Tutorial Description

Hello and welcome to the Anti-Submarine Tutorial.

This is a tutorial designed to teach players the fundamentals of anti-submarine warfare operations in CMANO.

In this tutorial, the following topics will be covered:

- Anti-submarine sensors.
- Anti-submarine weapons.
- Searching for a submarine with surface vessels.
- Searching for a submarine with helicopters/airplanes.
- Engaging a submarine.

Created by Andrea D., a.k.a. SirAndrew

Briefing

Welcome to the Anti-Submarine Tutorial.

In this scenario you will be guided through the following topics:

- Anti-submarine sensors.
- Anti-submarine weapons.
- Searching for a submarine with surface vessels.
- Searching for a submarine with helicopters/airplanes.
- Engaging a submarine.

In this scenario pop-ups will appear with important messages. You can find them in the document that comes with the tutorial or you can open the message history in a second window by pressing Ctrl+Shift+M and scrolling to the appropriate message.

Note: To successfully complete this scenario, you will need to use the knowledge gained in the previous tutorials, in particular **Flight Tutorial 1 - Basic Manual Flight Tutorial**, **Flight Tutorial 2 - Unattended Flight** and Apache85's **Submarine Tutorials** (at least the 4 **Basic Submarine Operations** tutorials).

Message 1

Good morning!

Today you will impersonate a US Navy Commander tasked with finding and sinking the North Korean Sinpo SSB.

Intelligence told us that North Korea is sending the new Sinpo Ballistic Missile Submarine to conduct an offensive patrol in the Pacific and possibly a surprise nuclear attack against Japanese cities.

We think that the Sinpo will likely pass through the Ryukyu Islands and we are tasked to patrol between the Island of Osumi and Southern Japan, find the SSB and sink it.

The flagship of the operation is DDG-113 John Finn (an Arleigh Burke Flight IIA) with 2 MH-60R Seahawk. Attached to your command are also 2 japanese P-3C Orion Update III and 4 japanese SH-60K Seahawk based at Kanoya AB.

The Japanese don't want to alert the press and insist that their airplanes and helicopters operate only by day, so until sunrise you will be alone out there.

Start by selecting your ship and planning a ruote towards the west. Set the speed to Creep (5 kts).

With a speed of 5 knots the sonar will work better, but that will make transit much slower.

Surface ships usually transit at high speed, but when searching for a submarine is always better to reduce speed (and at least avoid cavitation) or use Sprint and Drift throttling.

Note: When the ship is going fast and thus propellers turn quickly, areas of low pressure are created in the water surrounding the propeller blades. The lowering of pressure causes the water to boil without heating up, and produces bubbles of steam that then implode with a loud noise.

This is called cavitation and the noise produced will give away your presence and position to great distances (this is why submarines always avoid cavitation, and should be avoided by ships on ASW missions).

Plus, the bubbles will damage (over long times, this is not implemented in the game) propellers and other materials and, by producing friction and turbolence, will reduce efficiency.

Message 2

Now let's take a look at your ship capabilities.

Select the ship, click on the blue hyperlink text "DDG 113 John Finn [Arleigh Burke Flight IIA Restart]" in the right side Unit Status bar and the Database will open.

Check the "SENSORS/EW" section to find out the systems on the Arleigh Burke.

To find submarines we need a sonar, and there are two sonar systems on the USS John Finn.

The AN/SQS-53C(V)1 is a Hull Active/Passive sonar and it's a system operating in the LF band and with a 40nm range.

The TB-37/U MFTA instead is a Passive Towed Array sonar operating in the VLF band and with a nominal range of 70nm.

Note that the hull sonar can provide search Range, Speed and Heading Information as well as the general Underwater Search capability, while the towed array can only provide Underwater Search.

That means that precise info can be delivered from the hull sonar, while using the TASS heading, speed, depth and range of a contact all have to be derived from TMA (target motion analysis) over time.

The hull sonar will search for contacts mainly above the layer (however you can detect very close or very noisy contacts under the layer with it), while the towed array will be trailed beneath the layer (when the water is deep enough to deploy it).

Note 1: Sonar performance is influenced by speed: slower speeds reduce the noise created by the ship and increase the range at which a detection can be made.

Note 2: Active sonar is more precise than Passive sonar, but Passive sonar is undetectable, while Active sonar can be detected by other platforms at up to twice its effective range

Note 3: The layer (or thermocline) is the area between the warm surface water and the deep and cold (around 0 degrees Celsius) water. Remember that sea water freezes at -2.3 degrees Celsius.
Sound can travel long distances under water, but it can't easily cross the thermocline.

You can get precise information on the thermocline in CMANO by looking at the information box. Just below the USS John Finn, the layer is from -322ft to -548ft and has a strength of 0.53.

Message 3
Finding a submarine is just a part of the ASW work.
To better know the weapons you can use to sink the Sinpo SSB, select the DDG 113 John Finn and open the DB and look at "MOUNTS/STORES/WEAPONS".
You will find that the only weapons available to engage submarines are the Mk54 LHT Mod 0 torpedo loaded on the 2 324mm Mk32 Triple Torpedo Tubes and the RUM-139C VLA [Mk 54] in the Mk41 VLS.
Both systems use the Mk54 torpedo to engage submarines.
The Mk54 Mod 0 has a maximum speed of 45 kts, a practical range of 4nm and a kinematic range (the maximum range) of 6nm and a 44kg explosive head. Additionally it has Search Pattern, BOL and Re-Attack Capabilities and can engage targets down to -1510ft.

