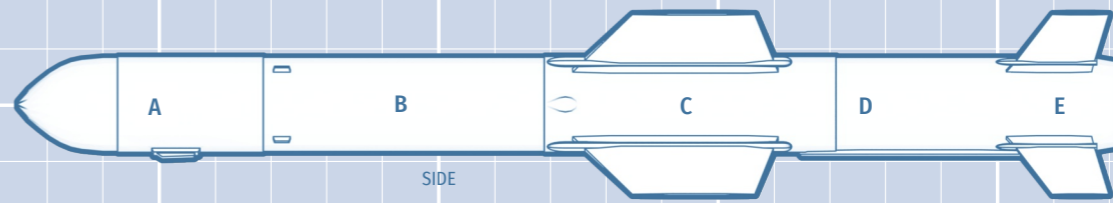
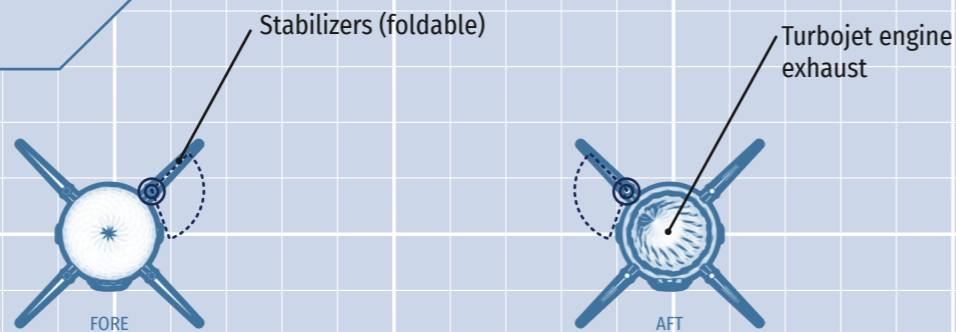
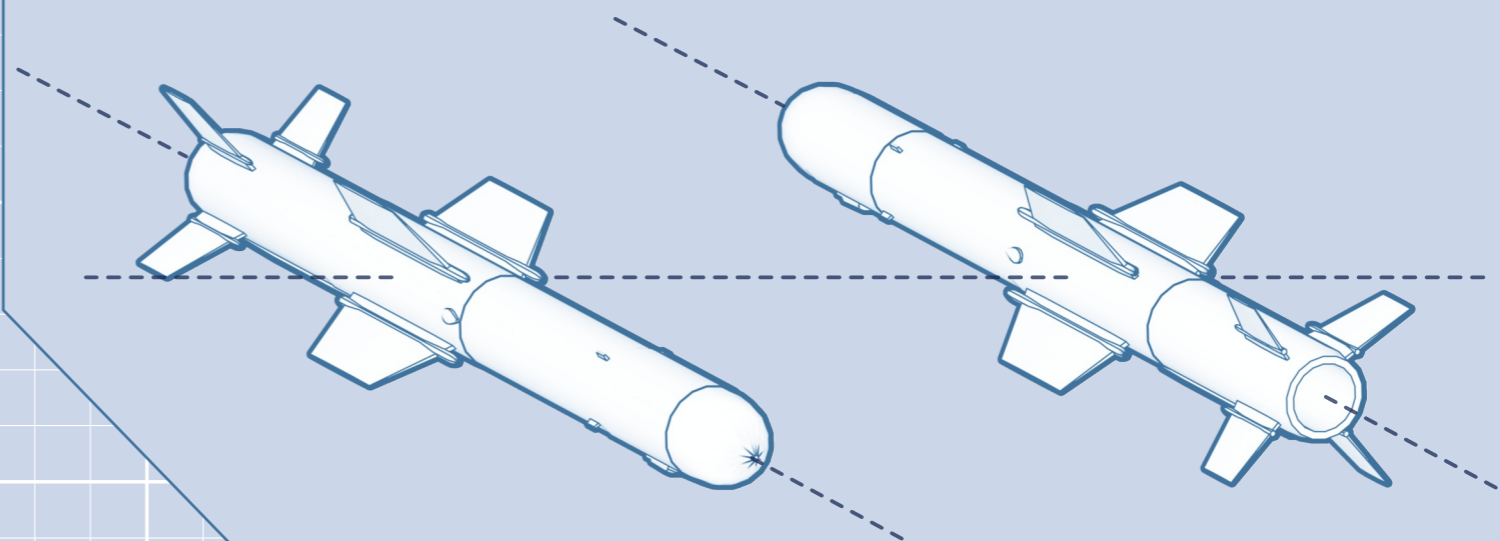
GAMEPLAY NOTE:

Officially the last submarine launched Harpoon version (UGM-84A) was retired from US Navy service in 1997.

