



# Naval Weapon Systems

**HAFM NAVY & DEVAS TAF MOD**

**Devastator\_CM; Aplion**

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## 2 SUBMARINES

### 2.1 CLASSES

#### 2.1.1 TYPE-209

The Type 209 is a class of diesel-electric attack submarine developed exclusively for export by Howaldtswerke-Deutsche Werft of Germany. The original variant (Type 209/1100) was designed in the late 1960s. Despite not being operated by the German Navy, five variants of the class (209/1100, 209/1200, 209/1300, 209/1400 and 209/1500) have been successfully exported to 13 countries, with 61 submarines being built and commissioned between 1971 and 2008<sup>[1]</sup>.


<i>Country of Origin</i>	Germany	
<i>Type</i>	Attack Submarine	
<i>Power</i>	Diesel-Electric	
<i>Armament (Torpedo)</i>	DM2A4	
<i>Armament (Anti-Ship Missile)</i>	UGM-84D Harpoon	
<i>Armament (Cruise Missile)</i>	N/A	
<i>Maximum Sonar Range</i>	4000 m.	

Table 1 – Type-209

### 2.1.2 TYPE-214

The Type 214 is a diesel-electric submarine developed by Howaldtswerke-Deutsche Werft GmbH (HDW). It features diesel propulsion with an air-independent propulsion (AIP) system using Siemens polymer electrolyte membrane (PEM) hydrogen fuel cells. The Type 214 submarine is derived from the Type 212, but as an export variant it lacks some of the classified technologies of its smaller predecessor, the most important of which is probably the non-magnetic steel hull, which makes the Type 212 submarine difficult to detect using a magnetic anomaly detector<sup>[1]</sup>.


<i>Country of Origin</i>	Germany	
<i>Type</i>	Attack Submarine	
<i>Power</i>	Diesel-Electric	
<i>Armament (Torpedo)</i>	DM2A4	
<i>Armament (Anti-Ship Missile)</i>	UGM-84D Harpoon	
<i>Armament (Cruise Missile)</i>	N/A	
<i>Maximum Sonar Range</i>	4000 m.	

Table 2 – Type-214

### 2.1.3 VIRGINIA CLASS

The Virginia class, also known as the SSN-774 class, is a class of nuclear-powered fast attack submarines (hull classification symbol SSN) in service with the United States Navy. The Virginia-class attack submarine is the U.S. Navy's newest undersea warfare platform and incorporates the latest in stealth, intelligence gathering and weapons systems technology<sup>[1]</sup>.


<i>Country of Origin</i>	USA	
<i>Type</i>	Attack Submarine	
<i>Power</i>	Nuclear	
<i>Armament (Torpedo)</i>	MK-48	
<i>Armament (Anti-Ship Missile)</i>	UGM-84D Harpoon	
<i>Armament (Cruise Missile)</i>	UGM-109 Tomahawk	
<i>Maximum Sonar Range</i>	4800 m.	

Table 3 – Virginia Class

### 2.1.4 YASEN CLASS

The Yasen-class submarine (Russian: Проект 885 "Ясень", "ash tree"; NATO reporting name: "Severodvinsk", also known erroneously as the Graney class) is the newest Russian nuclear-powered multipurpose attack

submarine. Based on the Akula-class submarine and the Alfa-class submarine, it is projected to replace Russia's Soviet-era attack submarines, both the Akula and Oscar-class submarine<sup>[1]</sup>.


Country of Origin	Russia	
Type	Attack Submarine	
Power	Nuclear	
Armament (Torpedo)	Type 65-76	
Armament (Anti-Ship Missile)	3M54K Kalibr	
Armament (Cruise Missile)	3M14K Kalibr	
Maximum Sonar Range	4600 m.	

Table 4 – Yasen Class

## 2.2 SYSTEMS & WEAPONS

### 2.2.1 DEPTH

Depth of the submarine can be controlled by the driver. There is a special panel in action menu which is used for this purpose.

Submarines can dive from 10 meters (periscope depth) up to 35 meters.



Figure 1 – Depth Control Panel

Mission makers can also adjust the depth via script command (below example is for 10 meters)

```
this animate ["senkou", 10];
```

### 2.2.2 SONAR

Sonar can be run in passive and active modes to detect enemy naval vehicles. Distance which sonar can detect sound sources varies between vehicles. The possibility to detect the enemy depends on the sonar mode which is used. Sonar operator can adjust these settings over sonar interface.





Figure 2 – Sonar Interface

Sonar can be also used to detect enemy torpedoes which are homing to the submarine itself. In such cases, sonar contact will be displayed as a red dot in this sonar display instead of a green dot.

#### 2.2.2.1 PASSIVE SONAR

Passive sonar is detecting the sounds emitted from the targets. Therefore it is the safest method to stay hidden. The limitation of this mode is, the target needs to emit sounds to be detected. In case the engine of the enemy vessel is not running, passive sonar will not detect it due to lack of sound source.

