

Mine Sweeping

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Anti-ship warfare

Missile armed helicopters can sink war, two Argentinean frigates were disabled in extensive littoral conditions. Helicopters. Torpedoes are also used against ships.

Search and Rescue

Helicopters are often used to fish sailors and downed pilots from the sea. Found familiar?

Detection

ABSTRACT

This document discusses the characteristics of modern helicopter design, use, and tactics as may be relevant to a computer simulation. It is meant to be a resource document and not a design proposal.

Supply

Used at sea for supplying ships and island bases, particularly where elements of supplies make ship to ship techniques impractical.

Peacetime Uses**Passenger Transport**

Possible topics: Carrying VIP's, such as politicians, Rock stars. Running a short haul passenger service, flying the copter where time is important but safety is critical.

Rescue Operations

Specialize in spotting victims of floods, earthquakes. Also good for finding people in isolated, rugged areas and bringing them out. Used by Coast Guard to rescue people in floundering boats, and to bring aid to boats in rough seas.

Construction

Putting steeples on churches, putting in phone/power poles in inaccessible locations (in coordination with ground crews).

Exploration

Used to supply and transport and in general aid explorers, particularly in arctic/antarctic regions.

Firefighting

Can spot fires developing, and drop flame retardant more accurately than fixed wing aircraft.

Naval Military Use**ASW - Anti-Submarine Warfare**

Used both to locate and to destroy subs. Typical weapons used are 2-4 homing torpedoes or depth charges. Copters can easily outrun subs, and can trail magnetic and acoustical detection gear to get a fix on subs without giving warning of their approach.

Mine Sweeping

Towing a barge that has the magnetic properties of a ship's hull, helicopters can set off mines from a safe distance.

Anti-ship warfare

Missile armed helicopters can sink ships. In the Falkland war, two Argentinian frigates were disabled in extreme blizzard conditions by British helicopters. Torpedos are also used against ships.

Search and Rescue

Helicopters are often used to fish sailors and downed pilots from the sea. Sound familiar?

Detection

Helicopters, particularly those operating off of carriers that cannot launch fixed wing craft, can form an additional line of defense by providing long range detection of enemy craft and missiles. In this role they may be equipped with air to air missiles to intercept attacking planes.

Supply

Helicopters are often used at sea for supplying ships and island bases, particularly where elements of speed or weight of supplies makes ship to ship techniques impractical.

Battlefield Military Use

Troop Transport

In Vietnam in particular, helicopters played a major part in placing troops wherever the fight is, even behind enemy lines or miles away in otherwise inaccessible territory. These helicopters are usually only armed with machine guns fired through the side doors and not controllable by the pilot. Helicopters were also used to pick up troops, often under fire. If a helicopter was disabled it was often able to land safely, and another helicopter was dispatched to pick up the crew. The chief dangers in troop transport are from ground fire, collision with trees, and other helicopters.

Medevac

As we all know from MASH, helicopters are the main way that wounded soldiers are brought back from the front lines.

Supply Missions

As with naval helicopters, they are often used to supply troops in a variety of locations.

Anti-Aircraft

When armed with air to air missiles, helicopters have the capability of destroying other helicopters and airplanes. Guns are also used, but are less effective and have much shorter ranges. As the use of helicopters in battle situations becomes more frequent, the U.S.S.R. helicopters have started to carry air to air missiles along with their usual antitank and antipersonnel weapons.

Anti-Tank

The modern helicopter has recently become the most effective anti-tank weapon in service. A variety of air to ground missiles, guided by wire, radar, infra-red (heat seeking), and laser sensors have amazingly good chances of destroying even the best armored vehicles. Recent innovations have made it possible for missiles to be fired at targets out of sight of the firing craft. In Europe, helicopters are becoming increasingly important as an answer to the Warsaw Pact's numerical superiority in armored fighting vehicles (I've heard figures as high as 3 to 1). Some of

the most interesting situations (in a game anyway) involve helicopters fighting tanks and other ground forces. The ground forces can fight back with guns and missiles as well.

Ground Targets

Using rockets or air to ground missiles, helicopters can destroy targets such as buildings, grounded aircraft, supply and ammunition storage, etc. This capability is particularly useful when combined with the helicopter's ability to fly through the treetops and carry troops as well.

Controls

Overview

The helicopter is flown with two sticks (called the collective and the cyclic) and two pedals. In most helicopters the weapons and defenses are controlled by a gunner and not the pilot, but fast single seat helicopters will soon be out that give the pilot full control. Modern controls include sensors in the helmet to let the pilot fire where he is looking, and computer aided control to automatically compensate for the otherwise conflicting forces generated when any single control is used.

