

To find the location of an objective, click on it in the objective list and the objective location will be shown on the map.

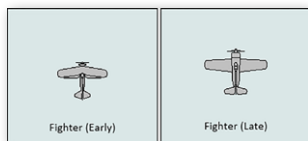
Note: The sections below apply to aircraft operations and radar. Aircraft will only start to have an impact in the game from circa 1916, so if you are a first time player you can stop reading here and revisit the manual when your game reaches the mid-1910s. Radar will only appear in the late 1930s.

AIRCRAFT OPERATIONS

AIRCRAFT AND AIRCRAFT ROLES

There are several different aircraft roles in the game.

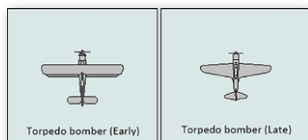
FIGHTERS (F)



Effective in countering other aircraft, as combat air patrol (CAP) or as escorts. Later models can carry bombs, and with improved glide bombing become reasonably accurate at bombing. With development of rockets they

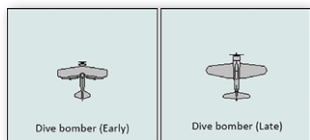
become even more useful in attacks on ships and ground targets.

TORPEDO BOMBERS (TB)



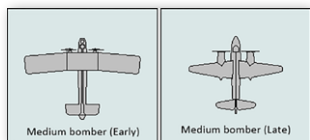
Can be carrier based or land based. Torpedo bombers are the earliest kind of attack aircraft that appear in the game. They can drop torpedoes or bombs. Torpedoes are more effective in sinking ships than bombs.

DIVE BOMBERS (DB)



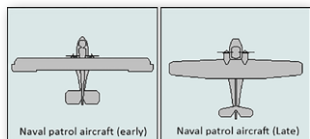
Can be carrier based or land based. Very accurate in bombing of ships, though their bombs are released at relatively low altitude and lack the penetration of bombs dropped from higher altitude.

MEDIUM BOMBERS (MB)



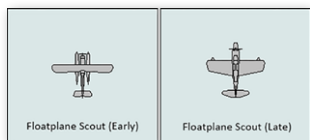
Land based only. Make level bombing attacks that are not very accurate. Some types can carry torpedoes. Bomb accuracy will increase dramatically with skip bombing, but that exposes the bomber to more AA fire. With the invention of guided bombs and missiles, medium bombers become more dangerous to ships.

NAVAL PATROL AIRCRAFT (PB)



Land based only. Initially mainly flying boats of various types. Primarily used for long range scouting. Can carry bombs, but are not very accurate with them. Flying boats contribute to limit the effectiveness of enemy submarines on the strategic level. In the late game, these aircraft can carry missiles, making them more dangerous to ships.

FLOATPLANE SCOUTS (S)



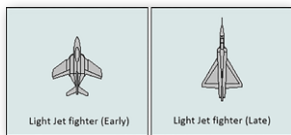
Land or ship based short to medium range scouts. Can be carried on any ship and launched by catapult. Before catapults are invented a launch requires the carrying ship to stop. Later models can carry bombs, but are not very accurate with them. Also help with local ASW.

AIRSHIPS (Z)



Based on land bases. Long ranged and reasonably effective as scouts, but more weather sensitive than airplanes. Can attack ships with high level bombing, but are rather ineffective. Before 1920 airships are the only available really long range naval scouting aircraft.

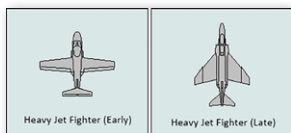
LIGHT JET FIGHTERS (LJF)



These are the first carrier based jet aircraft that will appear in the game. While considerably more deadly in air combat than propeller fighters, they have short range, especially in their early iterations. This makes them less suitable as escorts, and more useful as point defence fighters. Can attack ships with glide bombing, but have limited bomb loads.

Light jet fighters can operate from non-jet capable carriers, but count as 1.5 aircraft against aircraft capacity.

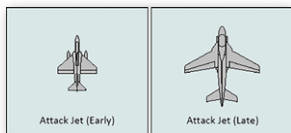
HEAVY JET FIGHTERS (HJF)



Heavier jet fighters with all-weather capability, often with two crew. They are longer ranged than light jet fighters and can carry a heavier bomb load. They can also carry medium anti-ship missiles.

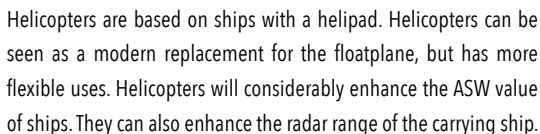
Carriers need to be designed as jet capable to operate heavy jet fighters. On carriers smaller than 40000 tons, heavy jet fighters will count as 1.5 aircraft against aircraft capacity.

JET ATTACK (JA)



Specialized attack aircraft with all-weather capability, often with two crew. Can carry a respectable bomb load and heavy anti-ship missiles.

HELICOPTERS (H)



There is also a role called "special squadron". This simulates an aggregate of anti-submarine, electronic warfare or rescue aircraft that will act as a modifier on various aspects of air combat in the game. Special squadrons will not perform missions themselves, but will automatically support other missions.

[illegible]

You can select the air formations you want to take part in the strike by checking the box for that formation. At the top of the screen you will see the estimated time for arrival at the target and the estimated time for landing.