However there was a recorded launched by USS Olympia of a UGM-84 in RIMPAC 2018 and there was a contract for refurbished missiles to be reintroduced in service by the end of 2021 presumably for Los Angeles class submarines. Since then it was re-certified on various LA class subs.

For gameplay purposes and since the Harpoon is widely adopted around the world we assume that this missile is also deployed from Virginia class submarines.

ORTHOGRAPHIC PROJECTION



A. Guidance section
B. Warhead section

C. Sustainer (cruise) section
D. Turbojet engine

E. Control section

Rocket booster

DEPLOYED
PACKED

BOOSTER BOTTOM

BOTTOM

Turbojet engine intake

Radar altimeter

Stabilizers (foldable)

Flight control surfaces (foldable)



CANISTER FORE



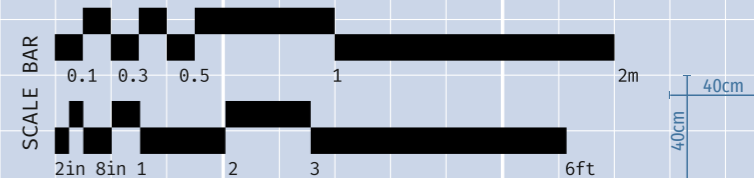
CANISTER AFT

Sea control surfaces (foldable)

Canister for underwater launch

PACKED
DEPLOYED

CANISTER TOP



DWG NO.

M 01

TITLE

UGM-84 HARPOON ASM

DATA

Type

Submarine launched antiship cruise missile

Manufacturer

McDonnell Douglas (now Boeing Defense)

Dimensions

Length 12.6 ft / 3.8 m
Length with booster 15 ft / 4.6 m
Diameter 13.5 in / 34 cm

Commissioned

1977

Weight

1 145 lb / 520 kg with booster
1 523 lb / 691 kg

Operators (UGM only)

United States, United Kingdom, Germany, Netherlands, Spain, Italy, Greece, Turkey, South Korea, India

HYBRID METRIC/IMPERIAL

DRAWING CAN BE SCALED



DRAWINGS FROM GAME MODELS

REV.

20260410184700

SHEET

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MODERN NAVAL WARFARE

Powerplant
Solid-fuel booster for launch
Williams International F107-
WR-402 turbofan for cruise

Speed
Cruise ~0.75 Mach

Cruise altitude
100-165 ft / 30-50 m AGL

Max range
900 nmi

Navigation
Inertial navigation (INS)
Terrain matching (TERCOM)
Digital scene matching
(DSMAC)

