Manual


Search & Rescue
NOW IN STORES
BK-117
RESCUE
COASTAL HEROES
EVERYONE
E
CONTENT RATED BY
ESRB
Windows® 98/Me/XP

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INTRODUCTION

Thank you for purchasing Vietnam Med Evac!

You are now the proud owner of the most realistic Med Evac helicopter simulation on the market.

Vietnam Med Evac is an offspring of InterActive Vision's highly successful Search And Rescue series.

Being a simulator, Vietnam Med Evac intends to give you a realistic challenge in your role as a pilot. The flight model, weather, and object physics are very detailed, and will, combined with the stunning graphics, have you fully immersed in handling and flying the helicopter. Many hours will be spent improving pilot skills and flight control, and this will, in itself, be a very entertaining part of the program.

Enjoy!

GETTING STARTED

System Requirements

To be able to play Vietnam Med Evac, your computer will have to meet the following minimum requirements:

Processor ..... Pentium III 800 MHz
Internal Memory ..... 64 MB
Graphics Card ..... 32 MB 3D Accelerated Card
Sound Card ..... Direct X Compatible Sound Card
Hard disc space ..... 1 GB
Operating System ..... Windows 98/Me/XP
Controllers ..... Keyboard

For optimum game performance and playability, we recommend that your computer specifications be as follows (or better):

Processor ..... Pentium III 800 MHz
Internal Memory ..... 256 MB
Graphics Card ..... 64 MB 3D Accelerated Card
Sound Card ..... Direct X Compatible Sound card
Hard disc space ..... 1 GB
Operating System ..... Windows 98/Me/XP
Controllers ..... Joystick, Pedals and Throttle stick

Running the Vietnam Med Evac CD

Installing the game

Vietnam Med Evac supports the AutoRun function. If your computer has this activated, the install start-up box should appear automatically after you have inserted the CD.

If AutoRun is not activated on your computer, you need to do the following:

1. Double-click on the icon on your desktop (usually called "My computer").

2. Find the icon for the CD-ROM drive (in the folder you just opened) and double-click on it.

If AutoRun is active on your computer, you will be presented with the Start-up box. Inside, you will see several buttons and drop down boxes, although only three will be available to you on your first run:

Run Search And Rescue: Vietnam Med-Evac – If you have previously installed the game, this box will be selectable, allowing you to launch straight into the program without using the Start menu, or desktop icons.

Install Game – This will begin the process of installing Vietnam Med-evac on your system. Once you have agreed to the terms of the License Agreement, simply follow the instructions as they appear on your screen. The game will then begin the installation from CD to hard disk. Vietnam Med-evac needs to transfer a large amount of data, so this process could take some time.

Install Direct X 8.1 – Direct X is a series of codec's developed by Microsoft to increase the power and effectiveness of your sound and video hardware. If you already have Direct X installed on your system, you may skip this process. However, if the software is not present on your system, you should select this option, and follow the on-screen instructions. Setup will require that you restart your computer for the changes to take effect.

View Read Me – The read me file is a text document, provided by the developer, which outlines any last minute changes, or other information pertinent to your game play experience.

Quit – This will cancel the install process, and bring you back into the Windows environment.

Quick Start Flight Manual

This section has been included to help you get through the start-up procedures and into the air without having to read through the entire manual first. Of course, we recommend you do this later on, but we also know that you will want to get right into the action.

Navigating Through the Front-End Menus

Vietnam Med Evac has an easy-to-use and intuitive menu system. It will be described in more detail later, but in this section you will learn just enough to be able to set up a mission and get started. On the main screen, you will see four buttons: Single mission, Campaign, Options and Exit.
The Exit button will let you exit back to your Windows desktop.

The Options button gives you access to various control, sound and graphics settings. The most important thing for you to begin with will be the switch setting at the top of the screen called controls. This will let you choose whether you want to fly with keyboard, joystick, or other game controllers.

The Single Mission button takes you to a menu where you can select which type of mission you want to play. This is the fastest way to get started.
The Campaign button opens the campaign system in the game. Here, you can create a new pilot, and start a career as a Med Evac pilot during the Vietnam War.

We suggest you start by playing a few single missions. Later, when you have familiarized yourself with the interface and controls, you can try a campaign session.

If this is your first flight with Vietnam Med Evac, you should not concern yourself too much with the choice of mission. Just click through the menus and make any choice you like. The most important thing right now is that you get into the game itself.

Helicopter Simulation Physic Modes

There are two ways to fly the helicopter in Vietnam Med Evac, Easy- or Realistic-mode. When you go through the steps of either the Single mission or the Campaign setup screen, you will be able to choose between these modes.

If you have no Joystick, we suggest that you use the Easy physics mode. The Realistic mode is best used with a Joystick, as it requires better and more precise control of the cyclic stick (flight stick).

Flying the Helicopter

When you enter the game, you will either be stationary at the base, or hovering in the air (depending on the choices you made during the front-end menu selections).

Note: If you are stationary on the base, you will need to start the engines. Pressing "R" once, followed by "E" and "T" twice each, does this

Before continuing, you should take a look at the accompanying key-reference sheet. This shows all the function keys for Vietnam Med Evac, and how they are placed on the keyboard.

(Notice that the number keys on the numeric pad have different functions than the number keys on the main keyboard!)

Now you should take a look at the instrument panel in the cockpit. Enter the cockpit by pressing “F1” on the main keyboard, then exit again by pressing “F2”. To look around in the cockpit use the glance keys (NUM PAD).

To rise and fall in altitude use the collective control keys “A” and “Z”.

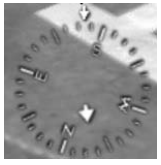
You can spin around your own axis using the tail rotor keys “X” and “C”.

To control the cyclic stick, use the arrow keys (or joystick if this is selected as controller).

Control Console
Any time during the mission you can access Control console by pressing “TAB” button. This console will give full control of your machine and all specialists and equipment located on board. You can navigate through the console by pressing the appropriate buttons (they will be displayed in the left-top corner of your screen). We suggest that you use this console until you get familiar with keyboard shortcuts, which of course, cover all console commands.

Finding the Mission Site
When you have familiarized yourself with the basic flight controls of the game, you should try playing through your selected mission.

To start, you should take a look at the instrument panel. (You gain access to a 2D instrument panel by pressing “Q”). Your main concern right now is this navigation instrument (also called HSVD).



The main purpose of the instrument is to give the direction and distance to the mission target. Try changing the heading of the helicopter while looking at the computer screen (use the tail rotor keys “X” and “C” or pedals if equipped). Now you will see the navigation pointer turning. The helicopter nose is pointing in the right direction when the arrow is pointing upwards (12 o’clock position).

To find the mission target, fly in the indicated direction until the distance counter reaches 0. The distance to the target is shown below the instrument.

At one point you will have to use the “time jump” function. The time jump function will take you to one area containing the next way point in the mission.

(Note: The time jump function will activate automatically if you fly out of the flight areas boundaries. If you are heading in the direction of the mission target, you will jump to the mission area, otherwise you will be repositioned back to the original area).

Finishing the Mission
A mission is considered successful when you have safely completed your mission goals. When the mission is considered completed, you may exit the mission by pressing “ESC”.

THE MENUS

This section will explain all menu features in Vietnam Med Evac. We will go through each screen one by one, and explain each button and text as we go along.

Vietnam Med Evac – Main Menu

Single Mission
Here, you gain access to the single mission features and screens, and can set-up and play a single mission chosen from the entire mission list.

Campaign
In campaign mode, you can start a new pilot, or load an existing one. You will then gain access to your pilot’s career data, and continue service in the rescue guard, flying more missions!

Options
Here are the screens for setting up graphics, controls and sound options.

Exit
Here, you can exit the game, and return to your windows desktop.