Selecting coordinated strike will cause the air formations in the strike to keep together, which will improve their chances against defending fighters and AA fire. A coordinated strike will take longer time to form up.

Every ship carrying aircraft has a spotting value (representing a deckload of aircraft). This is the maximum size of strike that can be launched from the ship. If you assign more aircraft than the spotting value, it will be indicated in the strike screen, and you will not be able to launch the strike.

To change the number of aircraft taking part in a strike from a formation, right click the number value for that formation.

Aircraft can perform naval strikes, armed with AP bombs and torpedoes, or land strikes, armed with GP bombs (equivalent to HE shells). To change the type of strike, right click the strike type column value for that formation.

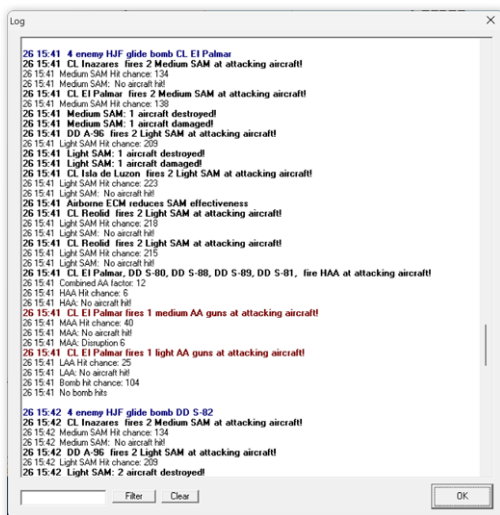
You can also select the loadout for each formation taking part. An aircraft with heavy bomb load will obviously carry more bombs, but that will reduce range and speed, and make it slightly more vulnerable in air combat. As a default, aircraft will select medium load, or torpedoes in a naval strike if they are capable of carrying them.

ANTI-AIRCRAFT FIRE

Ships will defend themselves with anti-aircraft guns against enemy air attack. Anti-aircraft guns are divided into heavy, medium and light. Heavy AA guns (this will be guns with a DP capability on ships) will fire first at enemy aircraft attacking a ship or friendly nearby ships.

Medium AA will fire at aircraft attacking their own ship before enemy aircraft release their ordnance. Light AA will fire at aircraft attacking their own ship either before or after enemy aircraft release their ordnance, depending on a random roll compared to the speed of the aircraft. The faster the aircraft is, the larger the chance that light AA will fire after the aircraft has dropped its ordnance. Thus, light AA guns will be of relatively less value the more aircraft technology advances.

Anti-Aircraft fire has four possible results. Aircraft can be shot down, damaged or made to abort their attack. AA fire also inflicts disruption on the attacking aircraft formation,



which lowers the hit chance of their attack. Note that light AA will always inflict disruption before aircraft attack, even if their fire takes effect after the aircraft have attacked.

Superstructure damage to ships will lower the number of effective anti-aircraft guns.

The accuracy of AA fire will be affected by

- ▲ Technology
- ▲ Number of AA directors (for medium and heavy AA) up to a maximum of 4 AA directors.
- ▲ Radar level
- ▲ Visibility
- ▲ Aircraft speed
- ▲ Crew quality of the ship

Bombing accuracy will be affected by:

- ▲ Technology
- ▲ Volume and accuracy of AA fire
- ▲ Visibility



- ▲ Target ship speed
- ▲ Target ship type
- ▲ Pilot experience
- ▲ Pilot fatigue

The same factors will influence hit rates for air dropped torpedoes, but in a slightly different manner.

AIRCRAFT ON SHIPS

Most regular ships can carry a small number of aircraft for scouting. These will initially be floatplanes, but in the late game, helicopters will be carried for this purpose. Ships specially designed as aircraft carriers have a flight deck to operate aircraft.

CATAPULTS AND OTHER AIRCRAFT ARRANGEMENTS

Floatplanes can take off from the sea, in which case the ship must stop, or can be launched from catapults.

Most ships can have catapults. It gives that ability for a ship to launch aircraft without stopping, but non-carriers must still slow down to recover aircraft.

Hangars provide protection from weather for floatplanes and helicopters and reduce the chances of the aircraft being inoperable at the start of a battle. A hangar is required if more than one helicopter is carried. Note: Aircraft carriers automatically have a hangar.

SEAPLANE CARRIERS

While all ships can carry a limited number of floatplanes, seaplane carriers have carrying and launching floatplanes as their main mission and can carry as many as will fit on board. They can even launch a strike of seaplanes, which can be useful in the period when naval aviation is in its infancy.

Seaplane carriers can be built once you develop the appropriate technology, which is one of the earliest in "Shipboard aircraft operation". Seaplane carriers can only carry floatplanes. Ships without catapults or a flight deck will need to stop to launch aircraft. Ships recovering seaplanes always need to slow down. Seaplane carriers are not restricted in the size of a strike by their spot number - effectively, the ocean is their flight deck - but larger strikes will take more time.

Seaplane carriers with a helipad will embark helicopters instead, effectively being helicopter carriers.