Collective

The collective stick is controlled by your left hand. Pulling back on the stick increases the pitch of all the blades in the rotor collectively, causing the helicopter to rise. However, this takes more power, and you have to twist the throttle, at the end of the collective stick, to increase power or the blades (also called wings) will slow and you will sink back down. Pushing forward and down on the collective has the reverse effect.

Pedals (Tail Rotor)

The left and right pedals respectively increase and decrease the pitch on the tail rotor. Pushing on the left pedal will make the nose of the helicopter go left. The tail rotor compensates for the tendency of the body of the copter to rotate clockwise as seen from above, in response to the counterclockwise rotation of the main blades. Because of this, turning right takes less power than left, and the throttle must be used to compensate for turns as well as up and down motion. To further complicate things, when giving more power to the throttle and pulling back on the collective to go up, the increased rotation of the main rotor tends to swing the helicopter right unless the pedals compensate. Automatic devices to compensate for these complex interrelationships are available in the newest helicopters.

Cyclic

The main stick, mounted between the legs of the pilot, is called the cyclic. It essentially controls the attitude of the disk that the rotor blades spin in, tilting it in the direction the stick is moved. The helicopter then flies in that direction, tilting towards the direction of flight.

Other controls

Some of the other things controlled by the pilot include radio switches, winches and cable releases, and ignition. The switches and buttons for these are located on the control panel, the sticks, and the floor of the aircraft.

Weapons

Guidance

The various weapons systems have different methods of finding their targets, ranging from simply shooting guns or rockets when pointing towards the target without any after-shooting guidance, through wire guided missiles that are controlled with a wire trailed behind them to the

copter, up through homing missiles with various detection gear.

Homing missiles may home in with radar, built-in TV cameras, infra-red heat sources, or be laser guided (more on this later). Missiles are the most generally effective and hence most common main armament, with most helicopters carrying cannon or machine guns of some sort for close range fighting.

Laser guided missiles need to have a target "painted" with a laser beam. Some of the newest helicopters have laser designators that provide the beam. Ground troops or other helicopters can also designate targets with lasers, letting the missiles come from elsewhere. The most potent weapon and guidance combination involves mast mounted laser designators. Helicopters can hover behind ridges, unseen, with only a thin mast sticking up from the center of the main rotor. On the mast is a combination periscope/laser designator. This is used to spot a target (a tank for instance) and shine a laser beam on it. Then a laser guided missile is fired, either from the helicopter behind the ridge, or perhaps from another location out of sight of the target. The missile closes in and destroys the target without warning.

Ranges

At sea, helicopters are likely to engage their targets at long range. Anti-ship missiles are large, and can be fire from many miles away. In most battlefields, helicopters are used at much closer ranges, 3-4 kilometers and closer. The various machine guns are effective up to about 800-1200 meters, and the cannon can fire out to two kilometers. Missiles have much longer ranges, allowing the helicopter to "stand off" and fire from distances of two to as much as five kilometers, assuming the target can be seen. Rockets have a range of three or four kilometers, but like missiles cannot be fired at point-blank targets within a few hundred meters. Air to Air missiles and Air to Sea missiles have longer ranges in general than Air to Ground missiles, and cannot be used interchangeably due to the vast difference in speed and amount of armor between tanks, planes, and ships.

Effects

Gun hits are often not fatal. Many helicopters are well armored against small arms fire, and it takes lucky shots or high calibers (heavy machine guns for example) to hurt them. Missile and rocket attacks are usually fatal if they hit, and the chance of their hitting depends on such factors as whether the target is moving, if it is actively seeking cover, what terrain it is in, and if it has anti-detection gear of the appropriate type in operation. As far as the helicopter's effects on ground units, tanks and some armored personnel carriers (APC's) are tough enough to need direct hits from missiles or rockets to destroy them. Helicopters armed with anti-tank guided missiles, particularly using the laser guidance method mentioned earlier, are perhaps the most effective anti-tank weapon existing today.

Tactics

Uses

The tactics used in battles involving helicopters depends largely on the use they are being put to. Extensive tactics using helicopter assaults were developed in Vietnam. NATO expects to use helicopters in the event of a Soviet/Warsaw Pact push with their masses of armored vehicles into the heart of West Germany. Israel uses them in a number of roles in their desert warfare. In each of these cases there are many ways to use helicopters, some more effective than others.

Nap of Earth flight (NOE)

This tactic involves having the helicopters fly only a few feet off the ground, taking advantage of the natural cover of the terrain as if it were a ground vehicle. Helicopters are more vulnerable than ground units because of the need to avoid too much armor so they can fly. Flying at NOE lets them approach the battlefield without being detected. Flying over rivers and streams is also a quick and fairly safe way to maneuver.