#### 2.2.2.2 ACTIVE SONAR

The famous sonar ping sound is created via active sonar. Main difference to passive sonar is the main sound emitter is the submarine itself. It is basically sending a sound wave and then waiting for the bounce back. Due to its working principal, submarine can be detected by enemy easier due to sound which it creates but the limitation of running engine at enemy vessel is neglected. This mode needs to be used carefully, in situations where stealth is important.

The transmission period of the pings are depending on the distance of first contact in sonar screen. Thus, faster transmission of pings will mean that, there is a close distance contact.

#### 2.2.3 WEAPONS

Weapons of the submarine are controlled by weapon officer via a special panel. All necessary settings for the weapon system can be done over this panel.



Figure 3 – Weapon Control Panel

Weapon officer can also chose what should be loaded to the tubes. Based on selection the ammo needs to be taken from storage and loaded into tube which will take around 2 minutes. Reload progress and the tube status can be checked over weapon control panel any time.

There are different torpedo/anti-ship missile ratios which can be set over the vehicle attribute in EDEN Editor.

#### 2.2.3.1 TORPEDOES

Main weapon of a submarine is, its heavyweight torpedoes. Heavyweight torpedoes can sink any size of ship with a single hit. Due to its strength, it is mainly used for large sized ships. They might not be suitable against small and fast targets as they can evade torpedoes by sharp maneuvers or high speeds.

Torpedoes have their own sonar modules which they can use to acquire target if an acoustic guidance method selected by weapon officer. The sonar module of the torpedo can track enemies in  $\pm 100^\circ$  in its moving direction up to 1500 meters in active mode or up to 750 meters in passive mode (torpedo sonar module limitations).

Torpedoes can travel up 90 km/h for a duration of 4 minutes before their fuel is depleted.

There are three guidance methods which can be used with torpedoes.

##### ACTIVE

This is an acoustic guidance method in which the torpedo is using its own sonar in active mode to detect ships.

After fired by the submarine, torpedo opens its sonar module approximately after 10 seconds and it will keep traveling in its current path until its sonar detects a vessel. As torpedo is transmitting sound waves, it can detect any vessel which fulfills sonar module's limitations. The closest vessel detected by its sonar will become torpedo's target and it will stop searching process but start homing.

If another vessel comes closer distance to torpedo than the previously acquired target, torpedo will change its target and start homing process again. In case the target is destroyed by other reasons, torpedo will start the searching process again.

## PASSIVE

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This is the second acoustic guidance method which can be used. Its working principals are totally same like the active mode except, in this mode the target needs to transmit sound waves to be detected by the torpedo's sonar module. This means any ship which has no running engine, will not be detected by torpedo in this mode. On the other hand, as torpedo not sending sound waves in this mode it will be also hard to detect it via passive sonars. So it gives kind of stealth attack opportunity to the submarine.

As a summary both active and passive guidance modes, are relying the torpedo's own sonar module. They provide advantage to submarine to keep itself silent and away from enemy eyes with the cost of not able to select a specific target to destroy. Although experienced captains can position their submarines before firing a torpedo in a way that, they can still let torpedo to pin point the very exact ship which they want to destroy.

## WIRED

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As it can be already seen, acoustic guidance is acquiring its own target based on the sonar module parameters. Therefore it is not always possible to aim for a specific target if there are multiple targets in region. Wired torpedo guidance mode is overcoming this problem.

In this mode, the captain is controlling which vessel should the torpedo start homing. There is a fiber cable between fired torpedo and the submarine itself, and all necessary information regarding the target ship is transmitted over it.

Captain needs to use the Status & Fire Control Display to transmit data to torpedo. The ship which is at the center of the periscope view will be the target. Status & Fire Control Panel will display all necessary information regarding the target as well. As long as those information is visible in that panel, torpedo will keep homing to it.

This targeting mode is mainly used to destroy a specific ship by the cost of stealth of the submarine as the periscope needs to be up and it can be detected visually by enemy forces.

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### 2.2.3.2 ANTI-SHIP MISSILES

For fast moving or small naval targets, anti-ship missiles are a better option than the costly and powerful torpedoes. Such missiles have longer range and shorter travel time than torpedoes.

Anti-ship missiles are using their own radar to acquire a target after they are fired. Thus, it is not possible to select an exact target before firing them. This means the experience and skills of the weapon officer is important to select correct parameters before firing a missile to destroy the target which captain wants to destroy.

For short range naval engagements which are less than 1000 meters, anti-ship missiles should not be used as due to their speed the active radar will be turned on too late to acquire the target.

Their fuel give them capability to travel up to 6 minutes.

## GUIDANCE

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There are two main guidance methods used by anti-ship missiles;

- **Radar:** After missile goes into cruise mode, it will turn its active radar and will search for any vessel which are in  $\pm 45^\circ$  in its moving direction up to 2000 meters distance (anti-ship missile active radar limitations).

In case it finds a target it will start homing towards it. There is a time limit for search phase. Missile can spend around 15 seconds in search phase (starts with active radar turned on) before it initiates a self-destruct. Therefore the distance to enemy should not be more than 3000 meters.