AIRCRAFT CARRIER CONSTRUCTION

Flight installations	
☐ Seaplane/helicopter hangar	☒ Angled flight deck
☒ Flight deck	☐ Helipad
☒ Deck edge lifts	
Air capacity 110	weight 27,200 29,320
Spot value 57	☒ Jet capable
Flight deck armour 3.5	weight 6,494
Hangar side armour 2.5	weight 2,088

Aircraft carriers are ships that have a flight deck. The type and size of the carriers you can build depends on the level of your "Shipboard aircraft operation" tech. After you reach level 3 "Flight Deck", you will be able to convert existing ships into light aircraft carriers

(CVL). With more tech advances you will be able to build purpose built CVLs, then convert

ships to full aircraft carriers (CV) and finally build purpose built CVs. The displacement limit for a purpose built aircraft carrier will be determined by the level of the "Shipboard aircraft operation" tech.

The aircraft capacity determines the number of aircraft that can be operated from a ship. CVLs are limited to no more than a capacity of 34 planes. There is no limit on CV capacity.

Carriers with aircraft capacity larger than 100 aircraft will have reduced aircraft operations efficiency as well as slightly increased cost. This is to reflect historical operational issues discovered by the US navy with very large carriers.

SPOT VALUE

An aircraft carriers has a spot value, which is the maximum number of aircraft that can be readied for a strike (not to be confused with spotting in the sense of seeing things). The spot value is normally half the aircraft capacity, but can be increased by equipment added to the carrier.

FLIGHT DECK CATAPULTS

Carriers do not need catapults to launch aircraft, but flight deck catapults increase the spot value of carriers.

Flight deck catapults also allows launching of CAP and search planes without the carrier having to turn into the wind. This might sound insignificant, but constant turns into the wind to launch and retrieve aircraft have a considerable impact on carrier practical mobility in battle.

Carriers below 10 000 tons must have catapults to launch aircraft with max speed above 120 knots at more than light load.

JET CAPABLE CARRIERS

A jet capable carrier is able to carry and operate heavy jet fighters and jet attack aircraft. This considerably increases the weight needed for each aircraft carried. This is to reflect the larger size of the aircraft and the added arrangements needed for operating jet aircraft, like strengthened decks and elevators, jet blast deflectors et cetera.

A ship must have a displacement of 40,000 tons or more, or have a displacement of 30,000 tons and steam catapults developed, to be made jet capable. On carriers below 40,000 tons, Heavy jet fighters and Jet attack aircraft will count as 1.5 times the number of aircraft against capacity.

You can make an existing carrier jet capable in a rebuild.

Light jet fighters can be operated from any carrier, but they will count as 1.5 times the number of aircraft against capacity, to reflect the added overhead of operating jet aircraft.

AIRCRAFT CARRIER SPECIAL ARMOUR

The flight deck may be armoured, which will provide some protection from plunging fire and bombs to any aircraft aboard.

Aircraft carriers can have hangar side armour provides protection from gunfire, bombs and near misses to aircraft aboard.

Both these types of armour have a considerable cost in weight, and will in practice reduce the number of aircraft that can be carried by the ship.

ANGLED FLIGHT DECK

An angled flight deck decreases the amount of time required to ready and spot aircraft. A carrier must have angled flight deck to operate heavy jet aircraft.

DECK EDGE LIFTS

Deck edge lifts decrease the amount of time required to ready and spot aircraft.

SLOW CARRIERS

Carriers with a speed below 24 knots will have their spot value reduced. This is because a headwind is needed to allow aircraft to take off from a carrier, especially if the much of the flight deck is taken up by spotted aircraft and the distance available for take-off is short.

LAND AIRBASES

You build airbases by in a manner similar to building coastal batteries, though you have to select a specific location within the possession to place the airbase. Airbases start with a capacity of 20 aircraft and can then be expanded in increments of 20, though this is limited by your current technology level. Expand an airbase by right clicking on the airbase in the "coastal fortifications" tab on the main screen, then select the 'expand airbase' menu item.

You can manage the squadrons and aircraft at airbases by selecting the button "air groups" on the main interface. This will open the "carrier air group management" screen where you can add or modify different types and quantities of squadrons to the base or to any carriers you have built. There is also a button to automatically assign aircraft to the base. Note that you only decide on the role of the aircraft in a squadron. The specific type of aircraft will be assigned automatically from your available aircraft (see aircraft types below).

New squadrons will initially have low experience, but experience will grow over time. Re-equipping a squadron or raising the number of planes drastically will lower experience. High combat losses will also lower experience.

FLOATPLANES AND AIRSHIPS

The player does not need to assign squadrons for ships carrying floatplanes or airship bases. This will be handled by the game. Appropriate squadrons of the latest type will be formed automatically.

AIRCRAFT TYPES

You manage your aircraft types using the button "aircraft types" on the main screen. This will bring up a list of all your available aircraft types. You can also look at estimates data for aircraft from other nations by using the compare list in the lower left of the aircraft types screen.