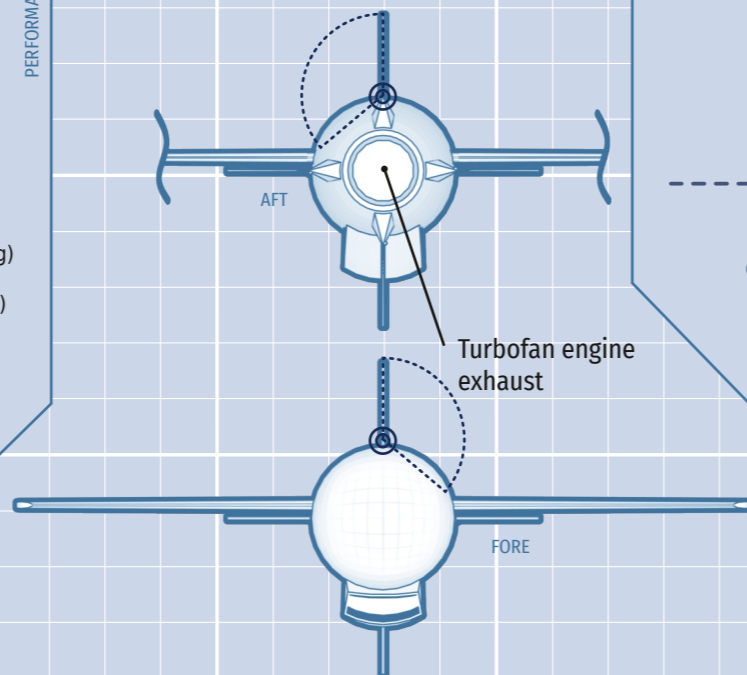
Radar altimeter

INS alignment time
~10 mins

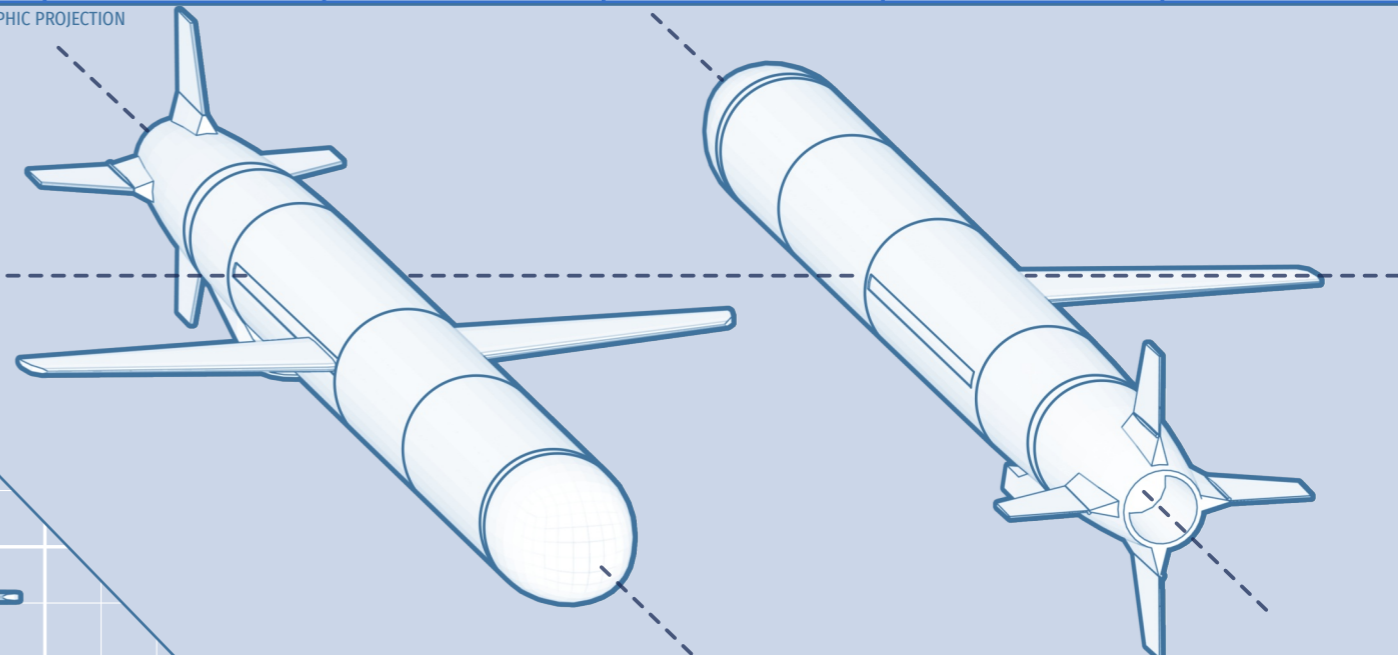
Warhead
WDU-36/B (690 lb / 310 kg)
with PBXN-107 high
explosive (265 lb / 120 kg)

Attack modes
Horizontal (HAM)
Pop-up
Programmed warhead
detonation (PWD)