- **GPS:** In this mode, weapon officer gives a map grid to the missile's computer. Missile will travel to center of this grid and will turn its active radar only when it reaches to this target grid. The firing relative angle to target grid from submarine should not exceed  $\pm 45^\circ$  otherwise missile will not be fired. This targeting mode is giving to a submarine long range attack possibilities for enemy vessels which are beyond 3000 meters, as self-destruction countdown will start only when missile arrives to target grid.

## FLY-OUT

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This parameter is used to set the cruise altitude of the anti-ship missile.

- **High:** In this setting, missile will cruise with altitude of 300 meters. It is usually used when there are close by enemy vessels or high terrain between submarine and the target to prevent an accidental hit. Even in this mode, missile will dive to Sea-Skim altitude immediately when its active radar detects the enemy to provide a stealth approach.
- **Sea-Skim:** This mode is mostly used for stealth approach to target as missile will cruise with altitude of 15 meters above sea surface right after it is fired.

## TERMINAL

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With this parameter, weapon officer can select the terminal mode of the missile.

- **Sea-Skim:** Missile will hit to its target from its sides while approaching in sea-skimming altitude. This is used to keep the stealth even in the last, destroy phase.
- **Pop-Up:** In this terminal mode, missile will suddenly climb to 200 meters and dive just before it reaches the target vessel. It is used to deliver the damage to the center of the target vessel which is weaker compared to its sides.

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### 2.2.3.3 CRUISE MISSILES

There are submarines which are equipped with modern cruise missiles to attack ground targets. For such submarines, weapon officers have a special panel.



Figure 4 – Cruise Missile Control Panel

Cruise missiles are powerful weapons which can follow specific waypoints to approach its target with cruise altitudes around 60-70 meters from ground level. At final stage in its approach, they are using terminal pop-up to dive to target location and hit its target with less than 10 meters error (a.k.a. circular error probable, CEP).

Weapon officer can input up to 5 waypoints (simply by selecting pin switch for the waypoint and clicking on the map) which the missile will follow after it is fired. So these waypoints are loaded to missile's computer before launch and cannot be changed after it is fired.

The waypoint which has the highest number will be considered as the target location. It is not a must to follow sequential waypoints, this means it is possible to set WP-1, WP-3 and WP-4 before firing. In this case WP-4 will be the target location as it has highest number.

In order to delete the previously given waypoints from cruise control panel, a new solution should be plotted via button 'Plot Solution'.

To start firing sequence, the submarine needs to be submerged but should not be deeper than 20 meters, only exception to this is Russian submarines which can also fire while surfaced. The Silo doors need to be open and at least one waypoint should be set.

As missile travels with low altitude, weapon officer should set the waypoints in a way that no sudden increase in terrain height encountered to prevent any terrain collisions.

#### 2.2.4 COUNTERMEASURES

Submarines can use decoys against incoming torpedoes. Decoys can be released by the captain from either starboard (right side) or port (left side) of the submarine.

Decoys are emitting a high volume sound to attract any acoustic guided torpedo which is coming towards it. They stay active around 5 minutes.

To evade incoming torpedoes successfully, captain should try to place a decoy between the submarine and the enemy torpedo so that torpedo will acquire the decoy as its target.

#### 2.2.5 STATUS & FIRE CONTROL

Submarine captain has a special display from which he can access most crucial information regarding the submarine.



Figure 5 – Status & Fire Control Display

This display is also used to provide target data to wired torpedo. As long as the target sections shows data regarding aimed target, wired torpedo will move towards it. Estimated time of arrival for such guided torpedo can be also seen over this panel.

The oxygen level is another important information which can be accessed via this display. Submarine oxygen level drops when it is submerged based on the number of personal inside submarine. Oxygen can be replenished if submarine is surfaced.

Seafloor depth can be measured only if the submarine is using active sonar. If that is the case, captain can see the seafloor's depth over this display.

## 2.3 SUBMARINE BASED SPEC-OPS

Stealth of a submarine is not making it a good hunter but also let them to be used as special operation base. In order to provide Special Forces such infiltration chances, a submarine can carry **Swimmer Delivery Vehicle (SDV)** and/or **Dry Dock Shelter (DDS)**.

Such attachments can be selected by vehicle attribute in EDEN Editor.

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### 2.3.1 SDV

SDVs are providing special forces extra speed to reach their destinations. They can carry up to four soldiers and can be detached or attached only if submarine is submerged.