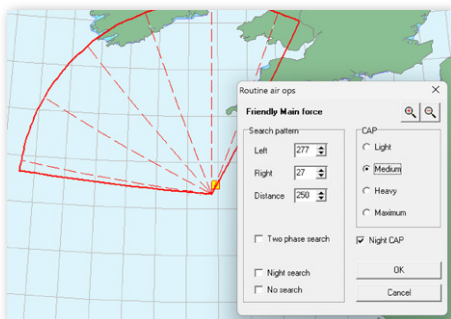
You can use the button, "Request proposals for new aircraft" to ask for new models. This allows you to select an aircraft role (fighter, dive bomber, etc.) and two aircraft traits

Type	OK/...	Mission	Base	Status	Time	Rema...
JA Gonzalez Gil-Pazo GP-263 B	1/0/0	N strike	CV Jumilla	Unready	-	0
JA Gonzalez Gil-Pazo GP-263(N)	14/4/0	None	CV Jumilla	Unready	-	0
Mixed	16/4/0	Special	CV Jumilla	Unready	-	0
LJF Construcciones Aeronauticas CASA 260 C	12/0/0	Escort	CV Jumilla	Unready	-	0
LJF Construcciones Aeronauticas CASA 260 B	1/0/0	None	CV Jumilla	Unready	-	0
HJF Hispano Aviacion HA-270(N)	11/4/3	N strike	CV Jumilla	Unready	-	0
LJF Construcciones Aeronauticas CASA 260 C	6/0/0	CAP	CV Jumilla	Flying	-	1321
LJF Construcciones Aeronauticas CASA 260 B	6/0/0	CAP	CV Jumilla	Flying	-	1304
LJF Construcciones Aeronauticas CASA 260 B	11/0/0	CAP	CV Jumilla	Flying	-	1312
JA Gonzalez Gil-Pazo GP-263 B	17/0/0	N strike	CV Jumilla	Landing	-	1410
LJF Construcciones Aeronauticas CASA 260 C	1/0/0	None	CV La Carolina	Unready	-	0
LJF Construcciones Aeronauticas CASA 260 C	12/0/0	None	CV La Carolina	Unready	-	0
HJF Hispano Aviacion HA-270	0/3/0	Escort	CV La Carolina	Unready	-	0
JA Gonzalez Gil-Pazo GP-263 B	0/3/0	N strike	CV La Carolina	Unready	-	0
JA Gonzalez Gil-Pazo GP-263 B(N)	0/5/0	N strike	CV La Carolina	Unready	-	0
Mixed	15/4/0	Special	CV La Carolina	Unready	-	0
LJF Construcciones Aeronauticas CASA 260 C	6/0/0	CAP	CV La Carolina	Flying	-	1235
LJF Construcciones Aeronauticas CASA 260 C	11/0/0	CAP	CV La Carolina	Flying	-	1200
LJF Construcciones Aeronauticas CASA 260 C	6/0/0	CAP	CV La Carolina	Flying	-	1183
HJF Hispano Aviacion HA-270	15/0/0	Escort	CV La Carolina	Readying: Ready	23	1787
JA Gonzalez Gil-Pazo GP-263 B	15/0/0	N strike	CV La Carolina	Readying: Ready	22	1335
JA Gonzalez Gil-Pazo GP-263 B(N)	13/0/0	N strike	CV La Carolina	Readying: Ready	22	1335

☒ Show recon
 ☒ Show CAP
 ☒ Show Unready
 ☒ Show land based
 Close

The “#” column shows planes in the listed squadrons as 12/3/0 in the format: operational planes / damaged planes / destroyed planes. The “Mission” column shows the mission each squadron has been assigned. The “Status” column shows what each squadron is doing at the moment: Unready, Ready for a strike, Spotting on deck, Spotted, Taking off, Attacking, Returning, Landing, or Striking below. It also shows amount of fuel remaining. This screen can be kept open while operating other controls and screens in a battle.

The button with one aircraft and a gear is called: ‘Handle CAP and search’. This opens a screen allowing you to set the size of your Combat Air Patrol (CAP = the number of

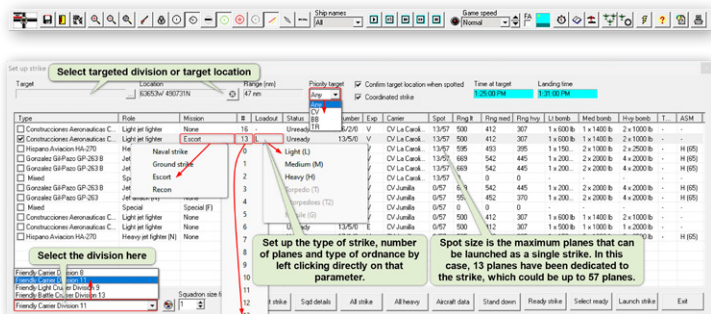


defending fighters that will patrol over their base or home ship) and the vectors used for search. You can set the search vectors for each division separately. You will probably want to visit this screen immediately upon starting a battle to set your search pattern and CAP as

these activities start up very rapidly. After setting the options on this screen the game handles all the air activities associated with search and CAP, including taking off and landing for CAP.

The lightning bolt button will open the screen for setting up an airstrike, more on that below.

PREPARING AND LAUNCHING AN AIRSTRIKE



The button with the lightning bolt is the "Airstrike" button and allows you to select squadrons to prepare and send on strikes.

You can either order an airstrike to ready planes and then launch them in one step, or first ready the planes and then send them out when a target is located. The second method is more risky, as it involves loaded and fuelled aircraft sitting on your carriers, but it also allows a faster strike once a target is located. It also requires more hands on control from the player.