Single Mission Settings Menus

This section will explain all features of the single mission screens, and will allow you to set-up a custom mission.

Choosing mission

This screen shows a list of all missions in Vietnam Med Evac, and will also let you set up certain flight settings for that mission. You can scroll down the list of missions by using the slider on the left.

If you click with your left mouse button on a mission name, you will see that it is highlighted by a dark green box. This means that you have selected that mission.

When you have chosen the mission and modified the desired options, click "GO".

If you want to go back to the previous menu, click "Back".

Choosing the Single mission flight settings
The left side of the screen holds a panel with a number of buttons. Each button will let you customize a particular flight setting.
Below is an explanation of each button, and the setting it affects.

Physics Switch
Click the icon to select between the two settings: Easy or Realistic. The difference between these is described later in this document, but as a rule, you should select "Realistic" for sensitive control and "Easy" if you are a beginner and have no joystick.

Weather
The weather setting you chose will influence wind, light, visibility and rainfall. When you click the icon, you will see a list of different icons to choose from.
Each setting is shown as a small icon, graphically illustrating the weather type it represents. They are explained below (Note that the wind strengths below show the constant "background" wind, but that occasional wind gusts which are more forceful can be experienced):

Clear: The visibility is very good and the wind is shallow. This is by far the easiest setting! Wind strength between: 0-5 knots.

Cloudy: The sky is grey and the mood is gloomy, but flight conditions are still good. Wind strength between: 5-10 knots.

Fog: A dense fog covers the landscape, and long-range visibility is poor. Helicopter control is still easy though! Wind strength between: 0-3 knots.

Rain: Rain and fog makes visibility poor. The wind is also slightly increased. Wind strength between: 5-15 knots.

Storm: Wind is strong, making control of the helicopter challenging. Additionally, you will have to fight with both fog and rain. Wind strength between: 30-40 knots.

Random: If you want to have the computer chose for you, this is the setting to select. The computer makes a random selection of the previous six weather types. The result will then be shown on the mission briefing screen.

Time of day
The time of day setting you chose will mostly influence the light level in the game. You change between the settings by clicking on the dial button.

Each setting is shown as a small icon, graphically illustrating the time of day it represents. They are explained below:

Morning: The morning is misty and cold.

Mid day: This is the normal setting for a rescue flight. The sun is high and the light is good.

Evening: The sun is setting and the sky is red with its last rays.

Night: It is pitch dark. This is not a setting for the rookie pilot. It will be nearly impossible to find any visual fix points, and you will have to rely heavily on instruments.

Random: If you want to have the computer chose for you, this is the setting to select. The computer makes a random selection of the previous four types. The result will then be shown on the mission briefing screen.

Start position
Here, you choose where to start the mission. The most realistic setting is of course to start from the base, but for training purposes, we have included the other two possibilities.

Base: The helicopter stands stationary, with the engines off at the base. You will need to go through the start-up procedure and power up the engines before you can take-off.

Hover: The helicopter is hovering in the air just over the base. You are ready to turn your bearing towards the mission site. This setting can be used if you do not want to go through the entire start-up procedure.

Mission site: The helicopter is hovering near the mission site. This setting is good when you want to train the rescue procedures used for each accident, without having to fly all the way to the site first.

Crashes
This button illustrates a small person giving thumbs up or down. You click the icon to choose.

Off: This will make your helicopter indestructible. You will be able to collide with any obstacle without inflicting any damage on hull, wheels or rotor. Additionally, you will never encounter damage on engines and gear boxes, nor be able to over-speed rotors.

On: Your helicopter will take damage and possibly be destroyed if you collide with anything.

Mission Briefing

This is the mission briefing. Information details about the mission are given here.

When you have read the text and feel ready to fly, click “GO”.

If you want to go back to the previous menu, click “Abort”.

Below is a description of each entry.

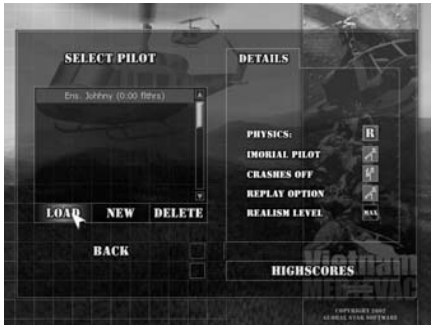
Mission settings
You see the icons representing your mission settings lined up at the left side. You can no longer change these setting, but they are shown as a reminder. If you do wish to make a change, you should go back and start over.

Mission description
This gives you a short description of the accident that has happened. Sometimes, you will learn a lot from this briefing, such as number of victims, victim condition, or hints on rescue procedures, but more often the information available is limited to hints or suggestions.

Campaign

The following section will describe the screens related to playing a campaign.

Setting up pilot and campaign



This screen shows a list of pilots. If the list is empty, it simply means that no pilot has been created yet.

You select a pilot by clicking on the name. When you have selected a pilot, you will be able to access him by using the buttons, explained below.

Click the “Back” button if you want to exit the campaign menu.

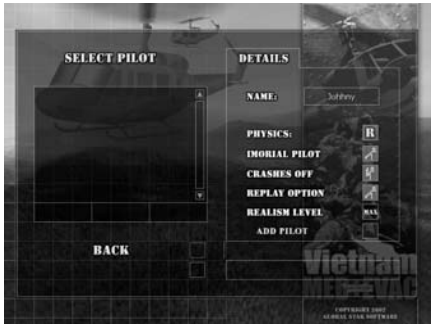
New button
If you click this button you will enter the “New Pilot” menu screen (described later in this manual).

Load button
If you want to continue a campaign with a pilot already created, select the pilot name from the list, and press this button. You will then enter the “Running Campaign” screen (described later in this manual).

Delete
If you click this button, the pilot you have chosen will be deleted. Think twice before you do this, as there is no “undo” function.

Deceased
If the status of a pilot is “Deceased”, it literally indicates that he has died on a mission. You will still be able to load his data and review his log, but you will not be able continue his campaign.

Creating a New Pilot



Here, you can create your new campaign pilot. This data will be used throughout the campaign of that pilot, and cannot be changed later on. It is therefore important that you think about what you want before selecting these options. (See descriptions below).

When your pilot has been created and you are ready to continue, press: “ADD PILOT”.

If you change your mind and want to return to the campaign menu, press: “BACK”.

Pilot name
Click on the empty box to type in the name – note that the mouse cursor will disappear while you type. When you are finished, and have typed in the name you want, press return. This will give you back control of the mouse.

The pilots name has no influence on the game itself, as it will only be used on the “Highscores” list, and for saving the pilots data after each mission.

Physics Switch
Click on this button to select between the two settings: Easy or Realistic. The difference between these is described later in this document, but as a rule, you should select “Realistic” for sensitive control and “Easy” if you are a beginner and have no joystick.

Immortal Pilot

On: Your pilot can never die. Even if you suffer a total crash during a mission, and the helicopter explodes into a thousand pieces, he will still be able to go on.

Off: Your pilot is mortal and will die if you suffer a serious crash during a mission. If your pilot dies, the campaign is terminated, and you cannot continue with that pilot.

Crashes

On: Your helicopter will take damage and possibly be destroyed if you collide with anything. If this happens, you will be penalized with points during the debriefing – or die.

Off: This will make your helicopter indestructible. You will be able to collide with any obstacle without inflicting any damage on hull or rotor. You will still be able to encounter engine failures or other flight problems.

Replay Option

On: You will be able to cancel the outcome of a mission, by choosing the replay option on the debriefing menu. This is good if you have made errors during a mission, but is, of course, not very realistic.

Off: There is no option to undo/ replay a mission. Once the mission is completed, you are forced to accept the outcome, and take any consequences it might have on your pilots career.