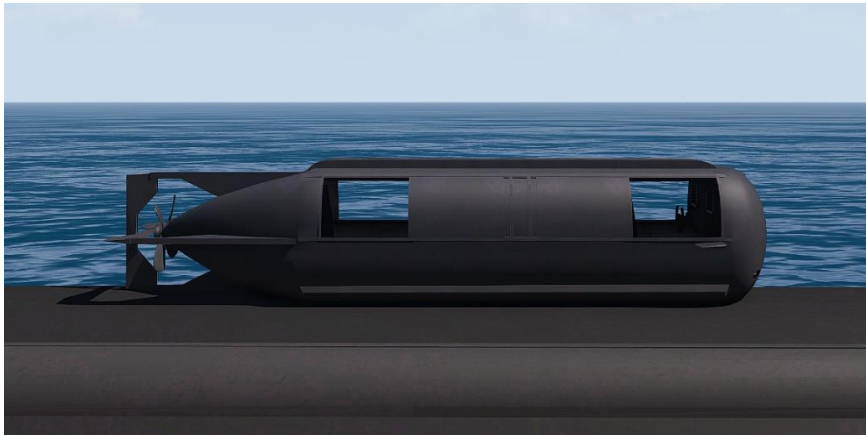


Figure 6 – Swimmer Delivery Vehicle (SDV)

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### 2.3.2 DDS

Dry Dock Shelters can be used to carry four zodiac boats and used to leave the submarine while it is submerged. Without having a DDS, it is not possible to leave the submarine if it is submerged.

Zodiac boats can be released only if the submarine is surfaced.

It is possible to move between DDS and submarine directly via action menu as long as DDS hatch is closed. Only exception is when submarine is surfaced. In such case the hatch door plays no role for moving between DDS and submarine.

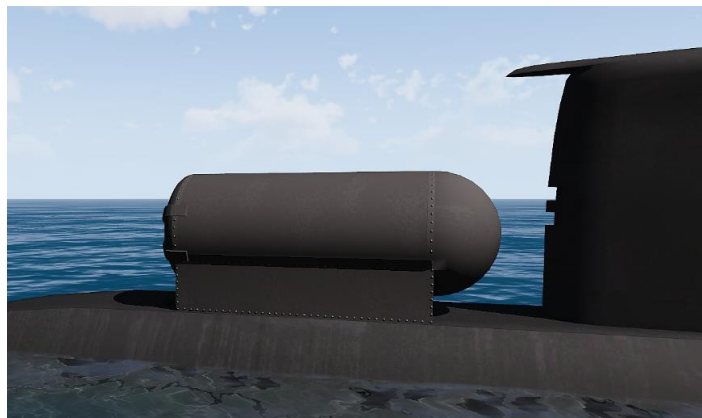


Figure 7 – Dry Dock Shelter (DDS)

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## 2.4 CUSTOM WAYPOINTS

In EDEN Editor there is possibility to use custom waypoints for AI controlled submarines. Via these waypoints, a mission maker can adjust the depth of the submarine. It should be not forgotten that, when AI detects enemy ships in area, it will decide its own depth and movement by itself. Below example is for DEVAS TAF Mod. In HAFM Navy Mod, custom waypoints will be found under “HAFM Navy Custom Waypoints”.

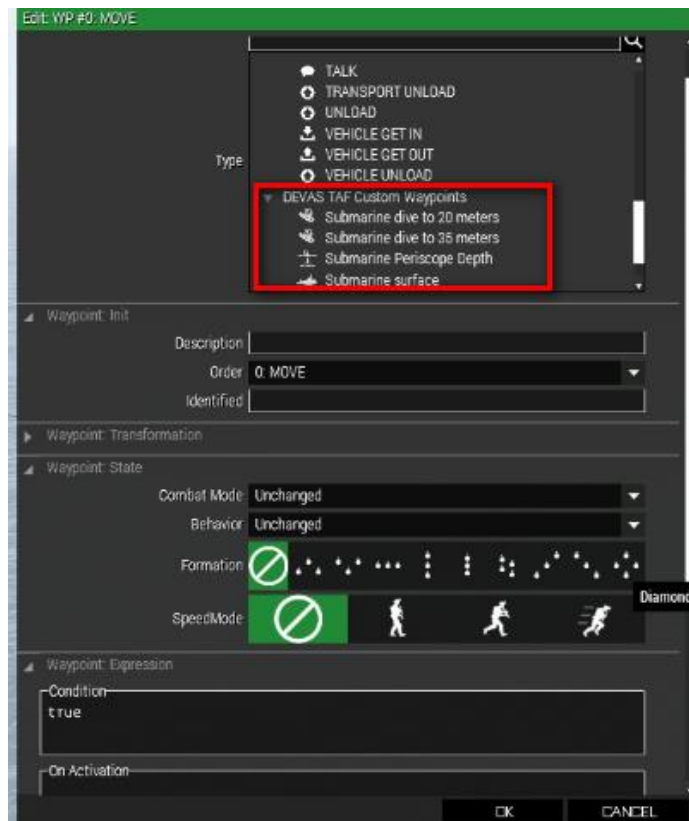


Figure 8 – EDEN Waypoints for Subs

## 2.5 ADDITIONAL INFORMATION

During night missions, searchlight which can be turned on by captain should be used to illuminate inside of the submarine.

Optics used by weapon officer and captain have thermal modes.



### 3 SHIPS

#### 3.1 CLASSES

##### 3.1.1 BARBAROS (MEKO 200TN)

The Turkish variant, MEKO 200TN, is a modified MEKO 200 type multirole frigate<sup>[1]</sup>.