To launch or ready a strike you use the "Set up Strike" screen. First select the originating division. Then select the squadrons to use for the strike by checking the boxes for each squadron on the left. When a squadron is selected it will set default settings for loadout and range. You can see the type of ordnance carried under the 'Loadout' column. The 'Number' column shows you operational / damaged / and destroyed planes in the squadron, while the number of planes assigned to this strike is shown in the '#' column.

To change the settings for loadout, range or number of participating aircraft, right click that value and select from the drop-down list.

A useful button is the "Auto select strike" button. This will automatically select aircraft for a strike with appropriate loadout and escort. It is often convenient to use the "Auto select strike" button and then adjust the details you might want to change.

You can set a target for a strike in two ways. Use the 'Target' drop down list to select a specific target that is known or has been scouted and reported (not always accurately). Alternately use the location button to pick any point on the map as your strike target.

If you have a target selected, you can now click on launch strike, and the selected squadrons will now disappear from the "Set up Strike" screen and will ready, spot on the flight deck (or airstrip) and then fly to the target.

As mentioned above, you can also ready planes even if no target is sighted. The selected squadrons will then ready but not launch until you launch them. Note that having readied aircraft on board will severely increase the vulnerability of aircraft carriers. Hits on carriers with loaded and fuelled aircraft are very likely to lead to devastating fires.

After selecting a target you click the 'Launch strike' button to launch your strike. It will then take about 20-30 minutes to spot and launch your strike (so take that into account when setting your target). The squadrons selected will disappear from the strike screen but you can follow their progress on the 'air formations' screen. Once the squadron is completely spotted the planes will take off and fly to the target.

When the planes arrive at the target they will launch an attack and then return to their base or carrier. If they cannot find a target to attack they will search the area for something to attack until they run low on fuel and then return to base. The status of these various activities can be monitored on the 'air formations' screen for each squadron. You will also see a small red icon

moving on the map that represents the approximate location of the squadron. Zoom in far enough and you can see small aircraft icons and a label with the type and number of planes in the strike (there will never be more than three aircraft icons, even if the strike is larger.



Like ships, aircraft icons are oversized on the map). You will get notifications on screen when an air attack is about to start and then notices in the 'Log' tab detailing the action.

SUPPLY OF TORPEDOES AND MISSILES ON AIRBASES AND CARRIERS

Some weapons carried by aircraft were bulky and in limited supply, especially on aircraft carriers but also on airbases. The weapons limited by this in game are anti-ship missiles, torpedoes and guided bombs. The number of missiles is also limited in the early missile age to reflect the relative scarcity of these new and complicated weapons.

Each time you ready a strike, the number of torpedoes and/or missiles on the carrier will be lowered by the number carried by the aircraft. If there are none left, the aircraft can still carry bombs.

Once it has taken off, a strike that does not find anything to attack will jettison the weapons load. This means that torpedoes and missiles carried will be lost.

Ready aircraft that have not been launched and are stood down will return their weapons to the store.

DAMAGE TO AIRCRAFT

Planes can be involved in air-to-air combat and can suffer losses to enemy AA. Planes will also suffer a fair amount of operational damage. You can monitor the damage status of your squadrons on the Air formations screen in the # column. Some damaged planes at bases or on a carrier will be automatically repaired or judged unreparable and marked destroyed.

AIR COMBAT

Defending fighters on Combat Air Patrol (CAP) will attempt to engage incoming strikes. The chance of CAP intercepting incoming aircraft is tied to technology, mainly radar and fighter direction technologies. In the 1930s it can be common for a strike to hit a target without being engaged by CAP, but later CAP can be quite deadly to strikes.

Escorting fighters will attempt to engage enemy CAP and prevent them attacking aircraft they are escorting. Providing a strike with an escort will considerably enhance its ability to withstand enemy CAP.

The air combat capabilities of an aircraft are based on its attributes, speed, firepower, manoeuvrability and toughness. These will also affect the ability of the aircraft to survive to AA fire.

Jet aircraft will be considerably more deadly than propeller aircraft. Also, propeller aircraft will be vulnerable to radar directed AA systems that are developed in the post 1940s period. Torpedo bombers in particular will be chewed out of the sky when attacking ships with modern AA systems.

CARRIERS IN BATTLE

Your carriers will turn into the wind and go to their highest speed when launching or landing planes. This occurs automatically and cannot be interfered with by the player. (You will need to be aware of wind direction and where these manoeuvres will take the carrier if it is near the enemy.)

Carrier divisions have some restrictions on the type of role they may be assigned. Carriers on Support role for carriers will send 1/2 of any fighters it has assigned to CAP to fly a distant CAP over the division being supported.

You will want to be careful about sending your airplanes on missions that force them to land at night. That will cause heavy operational losses. Inclement weather can totally shut down your air operations and it can change rapidly. The AI will send strikes against your ships so be wary of venturing close to enemy airbases or carriers.

At the conclusion of the battle there is detailed information available about aircraft losses and damage inflicted by aircraft.