PERFORMANCE DATA

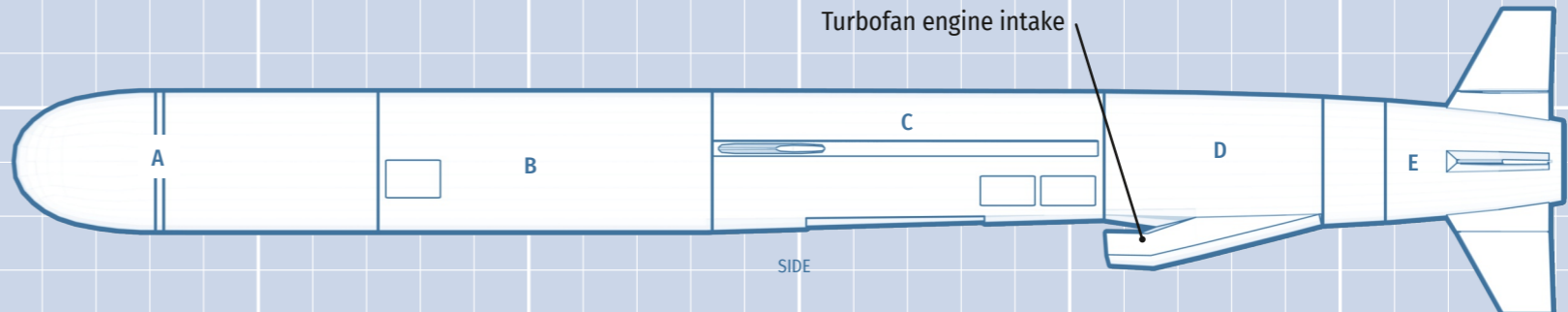
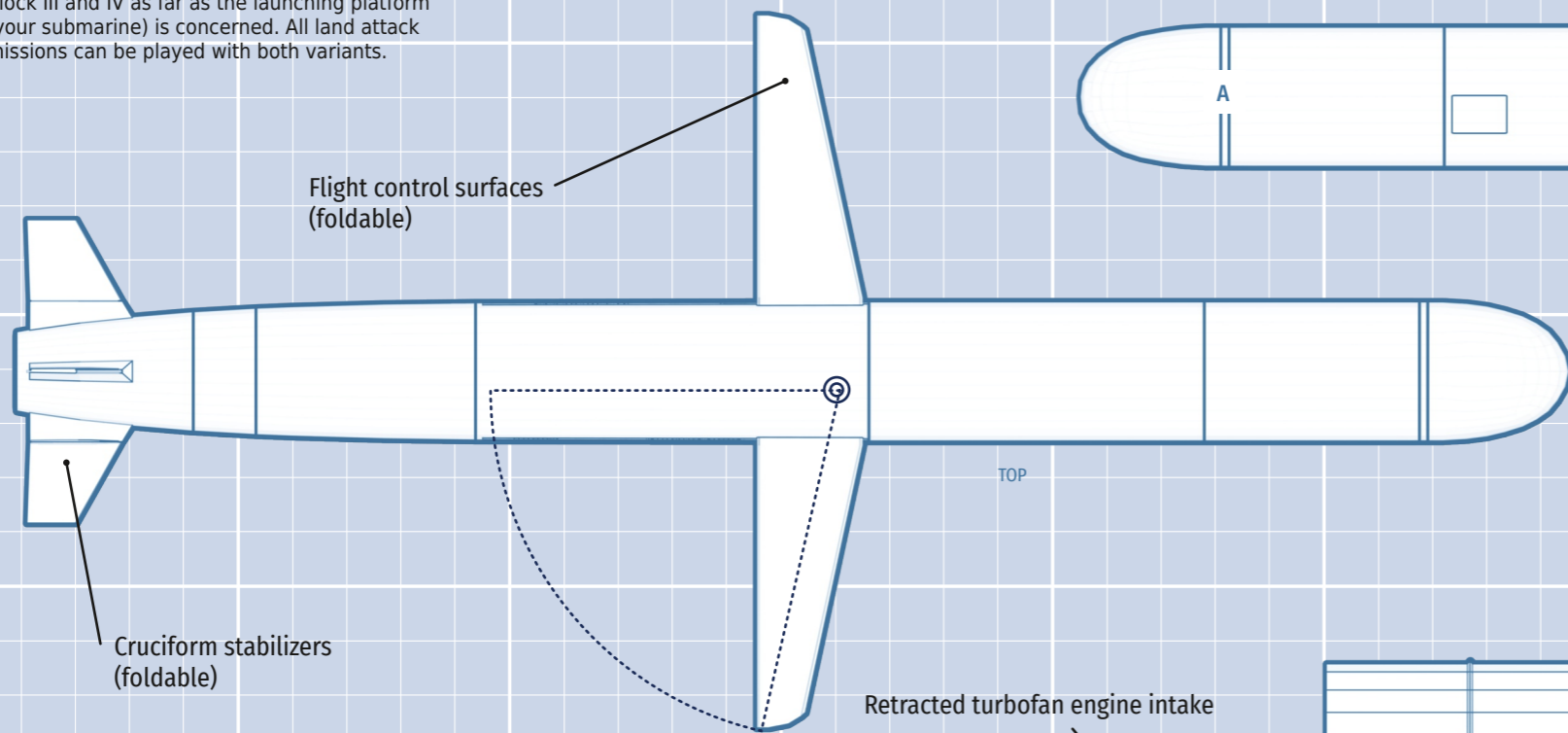