<i>Country of Origin</i>	Germany	
<i>Type</i>	Frigate	
<i>CIWS</i>	Sea Zenith	
<i>Armament (Torpedo)</i>	MK-46	
<i>Armament (Anti-Ship Missile)</i>	RGM-84D Harpoon	
<i>Armament (Cruise Missile)</i>	N/A	
<i>Armament (Anti-Missile)</i>	RIM-162 ESSM	
<i>Armament (Gun)</i>	MK-45 Mod 2 (127mm)	
<i>Maximum Sonar Range</i>	2400 m.	

Table 5 – Barbaros

##### 3.1.2 HYDRA (MEKO 200HN)

The Greek variant, MEKO 200HN, is a modified MEKO 200 type multirole frigate<sup>[1]</sup>.


<i>Country of Origin</i>	Germany	
<i>Type</i>	Frigate	
<i>CIWS</i>	Phalanx	
<i>Armament (Torpedo)</i>	MK-46	
<i>Armament (Anti-Ship Missile)</i>	RGM-84D Harpoon	
<i>Armament (Cruise Missile)</i>	N/A	
<i>Armament (Anti-Missile)</i>	RIM-162 ESSM	
<i>Armament (Gun)</i>	MK-45 Mod 2 (127mm)	
<i>Maximum Sonar Range</i>	2400 m.	

Table 6 – Hydra

### 3.1.3 FREMM (FRENCH VERSION)

The FREMM ("European multi-purpose frigate"; French: Frégate européenne multi-mission; Italian: Fregata europea multi-missione) is a class of multi-purpose frigates designed by Naval Group/Armaris and Fincantieri for the navies of France and Italy <sup>[1]</sup>.


<i>Country of Origin</i>	France	
<i>Type</i>	Frigate	
<i>CIWS</i>	Nexter 20mm	
<i>Armament (Torpedo)</i>	MU-90	
<i>Armament (Anti-Ship Missile)</i>	Exocet Block 3	
<i>Armament (Cruise Missile)</i>	Scalp Naval	
<i>Armament (Anti-Missile)</i>	Aster-15	
<i>Armament (Gun)</i>	OTO Melara 76 SR (76mm)	
<i>Maximum Sonar Range</i>	3000 m.	

Table 7 – FREMM

### 3.1.4 ADMIRAL GRIGOROVICH

The Admiral Grigorovich class (Фрегаты проекта 11356P/M) is the latest class of frigates ordered by the Russian Navy for the Black Sea Fleet <sup>[1]</sup>.


<i>Country of Origin</i>	Russia	
<i>Type</i>	Frigate	
<i>CIWS</i>	Kashtan-M	
<i>Armament (Torpedo)</i>	Type 53-65K	
<i>Armament (Anti-Ship Missile)</i>	3M54T Kalibr	
<i>Armament (Cruise Missile)</i>	3M14T Kalibr	
<i>Armament (Anti-Missile)</i>	3S90M Shtil-1	
<i>Armament (Gun)</i>	A-190 (100mm)	
<i>Maximum Sonar Range</i>	3000 m.	

Table 8 – Admiral Grigorovich

### 3.1.5 BUYAN (M VERSION)

The Buyan-class corvette was designed by Zelenodolsk Design and designated Project 21630 by the Russian Government. This is one of the newest corvettes of the Russian Navy <sup>[1]</sup>.


<i>Country of Origin</i>	Russia	
<i>Type</i>	Corvette	
<i>CIWS</i>	AK-630-M2	
<i>Armament (Torpedo)</i>	N/A	
<i>Armament (Anti-Ship Missile)</i>	3M54T Kalibr	
<i>Armament (Cruise Missile)</i>	3M14T Kalibr	
<i>Armament (Anti-Missile)</i>	N/A	
<i>Armament (Gun)</i>	A-190 (100mm)	
<i>Maximum Sonar Range</i>	2800 m.	

Table 9 – Buyan-M

### 3.1.6 ROUSSEN

The Roussen class is a seven-strong class of British-design fast attack missile boats improved and customized for the Hellenic Navy, also known as Super Vita. <sup>[1]</sup>.



<i>Country of Origin</i>	England	
<i>Type</i>	Fast Attack Craft	
<i>CIWS</i>	RAM Block 1	
<i>Armament (Torpedo)</i>	N/A	
<i>Armament (Anti-Ship Missile)</i>	Exocet Block 3	
<i>Armament (Cruise Missile)</i>	N/A	
<i>Armament (Anti-Missile)</i>	N/A	
<i>Armament (Gun)</i>	OTO Melara 76 SR (76mm)	
<i>Maximum Sonar Range</i>	2800 m.	

Table 10 – Roussen


### 3.1.7 ARLEIGH BURKE

The Arleigh Burke class of guided missile destroyers (DDGs) is the United States Navy's first class of destroyer built around the Aegis Combat System and the SPY-1D multifunction passive electronically scanned array radar [1].

Country of Origin	USA	
Type	Guided Missile Destroyer	
CIWS	Phalanx	
Armament (Torpedo)	MK-50	
Armament (Anti-Ship Missile)	RIM-66M	
Armament (Cruise Missile)	UGM-109 Tomahawk	
Armament (Anti-Missile)	RIM-174A	
Armament (Gun)	MK-45 Mod 4 (127mm)	
Maximum Sonar Range	3000 m.	