Realism Level

This is not an option, but shows the sum of the realism percentages of the above chosen settings. This has no influence on the game itself, but it will influence the amount of points gained after each mission. In this way, you will earn less points for flying easy, and more points for risking your neck.
Full point (100% realism) is obtained by choosing the most realistic settings (Physics: Realistic, Immortal Pilot: Off, Crashes: On, Replay Option: Off).

Running the Campaign

This screen holds all information about the pilot, and his career. This is the main screen of the campaign, and from here, you can gain information related to your pilots career.

To play the next mission in the campaign, press “GO”.

To go back to the pilot screen, press “BACK”.

The right part of the screen displays information about your pilots carrier status, including: your status, rank, total flight time, points, number of missions flown, number of successful missions, number of failed missions, and success rate.

Campaign information

Pilot name
As mentioned earlier, the pilots name has no influence on the game itself. Here, it is used to inform you of what pilot you are playing with.

Pilot Rank
This is a little bit of spice included from the real service. Here, you are given ranks according to the number of flight hours you have in the helicopter and to points that you earn during campaign missions. We have adjusted the ranking system a bit to fit Vietnam Med Evac, but it should still resemble real life closely.
You will gain rank in the following way:

Rank	***Required***
Ensign	0 Flight hours and 0 points
Able Ensign	20 Flight hours and 400 points
Sublieutenant	40 Flight hours and 1200 points
Lieutenant	80 Flight hours and 3000 points
Lieutenant commander	120 Flight hours and 4500 points
Aircraft commander	200 Flight hours and 6000 points

Total Missions Flown
Here you can see the total number of missions flown.

Successful Missions Flown
Here you can see the number of successful missions flown.

Failed Missions Flown
Here you can see the number of failed missions flown.

Total Flight time
The Total Flight time shows how much time you have spent in front of the computer with this pilot. It will gradually increase as you fly more missions.

Points
Shows how many points this pilot has scored throughout his career.

Debriefing

After completing your flight session (even if you crashed) you will come to the "Debriefing" screen. Here, you get information about the outcome of the mission, and how you handled yourself and the helicopter.

When you have read the "Debriefing" and are satisfied with the results, press "OK." Depending on what kind of mission you had been flying, you will then return to either the "Single mission" menu or the "Running Campaign" menu.

If you are unhappy with your result, you can choose to replay the mission. This is not very realistic, as real life doesn't grant such options, but it is helpful, especially when you want to practice your skills or procedures.

Note: This function will not be available if you are playing in Campaign mode, and have clicked the replay option off for your pilot!

The following paragraphs describe the information given in the debriefing window:

Mission Outcome
This is the primary parameter for success or failure, and you can encounter the following outcome messages:

Message	***Explanation***
Successful	You have returned to the base and all mission goals have been completed.
Failure	No mission goals obtained, or helicopter crashed.

Options

This screen handles 3 different subgroups of option-types: Sound, Graphics and Controls. Clicking the buttons at the top of the screen can access the 3 groups.

If you mess up, you can always return to the default settings by pressing "Default".

When you have finished modifying the option screens, you can press "GO" to get back to the main menu.

Options Screen

Options/Sound

Here, you can adjust the sound volume for Voice, Sound Effects (SFX) and Music. When you click the buttons on the right panel, a slider will appear. You use this to set each parameter from 0% on the left to 100%.

Options/Graphics

Here, you set up the graphical detail level of the game.

Remember that a higher detail level will result in a lower in-game frame-rate, but in return, you get a much more eye pleasing flight environment. If you are unsatisfied with your own settings, you can always recall settings, which were settled while installing the game by pressing the Default button.

Advanced Shadows
With this option, you can turn on and off advanced shadowing. We suggest that you turn it on, only when you are the happy owner of a high speed machine, because it has a great deal of influence on frame rates.

Clouds Density
This has been included to increase the frame rate speed in cloudy day (or night). A low setting will make clouds to look less realistic and a high setting will make them look better.

Resolution
This allows you to choose the screen resolution for the game. 640x480 at 16-bit is the lowest possible setting and 1600x1200 at 32-bit is the highest. Default is 640x480 at 32-bit.

Setting the resolution to a high level will increase the graphic detail level a great deal, but it will also slow down the game.

Low Detail Textures
If you are having trouble running the game, it might be helpful to set the "low detail textures" to "ON". Your only choice for this setting is "ON" or "OFF", with "ON" as default.
We naturally recommend that you set "low detail textures" to "OFF" to fully enjoy the game.

Visibility Range
The lower the number settled here, the less distance you will be able to see. Of course, lower visibility means higher frame rate, so this setting is mostly used when your computer isn't fast enough to display all of the beautiful visual details in-game.

Building Density
This has been included to increase the frame rate speed over the bigger cities. A low setting will remove houses from the city (but also rural areas), and a high setting will put more buildings in the city.

Note: If you want to see the cities as we have created them, you will need to set this to 100%.

Options/Controls

This menu will let you set up which control device to use for flying the helicopter, and such functions as pitch, roll, collective and tail rotor, and further, change how each axis of the device behaves. If you are unsatisfied with your own settings, you can always recall settings, which were chosen while installing the game by pressing the Default button.

Use the up/down lights at the right side of the screen to select which device and axis to use, or alternatively, you can try the preset buttons at the bottom.

The column called "Inv." is used for inverting the poles on the axis.

Pitch
Changing "pitch" is the same as raising or lowering the nose of the helicopter.

Roll
The helicopter is "rolling" when it is tilting from right to left.

Collective
The collective stick is used to raise and lower the altitude of the helicopter.

Tail Rotor
This is used to change the heading of the helicopter at low speeds.

Available settings for all mentioned above settings are listed below:

- Keyboard Left – Right
- Keyboard Up – Down
- Keyboard A – Z
- Keyboard X – C
- Mouse X
- Mouse Y
- Joystick X
- Joystick Y
- Joystick Rudder
- Joystick Throttle

Presets
We have included these preset buttons to ease the process of setting up controllers for Vietnam Med Evac. Each button represents a specific preset control set up as explained below.
If you start modifying any of the preset settings, the light will switch off to indicate that you are no longer using a preset.


Keyboard only


Joystick only

Joystick with Throttle stick (collective)

Joystick with Throttle stick (collective) and pedals

Mouse control of pitch and roll

DURING A MISSION

This section will deal with the basic functions of the in-flight part of Vietnam Med Evac, and will explain anything you need to know about the game play.

Camera Views

The main game screen gives you 4 different cameras to choose from (F1-F4). The default start screen shows the helicopter from behind (Outside camera) and the lower part of the screen shows the 2D instrument panel (by default toggled with "Q" on the keyboard).
For each camera, you will be able to set the panning angle and zoom in and out. This is done with the numbers on the numeric keypad. Vietnam Med Evac offers a few new tricks to accomplish this, so here they are:

"2" will pan down.

"8" will pan up.

"4" will pan to the left.

"6" will pan to the right.

"5" will reset to the default angle.

"+" will zoom in.

"-" will zoom out.

"** will reset the zoom to the default distance.

Note: Vietnam Med Evac allows you to pan 360 degrees around the helicopter, which will provide a much better view of the action.

Below is a description of the three most important view angles.

Outside Camera (F2)
This is the default camera view, and is considered the easiest way to fly the helicopter. It is, of course, not a very realistic viewpoint, but it will help you to judge the distance to the ground and objects with relative ease. Additionally, you will have a good view of the surrounding landscape.

This camera is also good in hoist situations, especially if you pan the camera to get the hoist door in sight.

Cockpit Camera (F1)
This is the most realistic viewpoint from which to fly the helicopter. You see the inside of the cockpit from the seat of the aircraft commander, and your view of the surrounding landscape is limited accordingly. Your pan keys are also important here, but you will often be using them to look at the landscape outside, trying to get a fix point, or to judge the exact position over an object.