ORTHOGRAPHIC PROJECTION



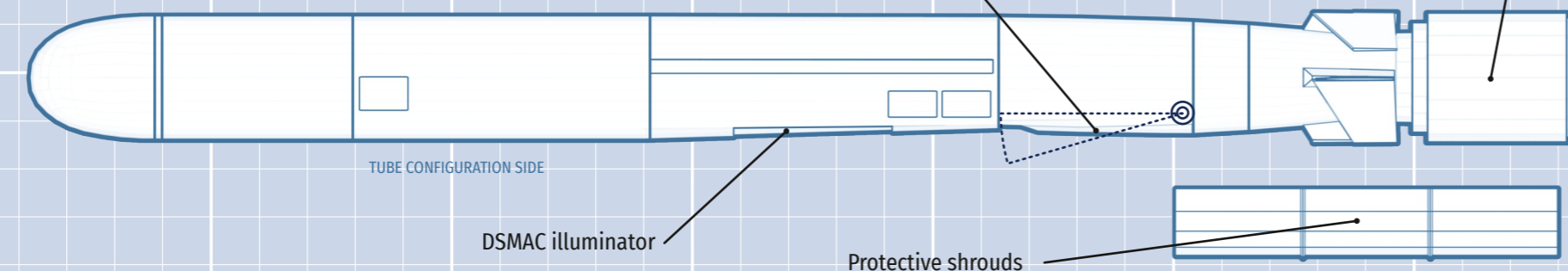
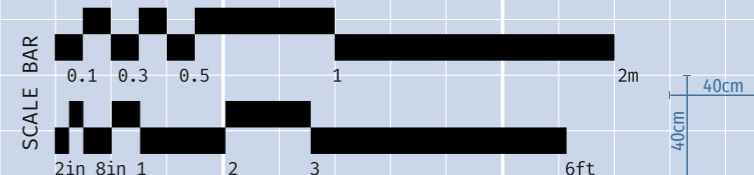
GAMEPLAY NOTE:

Excluding the INS alignment time, there is little difference, performance wise, between the Block III and IV as far as the launching platform (your submarine) is concerned. All land attack missions can be played with both variants.

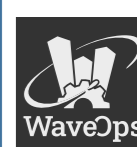


A. Guidance section
B. Warhead section
C. Mid-body section (fuel)

D. Aft- engine section (electronics)
E. Propulsion section



DWG NO. M 02	TITLE UGM-109C TOMAHAWK LAM (BLOCK III)
DATA	
Type Submarine launched land attack cruise missile	Manufacturer General Dynamics (Original) McDonnell Douglas (Blocks II, III)
Dimensions Length 18.4 ft / 5.56 m Length with booster 20.5 ft / 6.25 m Diameter 20.4 in / 52 cm Wingspan 8.75 in / 2.65 m	Commissioned 1983 Original 1993 Block III
Weight 2 900 lb / 1 300 kg with booster 3 500 lb / 1 600 kg	Operators United States Navy Royal Navy
DRAWINGS FROM GAME MODELS	
REV. 20260410184700	SHEET 4 of 5