FLOATPLANES AND HELICOPTERS

Floatplanes and later, helicopters, can be launched by any ships equipped with them. If a ship has catapults, the ship no longer stops to launch a floatplane." If a ship has

catapults, the ship need not stop to launch a floatplane. Ships without catapults need to stop to launch floatplanes, and also need calmer seas to do so. All ships must slow down to recover floatplanes.

Ships equipped with scout aircraft can be useful in battle, as floatplanes can scout and search out the enemy. If you have no carriers, they can at least often find the enemy. In a force with carriers, floatplanes can be used as scouts to save the carrier aircraft for airstrikes.

In the strategic turns, ships equipped with floatplanes or helicopters will be more effective as raiders. They will also be more effective at hunting raiders.

In preferences you can set what method to use for floatplane launch. On automatic, floatplanes will be launched according to the current search plan for the force, as selected by the player in the "Routine air ops" screen.

If "Ask" is selected, the player will be asked to confirm floatplane launches, but otherwise it works like automatic.

On manual, the player must launch all recon floatplanes or helicopters manually via the strike screen.

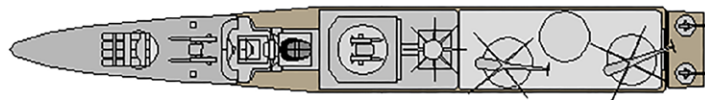
Ships will always ask before slowing down to recover floatplanes.

Land bases and aircraft carriers will always launch search planes automatically according to the current search plan for the force (which can be set to no search, if you want to preserve the aircraft for strike missions).

At the beginning of a battle scenario, aircraft on recon missions can be launched immediately without waiting for readying and spotting. This simulates that a search plan has been arranged before the scenario starts.

Floatplanes and helicopters can be sent on strikes, just as other aircraft, but the most common usage is for recon.

Helicopters carried on AV (helicopter carriers) will act in the same way as floatplanes in recon role, spreading out to cover the search pattern.



Helicopters on other ships will fly out to around 20000 yards and act as local recon. When radar equipped helicopters are developed, ships sighted by helicopters will be sighted by the owning ship as well, in effect extending the radar coverage of the owning ship and enabling missile fire.

Helicopters on recon missions will tend to be wary of approaching enemy ships too closely, as they can easily be shot down.

MISCELLANEOUS AIRCRAFT RELATED ITEMS

ELITE PILOT TRAINING

This gives an elite corps of well-trained pilots. However, the system is more effective in peacetime and hard to keep up in wartime.

PILOT FATIGUE

After pilots have flown two missions they will be fatigued. This is shown by an (F) in the squadron list in the setup strike screen. Pilot fatigue will affect air to air combat and attack accuracy. Fatigue is computed as an average for all pilots in the squadron. CAP and recon also generates fatigue, but at a lower rate than attack missions.

AIR SEA RESCUE

This increases the survival chances of pilots. It helps mitigate adverse effects on pilot experience from aircraft losses.

SUPER HEAVY AA SHELLS

Once these are developed, they can be used to give some AA capability to heavy (> 6 in) guns of ships. You select their use in the doctrine screen. Using super heavy AA shells will lower your available ammunition by 10%.

To represent the doubtful value of these shells in real life, their effectiveness is randomised and highly variable from game to game.

RADAR

Radar is divided into search radar and fire control radar. Search radar makes it possible to detect other ships in poor visibility. Radar detected ships will show as greenish outlines on the map. Early search radars are unreliable and prone to malfunctions. They are easily disabled by hits or even by own ships guns firing.

Fire control radar improves gunnery accuracy, and from level 3 will allow blind fire, where the target is only spotted by radar.

Once radar is invented, a nation will receive a number of radar sets per month. Radar sets will be automatically installed in ships with priority given to larger ships and ships in the active fleet. The player can manually install radar sets in ships, with the drawback that the ship will be unavailable the current turn.

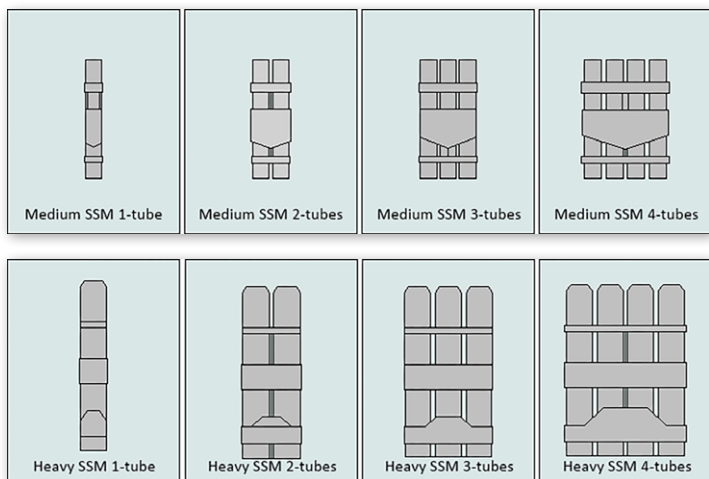
Note: The section below applies to missiles, which will only start to have an impact in the game from circa 1945. If you are a first timeplayer you can stop reading here and revisit the manual when your game reaches the time period when missiles appear.