This view is more difficult then the Outside Camera, but will probably give you a better "realistic" feeling for the helicopter.

Hoist Camera (F3)
This is the view of the Flight Mechanic looking out of the hoist door. If you want to stay as close to real life as possible, this is the camera to use during a hoist. From here, you will be able to scan the water surface for drifting survivors, but also follow the progress of the rescue swimmer.

Fly-by Camera (F4)
This is the view from a camera fixed to one point. You have no control of this camera, and by its very nature, is not a very realistic viewpoint, but it is not as easy as the Outside Camera view.

Mission Flow

Generally speaking, all missions follow the same pattern. There is a series of steps necessary to complete the missions in Vietnam Med Evac, and you will be expected to master all to perfection if you want to attain the highest rank possible in the game.

Here each step is explained in brief:

Step	Description
1: Engine start.	Making checks and starting the engine (See "Take off and landing")
2: Take off	Lifting off and attaining hover (See "Take off and landing")
3: Finding the site	Gaining speed, finding the direction. (Possibly also time jumping)
5: Rescue procedure	Picking up survivor/ mission objective (See "Rescue procedures").
6: Check survivor condition . .	Checking survivor injuries (See "Survivor condition")
8: Drop off survivors	Landing at hospital or drop-off site. Delivering survivors.
9: Return to base	Back to base. (Possibly also time jumping)
10: Landing	Slowing down and landing (See "Take off and landing")

(Note: Some missions will of course deviate in one way or another from this step by step procedure).

Campaign Flow

The flow of each individual mission in the campaign is just like that of the single missions (explained above), but the order in which you play is settled by the computer. As it is, missions are placed in such an order that you will encounter greater challenges in relation to the flow of time.

Flight Area

There are several different landscapes in Vietnam Med Evac, all of which spans 25x25 kilometers. To fly over a specific landscape, you will have to choose one of the free-flight missions, where you can fly freely with no mission limitations or time jumps.

Reason for Limited Areas

The landscape system is based on the same concept as InterActive Vision's other helicopter series, where flight is limited to an enclosed map. The reason for the limited area size is so that we could have as high a ground level detail as possible. During research, and based on feedback from real pilots, we realized how important static fix-points in the landscape are for maintaining hover position, and visually judging altitude. Therefore, we have chosen to include very high ground detail level, both with the number of objects, and with the ground textures.

Time Jump

As mentioned above, each area in Vietnam Med Evac covers 25x25 kilometers. However, as many missions start in one area with the accident site as in another, so you will need to switch to the second area at some point during the missions. The process of switching landscapes is called "time jumping".
A forced time jump occurs when the player nears the edge of the 25x25 kilometers landscape. You will be given a warning that you are close to the edge, and that time jump is necessary, but if you do not heed this (turning back) you will time jump automatically.

Effects of a Time Jump

When you time jump, the helicopter is moved to the edge of the target area in an instant. The screen fades to black, while the computer loads the new area into memory. When the screen fades up again you will find yourself in the air flying at approximately 120 KIAS, and heading straight for the way point.
Even though the flight between the areas is not played in the game, it will still be calculated into the mission time. This also means that fuel is used and time passes for the victims.

Point System

We have decided to include a point system in Vietnam Med Evac because it is a good way to award players according to their performance. This is especially true for the rescue procedure elements of the game, where several rules and patterns have to be followed in order to make a safe rescue (See the "rescue procedures" section for more details).
(See also the "Debriefing" menu screen description)

Rescue Equipment

A rescue helicopter is rigged with lots of gear and devices. Of most importance to Vietnam Med Evac are the three rescue devices: Basket, Sling, and Litter. Each one of these, attached to the hoist cable, is used as a method to transfer the hurt and injured into the helicopter.

Rescue Basket

The rescue basket is the primary device for hoisting individuals in most situations. It affords a measure of protection for the individual being hoisted from the accident site, particularly for an untrained person.
The rescue basket is used when hoisting survivors suffering from mild to medium injuries.

Sling
The sling is an efficient method to deliver and pick up personnel trained in its use. Due to the danger of falling out, it is not recommended for use with those not specifically trained in its use.
The rescue sling is used when hoisting unhurt individuals or rescue personnel.

Litter
In rescue situations where the survivor is incapacitated, the rescue litter is used. The litter is more difficult to use in a hoist, primarily due to its larger size and sail area. The rescue litter is used when hoisting badly hurt or dying victims.

Additional Equipment

Machinegun
Your primary role is to rescue wounded and injured solders of the US Army. In some missions, however, you will encounter enemies, which will try to disrupt your operations, mainly by shooting at your helicopter and/or at your crew. In this kind of situation, you will be able to defend yourself using the side mounted machinegun. To do this, you have to open the hoist door and order your gunner to open fire. Alternatively, you can manually control the gun and defend your man and machine by yourself.

Helicopter Lights

Spotlight
Each helicopter is fitted with a spotlight (also called search light). In real-life, this spotlight is controlled by the pilot or the flight mechanic using a small joystick placed inside the crew compartment. The spotlight is used at night, or in poor visibility conditions, to search for survivors on the ground or in the water.
In Vietnam Med Evac, the spotlight is fully controlled by you. You can turn the spotlight on and off using the (default) key “Numpad Del”. You can move/ aim the spotlight by holding the shift button while using the NUM PAD keys for direction control.

Positional Lights
You can switch the positiolan lights using the ”L” key on your keyboard.

Illuminating Flare
Each helicopter is fitted with a limited a number of illuminating flares. You can throw out the flare using the ”F” key on your keyboard. The flare is a powerful piece of equipment, because it can, for a limited time of course, light up surrounding terrain, making it easier to see any victims nearby.

Flight Crew

Pilot
In essence, you take on the role of the pilot, and are responsible for the safe and orderly conduct of the flight. You are in full control of the helicopter helm, and are responsible for finding the best possible way to complete a mission. (The crew member you see sitting next to you inside the cockpit is the co-pilot, but you will have no control over his actions).

Flight Mechanic
The flight mechanic is the person responsible for control of the hoist. He is also the one in command of the rear cabin in the helicopter, and is trained to check the condition of the survivors once they are picked up.
You have control of most duties belonging to the flight-mech, including hoist operation, rescue swimmer deployment, supervising external load operations, cargo loading and off-loading, operating the hoist door, visual area search, and deploying rescue devices.

Rescue Swimmer
The rescue swimmer is trained to be deployed from the helicopter, and acts independently while preparing survivors for pickup. When the rescue swimmer is used, they will participate in the on-scene evaluation, and advise the flight-Mechanic (player) on which rescue device to lower according to the victim’s condition.
The rescue swimmer has the authority to decline deployment if the situation is beyond the swimmers capabilities (though you will be able to drop him above the maximum drop height).
The rescue swimmer is used in many different ways, both over water and on land, and can be deployed both by hoist and by dropping from the helicopter (called “free fall”).

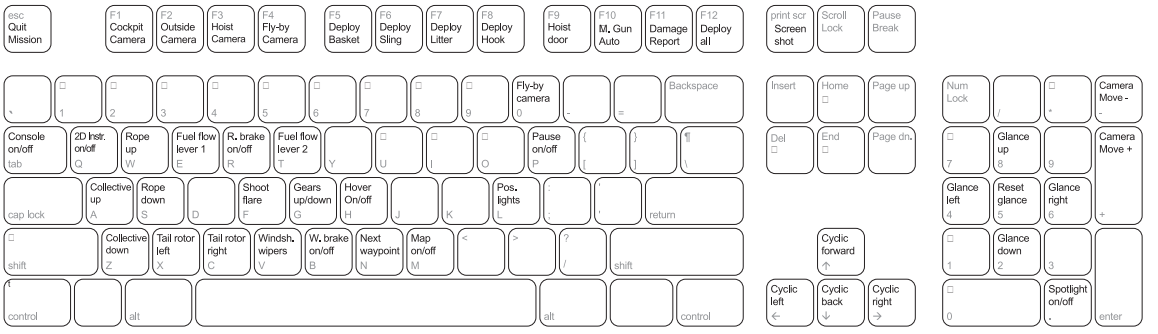
Gunner
The gunner is the soldier responsible for backup during a mission, and he operates the machinegun located in the hoist door. You can order him to open fire at will (he will fire when the enemy is in range) or you control the gun manually.