Spotting teams

Most helicopters attack in combination with other friendly forces - either other helicopters or various ground troops. Frequently some of these other forces will get close to the enemy (or let them approach), using cover to remain undetected, and direct the fire of the helicopter which uses its maneuverability and range to remain safe from attack.

Pop-up Attack

One very powerful maneuver is the Pop-up. The helicopter comes forward at NOE, and waits behind cover - trees, or a ridge. Another unit, either a helicopter or ground unit, spots an enemy and radios their position to the attacking helicopter, which then pops up 30 feet or so, fires a missile or gun, and drops back down behind the cover, all in a few seconds. With luck, the helicopter will be back in cover before the enemy unit even sees it.

Fancy Flying

There are of course many "tricks" possible using the versatile controls of the helicopter. In Vietnam, where many landings were made in small clearings, often the pilots had to push the machines to the limit to get in and out safely. Although helicopters can take off straight up, once they are travelling forward at about 30 miles per hour they gain something called "translational lift", that provides extra lift that may be needed to fly if heavily loaded. Being able to accelerate to that speed in a small clearing was often needed in the jungles. Translational lift is based on the rotors operating in clear air, instead of the turbulent downwash underneath them. In many cases heavily loaded helicopters take off and land on runways to use this effect.

Models of Helicopters

Current US Battlefield Helicopters

The standby of the Vietnam War was the UH-1, or Huey. One model was used for troop transit, another, the Cobra, for Gunships. The Huey had a crew of four, two pilots and two gunners. They could also hold six troops. Hueys are still in use, but the new AH-64 Apache is the latest (and most expensive, at \$10 million apiece) helicopter in the front lines. Other notable models are the OH-58A Kiowa Scout copter, the Chinook heavy lift copter (carries 44 troops), and the Hughes 500 Defender, sold to many other countries, notably Israel, and new versions have mast-mounted sights enabling laser designators to work from cover.

Future US Battlefield Helicopters

A new light one-man helicopter is being developed for use in the early 1990's in both an attack and scout version. It will have the latest in electronics and optics, and be able to fire laser guided missiles at targets it designates, all from behind cover. It's designation is now LHX for light helicopter experimental.

British Helicopters

The British have two notable helicopters, the Sea King, a larger, versatile helicopter used by many navies of the world for many duties, and the Lynx, probably the most maneuverable combat helicopter in existence. The Lynx can loop and roll repeatedly, fly backwards at 90 mph, and carries much of the latest weapons and detection gear. It is used for both naval and army missions and would be a good choice to model in a game (except for its rolling and looping ability!).

Russian Helicopters

Russia has one small naval attack helicopter variety, know in its NATO designation as "Hormone". It has only one army copter as well, in several weapons and sighting varieties, know as "Hind". The Hind E and Hind F varieties are the latest, and compare fairly evenly with the Apache. US thermal imaging gear (infrared sights and detectors) are much better than Warsaw

Pact devices, and can give a significant advantage in obscured battle conditions.

Possible Games

Night Games

One way to do a game would be to use Loren's 3D routines to draw arrays of lights simulating night attack. Infrared searchlights and detectors could be simulated by rendering only a small circle of landscape, giving a nice spotlight effect.

Naval Escort

The most promising idea I've come up with is flying a helicopter off of a small cargo ship. The ship is on a supply mission in wartime, and you are its only defense. You will fly on a variety of missions as the ship sails to it's destination, detecting and destroying enemy subs and ships, rescuing occasional friendly pilots, scouting the way, and fighting enemy helicopters. The landscape would be open sea and sky, with the 3D routines used to render realistically spaced waves and your landing deck, with Charlie's scaling algorithms to draw the ships and other helicopters.

Other topics

That's why we're having a meeting...

Passenger Transport

Possible topics: Carrying VIP's and/or politicians. Quick start. Running a short haul passenger service, flying the routes where there is no airport but where it is critical.

Rescue Operations

Speakers in remote areas of forest, mountains. Also good for finding people in hard-to-reach, rugged areas and bringing them out. Good for rescue of people in hazardous areas, and in trying to get to rough areas.

Construction

Putting together or churches, getting in powerlines, poles in mountainous regions (in cooperation with ground crews).

Exploration

Used to supply and transport and to search for resources, particularly in arctic/antarctic regions.

Fighting

Can spot fire developing, and drop bomb payloads more accurately than fixed wing aircraft.

Naval Military Use

ASW - Anti-Submarine Warfare

Used both to locate and to destroy subs. Typical weapons used are 24" homing torpedoes or depth charges. Can carry sonar, magnetic mine, and sea trail magnets and electronic detection gear to get a fix on subs without giving warning of their approach.