MISSILES

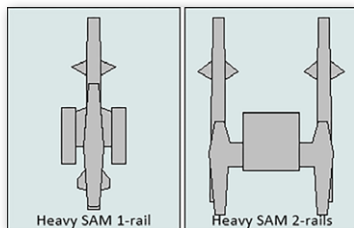
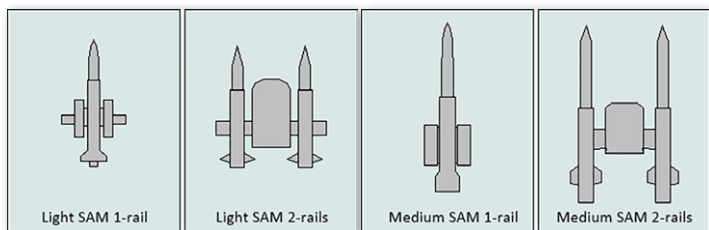
GENERAL

Missiles are of two general types, Anti-ship missiles and anti-aircraft missiles. Anti-ship missiles can be further divided into those launched from ships and those launched by aircraft. The following common abbreviations are used for missiles in RTW.

ASM Air to surface missile (fired from aircraft at ships)



SSM Surface to surface missile (fired from ships at ships)



SAM Surface to air missile (fired from ships or land bases at aircraft)

In the game, ASM and SSM work more or less in the same way, the main difference being the launch platform.

Missiles are further divided into three categories, depending on size and

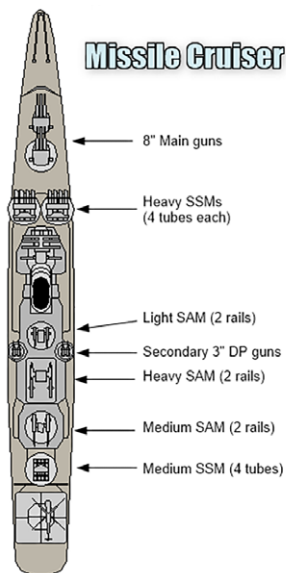
range, Light, Medium and Heavy, abbreviated L, M and H.

Thus a heavy surface to air missile would be abbreviated HSAM in game.

The exact classification of existing missiles can of course be subject to debate, but below are some examples of "typical" real world missiles that would correspond to the classifications used in game:

- ▲ Heavy SAM: Talos.
- ▲ Medium SAM: Terrier or Seaslug.
- ▲ Light SAM: Tartar, Seacat.
- ▲ Heavy ASM: He-293 or KS-1 Komet.
- ▲ Medium ASM: Exocet.
- ▲ Light ASM: Maverick.
- ▲ Heavy SSM: P-15 Termit.
- ▲ Medium SSM: Exocet. Harpoon
- ▲ Light SSM: Penguin or early Gabriel.

Heavy missiles have longer range and can be launched from farther away. They also cause more damage. On the other hand, they take up more space. Heavy ASM can only be launched from larger aircraft.



Medium anti-ship missiles are faster and somewhat more difficult to shoot down than heavy anti-ship missiles.

With the progression of technology, medium and heavy SAM missiles will get a secondary anti-surface capability. This can be advantageous, as SAM systems usually have plenty of reloads and relatively fast reload times, while SSM have limited numbers of reloads and are slow to reload. The range for SAM missiles in anti-surface role is limited to horizon range however, as these missiles did not have the ability to autonomously hit moving surface objects.

Designer's Note: Missile development in the real world included a number of projects in the later part of WW2. With the end of the war, the need for missiles capable of attacking heavily armoured warships disappeared and many projects were cancelled. In the RTW world, it is likely that armoured warships will continue to be present, and it is assumed that missile development would have felt more urgent than was historically the case. Therefore in RTW some technologies that never matured, like missile borne torpedoes or diving missiles, are available.

SHIP DESIGN AND MISSILES

In the design screen, you can add missile systems to your ships in much the same way as main turrets and torpedo mounts, using the same weapons positions. For AA missiles, facing is not important. SSM mounts are limited by facing. Note that heavy SSM in positions F and G will have a more forward facing firing arc than corresponding gun turrets.

Heavy SAM systems are very large and they and their guidance systems take up considerable space aboard ships. They have the advantage of very long range, and can engage and destroy aircraft that are not directly threatening the launch platform.

Note that SSM have a reasonable weight and do not have a very large topside cost. SAM missiles on the other hand, are quite costly in tonnage and use up lots of topside space, and require a large crew to operate them.

MISSILE STORAGE

Having large amounts of missiles in storage is expensive. To reflect this in game, once you reach the missile age, you can select between three levels of peacetime missile storage, minimum, adequate and plentiful, with varying levels of cost. On the two lower levels, there will be a risk of missile shortages during the first 18 months of a war.