Rescue Procedures

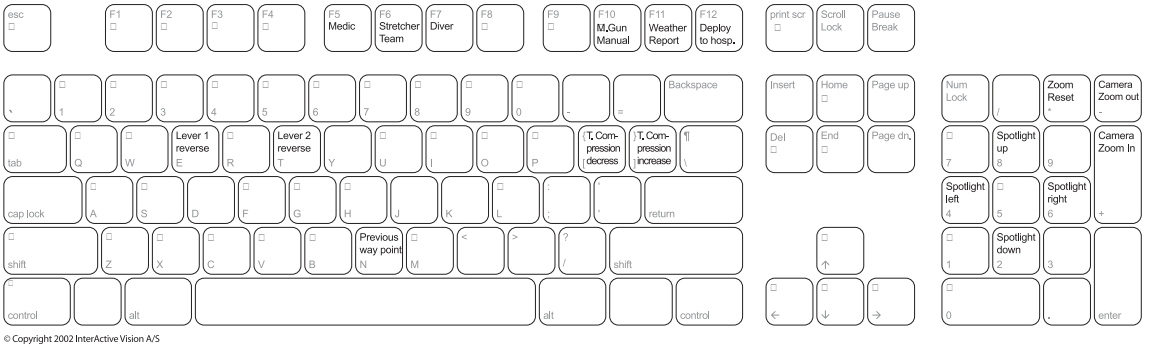
Vietnam Med Evac represents a brand new way to rescue victims. There are no settled procedures – each mission can be completed in many different ways. For example: you can hoist victims using a litter, or land on the ground and pick up the victims using a stretcher team. Below, we will give you some examples of how to rescue victims using the different kinds of available equipment.

Stretcher Deployment
In this type of rescue, you must land on the ground to enable you stretcher team to pick up the victims and carry them back to the helicopter.

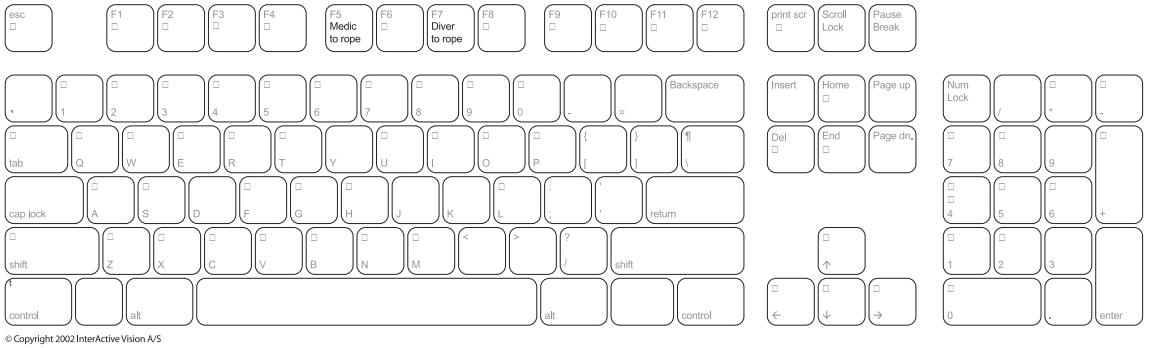
NORMAL KEYBOARD



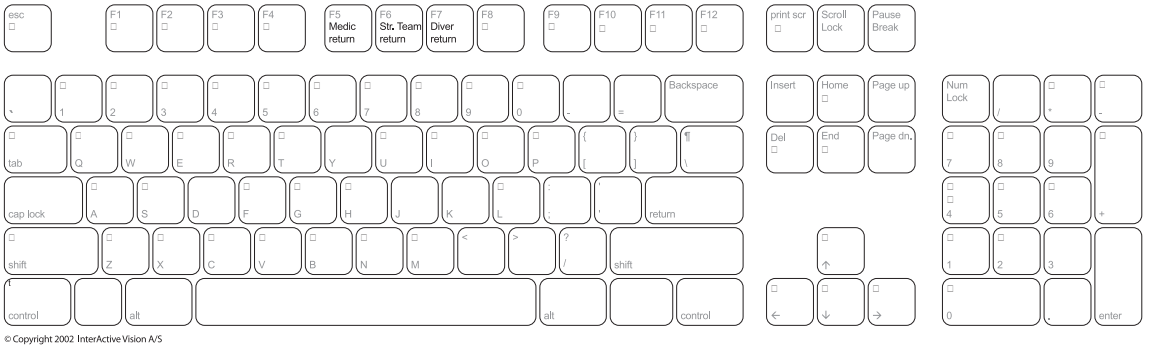
SHIFT KEYBOARD (hold down shift)



CNTRL KEYBOARD (hold CN\RLdown)



ALT KEYBOARD (hold ALT down)



1. The pilot establishes the helicopter in a stable hover, placing the survivor at the one – to – two o'clock position, well outside the rotor wash. Then, touches down to a stationary and secure position, and the pilot reports, "We have touch down".
2. Now you must complete the victim check. To do this, open the hoist door ("F9") and send the medic to the victims ("SHIFT + F5"). The medic will run to the first victim, examine them, and give you a report about their status. If the victim can't walk and needs to be carried to the helicopter, he will give you a sign. When the medic is finished examining the first victim, he will run and examine another, and so on. When the check is completed, he will return to the helicopter and the pilot will report "Rescuer is in the helicopter".
3. Now, you can begin picking up the victims using your stretcher team. To deploy the stretcher team, press "SHIFT + F6". They will run to the first victim, pick them up, and return to the helicopter.
4. Once the rescue is complete, and the stretcher crew and survivors are aboard, you can close the hoist door ("F9") and start delivering the victims to the hospital.

Land and Deliver

This kind of procedure requires the pilot to land the helicopter, so that the passengers or cargo can be delivered safely.

1. The pilot places the helicopter in a stable hover above the touch down area. (In most cases, you will be required to find a suitable location based on your own judgement). Then, he touches down to a stationary and secure position, and the pilot reports, "We have touch down".
2. Now the FM will direct, "Open the door to unload passengers/ equipment", and you can open the door ("F9").
3. When all has been delivered, the FM reports "Passengers/ cargo delivered". You can now close the door, take off, and return to base.

Rescue Using the Swimmer

This kind of procedure includes the Rescue Swimmer, where they are lowered to the survivor, apply the hoist harness, and indicate that they are ready for pickup. The swimmer and survivor are then hoisted aboard together.

1. The pilot maintains a hover position with the survivor(s) at the one – to – two o'clock position, outside the rotor wash.
2. Now, you can begin the rescue procedure. First, open the hoist door ("F9") and order the swimmer to go to the victim ("SHIFT + F7"). You can also deploy the sling ("F7") and attach the swimmer to the rope ("CTRL + F7"). Then, you can lower the swimmer using the hoist apparatus ("S").
3. When the swimmer reaches the survivor, he will prepare the survivor for pickup (securing him in the quick strop).
4. Once this is complete, you must pick up the swimmer and the victim using the sling ("F7").
5. Finally, you are able to close the hoist door ("F9") and bring the patient to the hospital.