MODERN NAVAL WARFARE

Powerplant
Solid-fuel booster for launch
Williams International F415 turbofan for cruise

Speed
Cruise ~0.75 Mach

Cruise altitude
100-165 ft / 30-50 m AGL

Max range
900 nmi

Navigation
Inertial navigation (INS)
Terrain matching (TERCOM)
Digital scene matching (DSMAC)

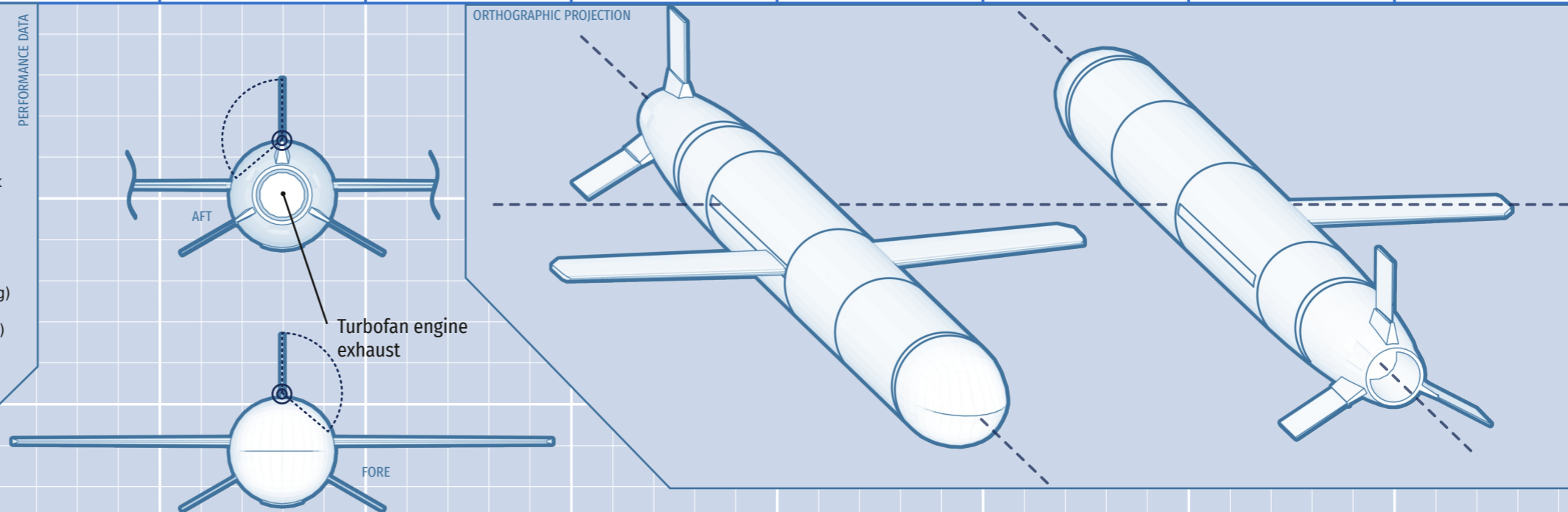
Satellite navigation (GPS)
Two-way satellite data link
Radar altimeter

INS alignment time
~1 mins (platform aided)

Warhead
WDU-36/B (690 lb / 310 kg)
with PBXN-107 high explosive (265 lb / 120 kg)