### 3.1.8 TYPE 052C

The Type 052C destroyer (NATO code name Luyang II class, or Lanzhou class after the lead ship) is a class of destroyer built by China. It features a four array phased array radar for 360-degree coverage. The radar is used in conjunction with vertically launched HHQ-9 long-range air defence missiles. The Type 052C was the first warship in the People's Liberation Army Navy Surface Force to have true long-range fleet air defence capability. [1].

Country of Origin	China	
Type	Guided Missile Destroyer	
CIWS	Type-730	
Armament (Torpedo)	YU-7	
Armament (Anti-Ship Missile)	YJ-62	
Armament (Cruise Missile)	N/A	
Armament (Anti-Missile)	HHQ-9	
Armament (Gun)	Type-210 (100mm)	
Maximum Sonar Range	2800 m.	

### 3.1.9 TYPE 052D

The Type 052D destroyer (NATO code name Luyang III class, or Kunming class after the lead ship) is a class of guided missile destroyers being deployed by the Chinese People's Liberation Army Navy Surface Force. Currently it is being built at two different Chinese shipyards. This class is the successor of Type 052C <sup>[1]</sup>.

<i>Country of Origin</i>	China	
<i>Type</i>	Guided Missile Destroyer	
<i>CIWS</i>	Type-730 & HHQ-10	
<i>Armament (Torpedo)</i>	YU-7	
<i>Armament (Anti-Ship Missile)</i>	YJ-83	
<i>Armament (Cruise Missile)</i>	CJ-10	
<i>Armament (Anti-Missile)</i>	HHQ-9	
<i>Armament (Gun)</i>	Type-210 (100mm)	
<i>Maximum Sonar Range</i>	3000 m.	

## 3.2 SYSTEMS & WEAPONS

### 3.2.1 SONAR

Ship sonars are functioning same as submarine sonars (see section 2.2.2) with only one crucial difference, effective distance. As environment over sea surface is louder, ship sonar's have shorter detection ranges than submarine sonars.

### 3.2.2 RADAR

Ships occupy air radar to detect aircrafts. Radar can be turned on from the gunner's seat.

### 3.2.3 WEAPONS

Weapons officer of the ship can access to torpedoes and anti-ship missile controls via action menu. In addition to that, he can also use the anti-air missiles to defend the ship against aircrafts. Such missiles can be controlled simply via turret view.

#### 3.2.3.1 TORPEDOES

Except Russian Admiral Grigorovich class ships occupy lightweight torpedoes. Lightweight torpedoes are not strong as the heavyweight torpedoes which submarines and Admiral Grigorovich class frigate is using but they are still effective to sink any size of submarine with single hit. The damage which they can deliver to another ship might not be sufficient to sink them with single hit.



Ship torpedoes are using the same mechanism like the submarine torpedoes (see section 2.2.3.1) except the wired torpedo option. Such kind of torpedo does not exist in ships.

In order to use the torpedoes, the torpedo launcher needs to be activated. As the torpedo launchers are located at the sides of the ships, driver needs to align the ship in correct firing position to give the possibility to torpedo's sonar to track the enemy.



Figure 9 – Torpedo Controls

### 3.2.3.2 ANTI-SHIP MISSILES

Same as by submarines, ships have also anti-ship missiles. They are functioning in the same way as the submarine ones (see section 2.2.3.2). One important point is the direction of the missile launch. Some ship classes (i.e. Russian ships) are using vertical launch systems, a.k.a. VLS, instead of the launch tubes located at the sides of the ship. Based on the launch platform, driver needs to align the ship so that the missile flies out in correct direction.



Figure 10 – Anti-Ship Missile Controls

### 3.2.3.3 CRUISE MISSILES

Cruise missiles by ships are working in same way like the submarine cruise missiles (see section 2.2.3.3).

### 3.2.3.4 ANTI-SHIP MISSILE DEFENSE

Unlike to submarines, ships have their defense systems against anti-ship missiles. Ship's commander can decide which systems should be used against anti-ship missiles automatically. Captain has also chance to use anti-missiles manually.