Hoist Pickup

This kind of procedure is very similar to the previous one - you must rescue victims without landing on the ground. But this time, you must deploy a medic, because victims are located on dry land.

1. The pilot maintains a hover position above the survivor or object to be hoisted.
2. You must open the hoist door ("F9"). Now, you can attach medic to the rope ("CTRL + F5") and lower him to the ground ("S").
3. The medic will now check the victims' status, and will report it to you. You will be also informed about what device is needed to pick up the victim.
4. You are now allowed to deploy the designated device to the rope (using either "F5", "F6" or "F7").
5. When the device has been lowered to the survivor/ object and is held there for a short while, it will automatically attach to the device. You must raise hoist rope using "W" key.
6. Finally, you can close the hoist door ("F9") and start flying to the hospital.

Survivor Condition

Your primary task in Vietnam Med Evac will be to find the injured individuals, and pick them up. However, your mission does not stop here. Some of the survivors you have picked up may have suffered an accident so severe that their life is slowly ebbing, and their only salvation will be proper hospital care. Therefore, once the rescue operation at the accident site is complete, you will be in a race against time to get the survivors to a hospital before their strength runs out.

Injury Types

All survivors in Vietnam Med Evac have been given a unique set of health condition characteristics. These will vary, from a simple concussion or lacerations to multiple fractures or cardiac arrest.
The type of injury a survivor experiences will depend on the type of accident. Additionally, it will be random from mission to mission, which will make each attempt a little different.

Effects of Injuries

A victim's injury type and condition have three important effects on the game:

1. The type of rescue device to be used when hoisting will depend on what type of injury the survivor(s) has suffered. (I.e. a man with a broken leg needs to be hoisted in the litter, where a man with a broken arm can use the basket).
2. The type of injury will dictate the drop off site. (I.e. a man with a heart attack must to go to the hospital, but a man who is mildly shaken can be dropped of at a parking lot).
3. The severity of the injury will dictate how much time you have left to deliver the survivor to the drop-off site. (I.e. a man with a severe wound will slowly bleed to death, but a man who is suffering from superficial cuts can stay alive a lot longer).

Checking Survivor Condition
Once you have picked up a survivor, the Flight Mechanic will check his condition and give you a verbal report. He will continue to do so with regular intervals, until the survivor has been delivered to a drop-off site. You can also make the check manually by pressing the designated key combination.
If more than one survivor has been picked up, the FM will report the condition of the survivor suffering the most.

Condition Report
The Flight Mechanics condition report is given as an overall estimation of the survivor's current health condition. This estimation is based on how long the survivor has left before dying. Below is a list and description for each condition report:

Condition report	**Meaning of report**
No Victims	Means you have no survivors in the rear cabin.
Victim Is Dead	Means that a survivor has just died.
Stabilized (or stable)	Survivor is in good health. He will not die by himself
Serious	Survivor needs hospital care NOW!
Victim Is Dying	Survivor will die within the minute!

Errors During Flight

During a mission in Vietnam Med Evac you will have to follow certain rescue procedures, as well as a set of basic helicopter flight safety rules. The procedures are explained previously in the section called "rescue procedures" and most of the flight rules are explained throughout the sections about the individual helicopter, and the section called "Flying the Helicopter".
This section shows a summary list of all error messages as they will be shown on the debriefing screen (under errors). A short description follows each error listed.

Helicopter damaged
You will see this message if you damage the helicopter in any way other than by a collision. (Except for a total crash, which is accounted for under "Helicopter damage" on the debriefing menu).

Lifted off before ready signal was given
During takeoff, it is important for the rotor to be at full rpm before commencing with your flight. You will see this message if you lift off from the ground before the rotor is at full speed, and you have been given the "Ready for take-off" message from the pilot voice.

No mistakes made
This is, of course, is not an error, but an indication of faultless flying. Well done! Except for a total crash, which is accounted for under "Helicopter damage" on the debriefing menu).

One or more survivors damaged by downwash
The downwash from the helicopter puts a lot of air pressure on those directly under the helicopter's rotor. This is especially dangerous for weakened or injured people trying to stay afloat in the water. You must therefore take care not to hover too close to lone survivors in the water. If you do, you will see this message.

Pilot dead, Campaign Terminated
You will see this message if you crash the helicopter and your campaign pilot dies.

Rescue device collision with object during hoist
You will see this message if a device attached to the rope collides with anything during a hoist.

Swimmer deployed closer than 5 ft from survivor
To ensure that both the swimmer and survivor are safe, it is important (especially in freefall deployments) that you do not deploy the swimmer too close to the survivor. You will see this message if you have violated the rescue procedure rules by deploying the swimmer closer than 5 feet from the survivor.

Wrong rescue device lowered
To ensure fast and easy recovery of all survivors, it is important that commands and directions between all crew members are understood, and followed to the letter. Therefore, it is important that you lower the correct rescue device as requested by the swimmer. You will see this message if you lower a wrong rescue device to the scene of the accident.

Maximum Speed Exceeded
To ensure passenger safety, you are not allowed to exceed speeds of 165 KIAS per hour. If you do so, the appropriate message will be displayed on your screen, and you will not gain the maximum amount of points available for successfully completing the mission.

THE HELICOPTER OF VIETNAM MED EVAC

The Bell UH –1 C Huey

Technical Specifications

Length: . . . . . 52.7 ft. (with rotors)

Height: . . . . . 14.1 ft.

Empty weight: . . . . . 5071 lbs.

Gross Weight: . . . . . 9499 lbs.

Maximum Weight: . . . . . 9500 lbs.

Powerplant: . . . . . Lycoming T53-L-11.

Horsepower: 1100

Range: . . . . . 382 miles

Max speed: . . . . . 148 knots

Climb: . . . . . 1400 ft/min

Ceiling: . . . . . 11500 ft.

Armament: . . . . . 7.62-mm macine gun

IN THE COCKPIT

In this chapter, we will take a look at all the handles, buttons, and dials in the cockpits, and explain how they work. You will not learn how to fly the Helicopter here, but you will learn about the instruments that are essential to proper helicopter operation.

Flight Controls

A helicopter pilot uses all his limbs to make the helicopter behave as he intends it to. The right hand is holding a stick protruding from the floor in front of the pilot, which is called a Cyclic. The left hand is holding a grip called a Collective, and his feet rest on a set of pedals.

The cyclic can be moved along two axes: Moving it forward will make the nose of the helicopter go down, and moving it back will make the nose pitch up. Moving the cyclic sideward controls bank: If the cyclic is pushed to the left, the helicopter will bank to the left, and vice versa. Usually, the joystick on your computer will control the cyclic, but you can also use the cursor keys or the mouse.

The collective can be moved in one direction only. When it is moved, the helicopter generally does not change attitude. If it is pulled upwards, you will climb, and if it is lowered, you will descend. If you have a joystick with throttle, you should assign this as the collective. Otherwise, use a mouse or keyboard.

The pedals control which direction the nose of the chopper is pointing, and will move the aircraft from side to side. They are connected in such a way that if one is pushed down, the other one will go up. If you push the left pedal, the nose will turn towards left, and vice versa. Pedal game controllers are ideal for this purpose, but a twisting motion joystick, mouse or keyboard can also be used.

Engine Controls

If you look up and left, in the middle of the roof of the cabin, you will find three levers that control the two engines and the power transmitted to the rotors.
The yellow levers on the left and right sides are Fuel Flow Control Levers. Each can be placed in three positions: Cut-off, Idle, and Flight. The rearmost position is Cut-off, where the engines will stop entirely. The levers can be moved one step forward to the Idle position by pressing “E” and “T”, respectively. Now, ignition will be on, and the engines will spool up to idle RPM. Moving the levers fully forward by pressing the same keys again will take them to the Flight position, where power will be transferred from the engines to the rotors, bringing the rotors up to flying speed. Pressing the SHIFT key and “E” or “T” will move the levers backwards.