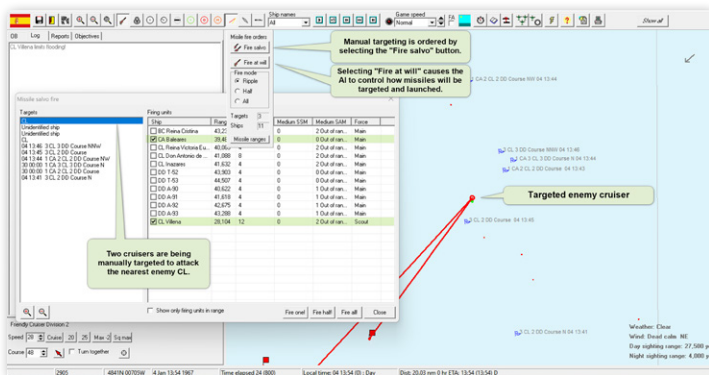
LAUNCH AND ANTI-AIRCRAFT SEQUENCE

The various types of AA systems and methods of attack will interact in a sequence when a ship is attacked by aircraft. In the table below you can see in which sequence various attack types and AA weapons fire. AA weapon systems marked with a * will have an effect against air attacks on all ships near the firing ship. Light and medium AA guns will only affect aircraft that attack their own ship.

The firing of AA missiles is completely automated, just like fire by AA guns.

SEQUENCE	TYPE OF AIR ATTACK	TYPE OF AA	AFFECTING FACTORS
1	Heavy ASM	Heavy SAM *	Radar / EW advantage / Missile tech
2	Medium ASM	Medium SAM *	Radar / EW advantage / Missile tech
3	Light ASM	Light SAM, Heavy AA *	Radar / EW advantage / Missile tech
4	Level bombing		
5	Unguided rockets	Medium AA	
6	Torpedo, Skip, Dive bombing	Light AA	Aircraft speed

USING ANTI-SHIP MISSILES IN BATTLE



You control the firing of anti-ship missiles from your fleet in the missile control panel, which can be shown by clicking the missile control button in the toolbar.

Your ships will hold fire with missiles in battle until you order missile fire at will. When missile fire at will is selected, ships that have missiles that bear will fire them at appropriate targets at their own initiative, similar to torpedo launches.

There is also a button for ordering your ships to fire a salvo of missiles. This will bring up a screen where you can select targets and firing platforms. All platforms in

theatre will be able to fire, depending on your technology level. Thus, a missile salvo can include missiles from surface ships, coastal missile batteries and missile submarines. Missile salvos can be launched both against sighted ships and against reports of more distant enemy ships, if the missiles have the range. The latter method is of course less precise and hits will depend on the reported ships being where they are predicted to be.

The missile fire orders determine the amount of missiles that will be fired. Ripple means single missiles will be fired. Half means that half of all loaded tubes will be fired. All means that all available missiles will be fired.

Your technology will determine how missiles can be fired. After cruise missiles and data link are researched, ships can fire missiles at targets observed by other friendly ships, provided they are in range. With improved data link, the accuracy and range of such missile fire is improved.

The firing of anti-aircraft missiles is completely automated, just like AA guns.

DAMAGE FROM MISSILE HITS

Anti-ship missiles are treated in game as very large HE shells with additional sensor, superstructure and fire damage being applied. Some missile types get SAP warheads once the technology is developed, to simulate the large shaped charge warheads used in some missiles.

SPECIAL MISSILES

Some specialized missiles are included in the game based on technologies that were in the experimental stage in the early missile age but eventually deemed not necessary, as large armoured warships became rare as targets. Their effects are somewhat irregular.

The missile torpedo is modelled on the US Petrel weapon. It was an aerial standoff torpedo that was carried by a missile that then dropped the torpedo when close to the target. It can only be launched by MB and PB aircraft in game.

The diving missile is modelled on the Swedish Rb 302/303. It was similar in concept to the bomb torpedo in that it was intended to dive at the last moment and continue through the water to hit the target below the armour. Damage effects are as for a light torpedo.

AA GUNS IN THE MISSILE AGE

With technological advances, medium AA guns can be upgraded to radar controlled MAA. These will have much better capabilities against jet aircraft, and some ability to engage incoming missiles. They use much more space than earlier MAA, but they will be worth it. Old style MAA is not very effective against jet aircraft and ineffective against missiles.

When radar directed MAA becomes available, large numbers of MAA are not needed. More than 4 radar directed MAA on a ship will give diminishing returns, and more than 8 is (more or less) redundant.

Similarly, LAA can be upgraded to Close in weapons systems (CIWS) that have an ability to shoot down incoming missiles. These also use much more space than previous



LAA, but by this time the old WW2 style massive LAA batteries will be of limited effectiveness.

Like radar directed MAA, CIWS are not needed in large numbers. More than 6 on a ship will tend to be redundant, and 4 will usually do the job.

QUESTIONS AND ANSWERS (Q&A)

How do I select torpedo type for my ships?

Torpedo quality is dependent on research. Your ships will always have the latest torpedoes that you have developed, and old ships will be automatically upgraded. This means that as heavier torpedoes are introduced, the weight of torpedo tube installations go up with time.

Why is there no oil in Borneo/Libya wherever?

The oil fields in the game are those that were in or came into production in the early years of the 20th century. Many well-known oilfields today were not discovered at the time of the game.

Why is not Grenada/Easter Island/Bali a possession in the game?

The possessions in the game are there to represent important pieces of territory for naval purposes or colonies that needed some form of naval presence. However, there is no attempt to include every island or minor colony in the game. That would just clutter up the map to no purpose, so a selection has been made where those that figured prominently one way or another has been included.

How do I break a blockade?

Blockade status depends on the force ratio in a nations build area. You must whittle down enemy strength or add more forces in your home area until the force ratio has changed enough.