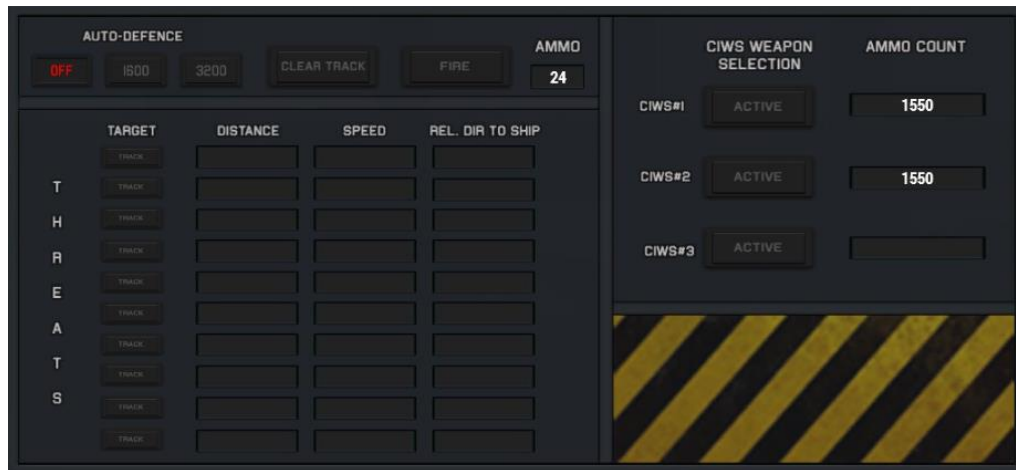


Figure 11 – Ship Defense System

## ANTI-MISSILE MISSILES

Most accurate defence against incoming missiles is the anti-missile missiles with their very high speed and maneuverability. Such missiles can be used either manually or automatically depending on captain's choice. They are using semi-active radar and needs ship's radar to track the target which they should aim with kill ratio around 80%.

Automatic mode has 2 different range settings. Selected range is used by the defense system to decide the missile launch. In case, radars detects an anti-ship missile launch closer than the selected range and if that missile has a flight path which endangers the ship then it fires one or two anti-missiles (two missiles are used if threat is close to increase the hit chance) to destroy the threat. It should not be forgotten that in case a missile is launcher further away than the selected auto defence range, defense system will not reach and will let the captain to decide the missile launch by him/herself.

In manual mode, captain can select the threat which he wants to destroy. After that the radar of the ship starts illuminating that target and in case captain fires the anti-missile missile, it will guide it to the threat.

Radar of the ships can illuminate only one threat at a time although it can detect 10 threats simultaneously. So selecting the most dangerous target in multi anti-ship missile attack situations is crucial for survival.

In case the target which is illuminated is changed while the anti-missile missile is flying, it might try to maneuver to the new target in case it's semi active radar detection cone is able to see the illuminated target.

One very important point with anti-missile missiles is that they are fired via VLS method and need some time to climb and start their flight path. Due to this time requirement, it is not advised to use them against threats which are closer than 1400 meters. Automatic mode is also not firing any missiles in case, the missile launch is detected below this range.

## CLOSE-IN WEAPON SYSTEM (CIWS)

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CIWS are the last defence of the ship against anti-ship missiles. They have lower kill ratio than the anti-missile missiles but can operate for closer ranges. They can be only used in automatic mode to destroy the anti-ship missiles. When they are activated they evaluate the flight path of the anti-ship missiles and open fire when their computer detects any danger to ship.

In case the CIWS turret is not activated for self-defense, sailors can use them manually attack aircrafts or small attack boats.

It is advised to turn off the CIWS while firing any missiles from the ships, as CIWS might evaluate those friendly missiles as threat to the ship itself.

---

### 3.2.4 NAVAL GUNS

Ships can provide artillery support for the troops operating inland. Their guns have artillery computer to fire long distances. Based on the shell caliber the damage they inflict varies.

Each gun has different type of shells and rate of fire. Possible shell types are

- High Explosive (HE) Rounds against infantry or light armored vehicles
- Armor Piercing (AP) Rounds against armored vehicles
- Guided AP Rounds which can be used against vehicles whose engine is on
- Flare Rounds

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#### 3.2.4.1 MK-45 MOD 2

MK-45 Mod 2 has 127mm caliber and range of 14km. It can fire 16 rounds in a minute and uses HE and Flare rounds.

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#### 3.2.4.2 MK-45 MOD 4

MK-45 Mod 4 has 127mm caliber and range of 18km. It can fire 20 rounds in a minute and uses HE and Flare rounds.

---

#### 3.2.4.3 OTO MALERA SR

OTO Malera Super Rapid can fire 120 rounds in a minute. It has range of 8km with 76mm calibre barrel which is far smaller than other naval guns but can fire Guided AP rounds in addition to normal AP and HE rounds.

---

#### 3.2.4.4 A-190

Russian ships are using 100mm calibre guns with range of 14km. Although the gun can fire only HE rounds, it has very high fire rate (80 rounds per minute) and uses double magazines which decreases the magazine change time to 1 second.



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#### 3.2.4.5 TYPE-210

Chinese ships are using 100mm calibre guns with range of 14km. The gun can fire HE and flare rounds, it has very high fire rate (90 rounds per minute).

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#### 3.2.5 COUNTERMEASURES

Ships have decoys same like the submarines (See section 2.2.4) to defend themselves against incoming torpedoes.

### 3.3 SHIP BASED SPEC-OPS

Although ships does not provide the stealth of a submarine, they are still a good option for special operation base as they can be used for insertions with higher number of soldiers.

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#### 3.3.1 COMBAT RUBBER RAIDING CRAFT

Also known as zodiacs, ships can carry multiple combar rubber raiding crafts at same time which can be used by soldiers to leave the ship. Zodiac boats cannot be retrieved back into ship.