The red handle in the middle is the Rotor Brake Control Lever. When in the rear position, the brake on the main rotor is activated, and when the lever is forward, the rotor is free to move. The brake position is toggled using the “R” key (default setting).

The fuel flow controls and the rotor brake are interlocked: You have to release the brake before the fuel flow levers can be moved to the flight position, and you cannot activate the brake with the fuel flow levers in the flight position.

Instruments

Flying close to the ground means that your most important instrument is an unobstructed view of the world outside. Still, a glance at the instruments is required from time to time, and sometimes the visibility may be so bad that the instrument panel is your only guide to safe flight.

Your suite of instruments includes the following:

Flight Instruments
- Attitude Director Indicator
- Airspeed Indicator
- Radar Altimeter
- Barometric Altimeter

Vertical Speed Indicator
Horizontal Situation Video Display

Engine Instruments
Triple Tachometer
Triple Torquemeter

Misc. Instruments
Landing Gear Position Indicator
Landing Gear Warning Light
Master WARNING Light
Console

Let's go through the list instrument by instrument.

Attitude Director Indicator

In low visibility conditions, this instrument is a substitute for your view of the outside. The ADI shows the orientation of the helicopter relative to the horizon, while the stationary yellow wing in the middle represents the helicopter, and the moving blue/brown ball is the world itself. In reality, the ball is kept stationary by gyroscopes, and it is your cockpit that is revolving around it. If the wing is in the blue, your nose is up, and if the wing covers the brown region, you are nose down. If you are banking, the ball will bank also: If the ball tilts to the left, you are banking to the right and vice versa. This may sound confusing, but you will see that it works quite well. When you are less than 200 feet above ground level, a radar altitude pointer will become visible. This is a green and white horizontal bar that will rise towards the yellow wing, as you get lower, and touch it when you are at ground level.

Airspeed Indicator

This dial displays your speed through the air in the forward direction. A small tube is protruding from the front of the helicopter, and as airspeed builds up, the pressure changes inside the tube, which is translated into the displayed airspeed. As this type of measurement works poorly at very low speeds, nothing will be shown below 15 knots. If there is any wind, this will make your airspeed different from your ground speed. The unit used is knots, i.e. nautical miles per hour.

Radar Altimeter

You have two instruments that inform you of your current flying height - it is very important to know the differences between their operation. Your Radar Altimeter measures your height above the ground by emitting a radar pulse downwards and timing its return. Other structures large enough to reflect the radar signal, like rooftops, ships, etc., will also affect the radar altitude. This type of altimeter is only used when flying close to the ground, as is evident because the scale ends at 2000 feet above ground level (AGL). The scale is finely graduated and very responsive when close to touchdown, and gets less detailed as you gain altitude.

Barometric Altimeter

As you get further away from the ground, the Barometric Altimeter is a more practical tool to use, as it measures air pressure, which decreases as you go higher, and is translated in to a displayable altitude. When you enter the cockpit, the altimeter will be adjusted to show your height above sea level, independent of whatever air pressure the weather conditions dictate. Note that this altimeter does not show your height above any obstacle, so be careful when using it close to the ground.
The barometric altimeter is located on the right side of the instrument panel, below the radar altimeter.
In the centre of the display, your altitude, in feet, is displayed as a digit. The leftmost number drum shows hundreds of feet. To the right, this is followed by two counters, showing thousands and ten thousands of feet, respectively. At low altitude, the leading zeroes will not be shown.
In addition, a needle displays your altitude. Each number on the needle clock is one hundred feet, so that one complete turn of the needle corresponds to a 1000 ft altitude change.

Vertical Speed Indicator

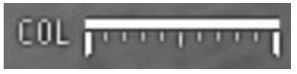
This instrument is the Vertical Speed Indicator. It displays how fast you are climbing or descending by measuring the rate of change in the air pressure. The scale is in thousands of feet per minute, showing up to 3000 FPM in both directions. The graduation is finer for vertical speeds less than 1000 FPM, which makes this instrument much easier to use e.g. to maintain level flight rather than watching the altimeter slowly move.

Horizontal Situation Video Display

When it comes to navigation, the Horizontal Situation Video Display (HSVD) is the instrument to use, as it displays information provided by the navigation computer. The small arrow inside the circle illustrates the direction in which you are flying, and will spin around as you change your direction. The arrow outside the circle, which will always be located at the 12 o'clock position, indicates the location of the way point. The distance to the way point is shown under the HSVD, and is displayed in nautical miles.

Collective

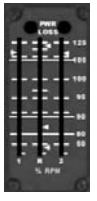
This indicator shows your current settings of rotor thrust.



Fuel indicator

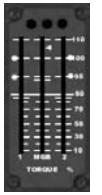
Here, you can see information about the current amount of fuel that your helicopter is carrying. You must watch this indicator very carefully when you need to fly to distant way points, because if your fuel runs out, your helicopter will crash –
and your pilot along with it.

Triple Tachometer



This instrument consists of three colour-coded bars displaying the revolutions per minute (RPM) of your two engines and the main rotor.The main rotor RPM is shown by the bar in the middle. The UH-1C is equipped with a throttle governor, that automatically tries to keep the rotor RPM at 100%, or 350 RPM. The allowed range for continuous flight is from 97% to 108%. During normal flight, the main rotor will be very close to 100% RPM, but it can become lower if you pull the collective enough so that there is insufficient power to keep the rotor speed up. RPM will, of course, also go down if you lose engine power. Conversely, RPM can become higher than 100% if you lower the collective and enter auto-rotation. Be warned that a too high an RPM may cause the rotor to break up, so you should get in the habit of listening to the rotor beat, rather than looking at this bar. The turbo-shaft engines have two sets of independently rotating blades. The first set is the compressor, or gas generator stage, which are the ones that you hear spool up when starting the engines. The second set of blades converts the gas pressure to power for the rotors through a gearbox. The RPM of this power turbine is what is displayed for each engine in the left and right sides of the triple tachometer. Because of the gear system, the power turbine RPM will closely follow the main rotor RPM, whenever the engines are providing thrust. On the other hand, the main rotor is allowed to overtake the power turbines, so that if no power is required, the main rotor RPM will be higher than the power RPM. These are also the bars to inspect if you think an engine failure has occurred. In case a power turbine RPM falls below 84%, the red warning light over the relevant bar will illuminate.

Triple Torque Meter



This instrument is closely related to the tachometer in layout, but instead it displays the twisting forces, also called torque, inside the gearbox.
The bar in the centre shows the torque transferred to the axis of the main rotor. This is the sum of the torque from the two engines, shown on each side of the centre bar, and will change as the throttle alters the engine output to keep the main rotor at 100% RPM. The bars are colour coded: Green indicates the continuous flight range, from 10% to 88% torque. The yellow range extends from 88% to 100%. This range is allowed for hover and transition, e.g. accelerating and climbing to the desired cruise setting. Above 100%, the three bars become red to indicate an excessively high system load, which will eventually wear down the gearbox. In addition, the engine over-torque lights will illuminate above 100%, and above 103%, the main gearbox over-torque light will turn on.

The Flight Computer

Flying a helicopter is a lot of work. Flying a helicopter on a Vietnam Med Evac mission in awful weather is even worse - sometimes so much so, that even the best pilot cannot perform well enough to save the lives of the people in need of help. So, to aid the pilot in completing the mission requirements, and worrying less on steering the helicopter, the Automatic Flight Control System (AFCS) was introduced.