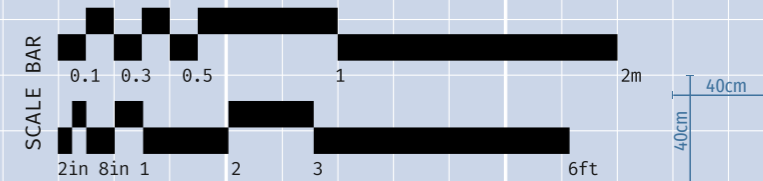
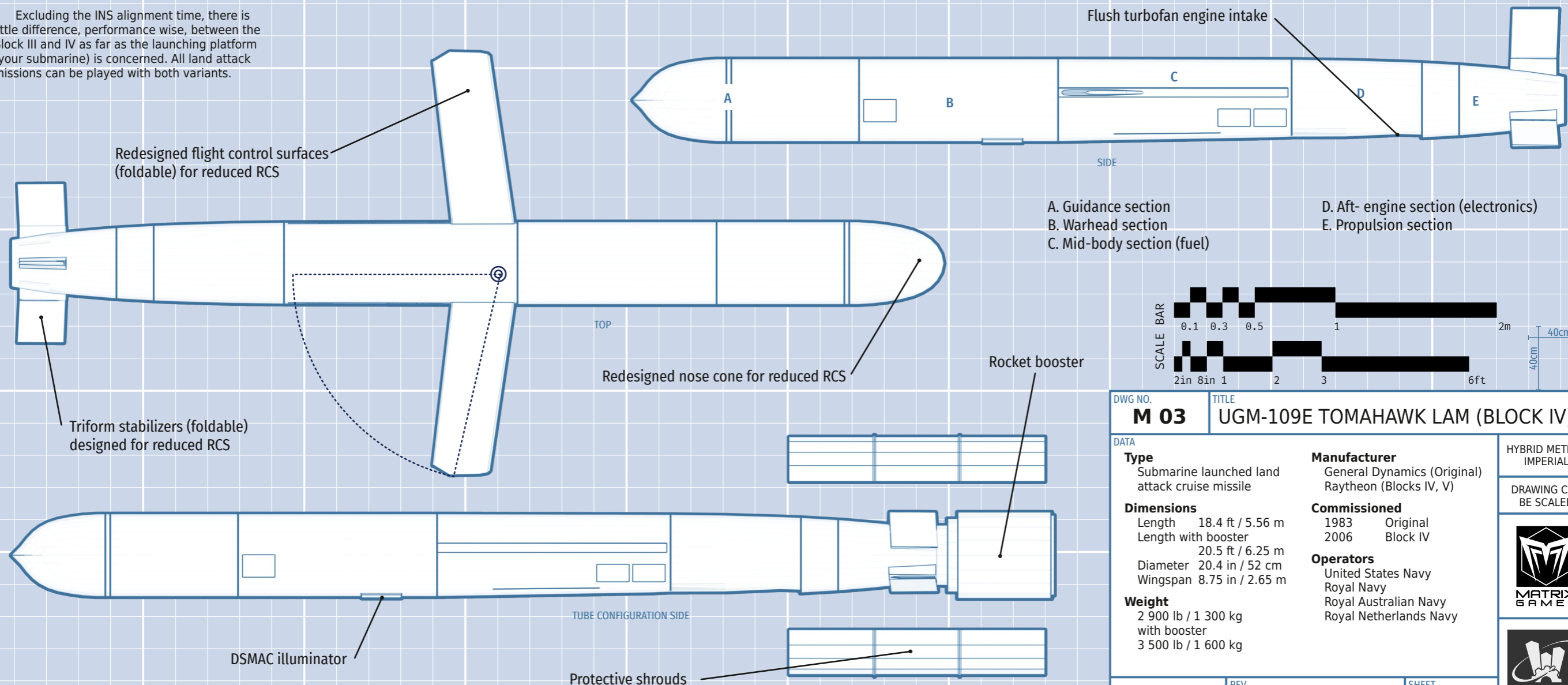
Attack modes
Horizontal (HAM)
Pop-up
Programmed warhead detonation (PWD)
Loitering

PERFORMANCE DATA



GAMEPLAY NOTE:

Excluding the INS alignment time, there is little difference, performance wise, between the Block III and IV as far as the launching platform (your submarine) is concerned. All land attack missions can be played with both variants.



DWG NO. M 03	TITLE UGM-109E TOMAHAWK LAM (BLOCK IV)
DATA	
Type Submarine launched land attack cruise missile	Manufacturer General Dynamics (Original) Raytheon (Blocks IV, V)
Dimensions Length 18.4 ft / 5.56 m Length with booster 20.5 ft / 6.25 m Diameter 20.4 in / 52 cm Wingspan 8.75 in / 2.65 m	Commissioned 1983 Original 2006 Block IV
Weight 2 900 lb / 1 300 kg with booster 3 500 lb / 1 600 kg	Operators United States Navy Royal Navy Royal Australian Navy Royal Netherlands Navy
DRAWINGS FROM GAME MODELS	REV. 20260410184700
	SHEET 5 of 5