Figure 12 – Combar Rubber Raiding Craft

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#### 3.3.2 Rigid-Hulled Inflatable Boat

A rigid-hulled inflatable boat (RHIB) or rigid-inflatable boat (RIB) is a lightweight but high-performance and high-capacity boat constructed with a solid, shaped hull and flexible tubes at the gunwale. The design is stable and seaworthy. The inflatable collar allows the vessel to maintain buoyancy if a large quantity of water is shipped aboard due to bad sea conditions. The RIB is a development of the inflatable boat <sup>[1]</sup>.

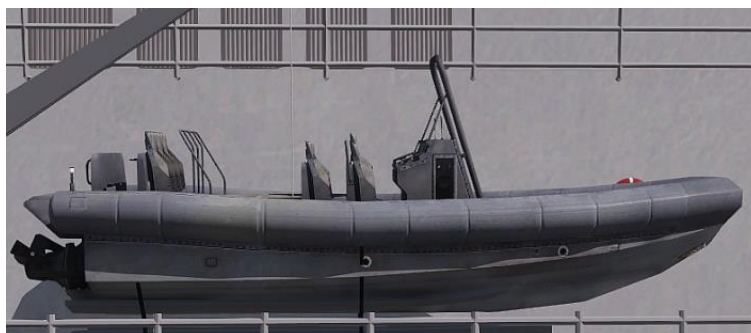


Figure 13 – RHIB

### 3.3.3 HELICOPTER

Ships have landing pads which can be used by helicopters to bring in or out the soldiers. A helicopter need to be secured via action menu to lands on the ship. After this, soldiers can leave the helicopter to move in the ship or get into the helicopter from ship via action menu.

Only one helicopter can be secured at a time. Due to limitations of Arma 3 engine, it is not possible to change the state of the helicopter's rotor when it is secured via turning on/off the engine.

## 3.4 ADDITIONAL INFORMATION

During night missions, searchlight which can be turned on by captain should be used to illuminate inside of the ship. In addition to that there are also collision lights and normal lights to illuminate the ship and they can be turned on/off by driver.

It is possible to show flags by ships. There are already predefined flags by each ship which can be set via EDEN Editor Attribute. In case a custom flag wants to be used, the custom flag attribute can be set. The last adjusted attribute takes the priority.

## 4 FOR MISSION MAKERS & ZEUS

### 4.1 ZEUS MODULES

Under Fire Support section you can find "Create Missile Target" module which is used to create a target for cruise missile attack. Only one target can be set during the game, so if you put an additional one the previous target will be deleted.

This section holds also one more module which is "Fire Cruise Missile". With this module, Zeus can let a submarine or ship to fire cruise missile to a target created before. This module should be placed very close to the object which is required to fire.

The messages regarding the status can be seen in regular "Zeus Feedback Message" location.



Figure 14 – Zeus Feedback Message

## 4.2 COMBAT MODE

It is possible to change the behavior of the AI via combat mode ([https://community.bistudio.com/wiki/Combat\\_Modes](https://community.bistudio.com/wiki/Combat_Modes)) selection.

- Blue (Never Fire): AI will not attack to enemies but only defend itself
- Green (Hold Fire, defend only) & White (Hold fire, engage at will): AI will not attack enemies unless they attack first.

## 4.3 COMMANDS

### 4.3.1 HAFM\_FNC\_DIVE (DIVE)

**Description:** Forces submarine to dive to given depth level. There are 7 different depth levels from 0 to 6, which submarine can dive.

**Syntax:** [vehicle\_name, depth\_level] spawn HAFM\_fnc\_Dive;

**Parameters:** vehicle\_name: Object

depth\_level: 0 for surface, 1 for periscope depth (10 meters), 2 for 15 meters, 3 for 20 meters, 4 for 25 meters, 5 for 30 meters and 6 for 35 meters.

**Return Value:** Nothing

### 4.3.2 HAFM\_CRUISEFIRE (FIRE CRUISE MISSILE EVENT)

**Description:** Forces submarine/ship to fire cruise missile. Object need to be not moving and hatch needs to be fully open before launch. For submarines depth need to be set properly. Details of depth range can be found under submarine section of this document.

Prior to calling this command, you need to set the target location like the following example

```
vehicle_name setVariable ["Cruise Waypoints", _TargetLoc, true];
```

\_TargetLoc: is an array with format PositionAGLS

**Syntax:** ["HAFM\_CruiseFire", [vehicle\_name]] call CBA\_fnc\_serverEvent;

**Parameters:** vehicle\_name: Object

**Return Value:** Nothing

---

#### 4.3.3 CRUISE MISSILE HATCHES

**Description:** In order to force the hatches for cruise missile to open animatedoor (<https://community.bistudio.com/wiki/animateDoor>) command should be used for the door "hatch1L"

**Syntax:** vehicle\_name animateDoor ["hatch1L", phase];

**Parameters:** vehicle\_name: Object

phase: 0 to close 1 to open.

**Return Value:** Nothing

## 5 REFERENCES

[1] Wikipedia – The Free Encyclopedia