When launched by the Mk32 tubes (that are mounted on the sides of the ship and thus have limited firing arcs), the Mk54 will therefore have a 4nm range.
The RUM-139C VLA, instead, has a 9nm range and, due to the 300 kts rocket booster, it's a fast way to engage submarines at a standoff range.

Yet, the more powerful ASW weapon of the ship are the 2 MH-60R Seahawk helicopters.
Presently, they are loaded with Mk54 Mod 0 torpedoes, but Mk46 NEARTIP and Mk50 Barracuda are also available.
They also have AN/SSQ-53F DIFAR Passive Sonobuoys, AN/SSQ-62E DICASS Active Sonobuoys and the AN/AQS-22 ALFS Dipping Sonar (a sonar that is deployed in the water by a hovering helicopter).
With a maximum speed of 155kts and the ability to stay more than 175 minutes on patrol, they give the Arleigh Burke a great standoff ASW capability.

Message 4
We have detected a submerged contact!
We know it's a Convergence Zone (CZ) contact because the area of uncertainty around it starts at the first convergence zone and extends out to the maximum sonar range along the estimated bearing.
Direct path contacts will only appear between your ship and the first CZ.

Convergence Zones are ring shaped areas surrounding a sonar receiver where sound can be detected as it travels in a curved path through water.
CZs are at regular intervals of between 40nm in the poles and 20nm in the equator, usually have a thickness of 5nm and only occur in deep water.

You can get precise information on Convergence Zones in CMANO by looking at the information box. In this area CZs are at 27-54-81-108nm.

Even if the area of uncertainty extends to zones of the ocean that are out of the CZs rings, a CZ contact means that the target is inside one of the Converge Zones.
To give more time to the sonar specialists to gather data on the contact, turn the ship perpendicular to the target to slow down closure (analyzing a contact longer will give you better data on it), then when you lose sonar contact return to your previous course.

Message 5
We were expecting the Sinpo, but we found the Type 033 Romeo that is escorting it.
We are authorized to engage it as it's part of the SSB mission.

By clicking on the contact, you can find that the Romeo was detected using the towed array but not the bow sonar. This may be a consequence of the submarine cruising below the thermocline (this means there was no reduction of acoustic strength between the sub and sensor due to the layer) or that the TASS operates in the VLF band and the hull sonar in the LF band (select the Romeo, then open the DB and check the "SIGNATURES" section and you will find out that it has a base signature of 115dB in the VLF band and only 85,5dB in the LF band).

Therefore, even if it's a diesel-eletric submarine, the Romeo is noisy and we found it easily. Yet, as it's moving slowly and under the layer, a ship without a towed array wouldn't have been able to find it.

From the DB we know that a North Korean Romeo is armed only with Yu-1 Straight Runner Torpedoes with a range of 3nm and so it shouldn't be able to attack us yet, but it's always better to destroy an enemy submarine as fast as possible!
Whatever weapon you decide to use, sink it!

Note 1: An helicopter assigned to an ASW mission will automatically launch sonobuoys and deploy the dipping sonar.
If you want to launch the sonobuoys manually, select the helicopter and open the "Unit Orders" drop-down menu (or right-click on it), select "ASW-Specific Actions" and then choose the type of the sonobuoy (active or passive) and if you want to deploy it above or below the layer.
For the dipping sonar, repeat this process but instead select "Deploy Dipping Sonar" in the "ASW-Specific Actions" sub-menu (the shortcut is Shift + D).

Note 2: If you want to engage a contact manually, you can do that by selecting the unit, then key F1 and then click on the enemy unit you want to attack.
If you press Shift + F1, you can manually allocate the weapons that you want to use, and by pressing Ctrl + F1 you will order a BOL attack (attacking a fixed point in the area, instead of attacking directly the enemy unit. This is useful if you want to attack a contact that has an area of uncertainty around it).
ASW helicopter should be able to drop torpedoes from an height of no more than 1000 ft.

Message 6

Well done! The Romeo has been sunk!

Yet, it was only the escort. We still haven't found the Sinpo and now we have a shallow water area ahead of us, where we won't be able to use the towed array.

Fortunately, it's morning and the Japanese land-based air assets should be now available.

There is an ASW Mission already planned, so all you need to do is open the Mission Editor window (key F11 or select the "Missions + Ref. Points" drop-down menu) and add the 2 P-3C Orion and the 4 SH-60K Seahawk to the mission.

You can change the various mission parameters, but the default settings are good and you shouldn't change them.

Instead, you should change the EMCON settings of the mission.

By default, ASW mission have the Rules of Engagement for sub-surface contacts set to FREE, fire at any contact, but in this way your units may be end up engaging Biologics (fish, wales, orcas etc) or neutral submarines.

Change this setting to TIGHT (firing only on known enemy units) or HOLD (requires the player to manually order to fire).

Message 7

Contact! We just found the Sinpo!

It's moving slowly under the layer but it's a noisy boat, particularly for a Ballistic Missile submarine, even if it's a diesel-electric boat.

Now sunk it before it can launch a KN-11 SLBM!

Message 8

Well done! You have successfully destroyed both the Romeo and the Sinpo North Korean submarines!

You are now ready to hunt submarines in CMANO!