The Autopilot

Flying at a constant altitude and airspeed while navigating through your way points, or searching for the source of a distress call, is not the most difficult task in the world, but still requires a significant amount of attention - this is why the autopilot can help make your life a lot easier in such situations. Engage the autopilot by pressing the "F11" key (default key setting), or push the button again to disengage it. When the autopilot is active, it will take control over the pitch and collective, and in return, will keep your airspeed and barometric altitude constant at the values during autopilot engagement. You will maintain full control over bank and yaw, which means that you can still turn to change course. This takes a lot of the work out of navigation.

Beware that the autopilot keeps barometric altitude constant, which means that it will not hesitate to fly right onto a mountain or another obstacle if there are any at that altitude. So, stay alert, and be ready to disengage at any moment!

Using the Flight Director Slew Switch, a four way button located on the pilot's cyclic stick, you can change the reference speed that the autopilot tries to maintain. Holding down the "Home" key will increase the reference speed at a rate of 4 knots per second, and pushing "End" will decrease the speed at the same rate. The highest allowed reference speed is 150 knots. In this way, you will have very good control over airspeed, even though you cannot directly control pitch.

Your loss of pitch control is downplayed somewhat, since pushing or pulling the stick hard enough will initiate a "fly through" feature, which allows your input to override the autopilot input. Still, for complete pitch control, you will have to disengage the autopilot.

Hover Augmentation

Search And Rescue missions often require extremely precise hovering under difficult conditions. The Hover Augmentation flight computer mode is an invaluable tool here, And can be toggled using the "H" key (default key assignment).

Using the ground tracking radar, ground speed is determined in both forward and sideward directions, and the flight computer steers the helicopter in order to get zero ground speed in both directions. If you are more than 50 feet above the ground, the helicopter will descend to 50 ft AGL and stabilize there. If you are already below 50 ft AGL, the current height will be maintained. In HA mode, the flight computer takes control of both cyclic and collective, leaving only the pedals to you – however, "fly through" is available in this case, and can prove to be very useful. If the cyclic stick is deflected more than about 1/3 of its full travel, your command will override the flight computer's command, and the helicopter will move in a horizontal direction, still maintaining its height over the ground. As soon as the cyclic is released, the flight computer will reduce ground speed to zero again. This can be utilized for very precise hovering.

The zero ground speed mentioned above is actually a reference ground speed that is initially set to zero. You may change the reference ground speed using the Flight Director Slew Switch, implemented as four keys. Pressing a key will increase the reference ground speed in the same direction by four knots per second.

You should be cautious when flying over uneven terrain using this feature, as the height over ground varies rapidly, forcing the flight computer to try to make similarly rapid height changes.

A little trick: When you have used the slew switch to set a certain ground speed, and want to quickly go back to zero ground speed, rapidly disengage and then re-engage hover augmentation. This will set the reference ground speed to zero. The same trick can also be used for levelling the reference attitude.

The hovering height can be altered using the three-position Hover Beep switch. In reality, located on the collective grip, its Up position in this simulation is the "7" key on the keypad, and it's Down position is the "1" key on the keypad. For every time it is flicked up or down from its centre position, the reference hover height will go 3 feet up or down, respectively.

BASIC HELICOPTER AERODYNAMICS

At first look, it is really mind-boggling that such a strange machine as a helicopter is able to fly, and accomplishes this task well. In this section, we will look at some of the basic principles that make a helicopter work.

How a Wing Works

A helicopter has no wings – then again, it has. A fixed wing aircraft flies by moving the wings through the air at high speed. A helicopter has to work even at a standstill in the air; so fixed wings will do no good. Instead, the wings of the helicopter are put on a rotating axis and in that way they are able to move through the air at high speed, even when the helicopter is not moving.

So how does a wing really work? You have probably heard it before; the wing is slightly curved on the upper side, and this creates a suction force that can be used as lift. Well, that is correct, but it is not a very useful explanation. Instead, we should start by looking at rockets.

A rocket accelerates because it pushes some mass (propellant) in the opposite direction to which the rocket is going. This is a very fundamental principle, called Newton's Third Law: "To every action, there is an equal and opposite reaction". The wing works in the same way: It is pushed upwards because it is pushing air downwards. The method of pushing is where the curved upper surface enters the picture.

The Rotor System

The helicopter has to push a lot of air downwards to fly, and that is what the large horizontal main rotor is for. As the rotor pushes, it transfers energy to the air, And as such, needs to be re-supplied with energy constantly, which is what the engines turning the shaft of the main rotor do. The turning force, or torque, will make the helicopter body rapidly turn in the opposite direction of the rotor, which is, of course, very impractical. To prevent this, the vertical tail rotor pushes on the tail, cancelling the turning force of the engines.

Controlling the Helicopter

The helicopter is primarily piloted by manipulating three controls: The collective grip, the cyclic stick, and the anti-torque pedals.

Changing the pitch angle of all rotor blades at the same time controls the lifting force of the main rotor, which is why the control handle for doing this is called the collective. For more lift, the forward edges of the rotor blades are pointed upwards. In the cockpit, the collective grip is raised to do this. If less lift is desired, the blade pitch is made less steep by lowering the collective towards the floor.

As mentioned above, you do not get lift for free. As the rotor produces more lift, more engine power is automatically added to maintain adequate RPM. This, in turn, increases the force, making the body rotate about the vertical axis. The way to counter this is to make the tail rotor push harder on the body. Just as the collective controls the main rotor pitch, the pedals control the tail rotor pitch. Of course, the tail rotor can be used for more than countering torque – it can also be used for rotating the body about the vertical axis.

For accelerating in the forward or sideward direction, the main rotor has to be tilted so that its lifting force is pointing in the desired direction. This is a bit tricky, as every rotor blade is constantly moving around. This problem is usually solved by a “swash-plate,” Which is a ring around the main rotor axis that can be tilted according to the movements of the cyclic stick. If the cyclic stick is moved forwards or backwards, the swash-plate is tilted in one direction, and if the stick is moved sideward, the plate is tilted in the other direction. The swash-plate is actually two rings that move in the same plane, With the lower stationary (except for the tilting motions,) and the upper one rotating (connected by rods to the pitch controls of each of the main rotor blades.) This means that, if the swash plate is tilted, the pitch of the main rotor will increase on one side, and decrease on the other. The pitch change will, in turn, create a tilting force on the rotor, and in this way, it is possible to control the orientation of the main rotor and the direction of its lift.

In the following text, you will sometimes encounter the term “vector,” which is just another way of saying direction. Imagine a lift vector being an arrow pointing in the direction of the lift force, and the length of the vector is proportional to the strength of the lift.

With this knowledge, you are ready to learn to fly the Dolphin. As we progress through the training program, more details of helicopter aerodynamics will be added.

FLYING THE HELICOPTER

By reading this section, and setting up and flying the practice situations described, you should be able to acquire enough skill as a helicopter simulation pilot to take up the Coastal Heroes challenge of a career as a search and rescue pilot.

If you have flown other helicopter simulators, you might be able to do fairly well if you skip this training course and start out on the missions right away. But chances are, you will be missing something vital covered here.

In the training lessons, it is assumed that you have selected the “Realistic” physics. If you do not want to bother with all this training, you might want to jump in and fly about in the “Easy” physics modes. However, if you really want to experience the details of the simulation, you should use the “Realistic” mode only.

Training Flight Set-Up

You will define the training flight yourself, using the menu system. First, make sure that your controls are set up properly in the “Options” menu. In the main menu, select “Single Mission”. You will then be prompted for a mission type/ name. The free flight missions are ideal for this purpose, as mission goals and time limits will not distract you. You will have several options available in the next menu screen - Select “Realistic” at the “Physics“ entry. For the first missions, you should select the sun symbol for both “Weather” and “Time of day”.

When you start the mission, you will be looking at the helicopter from behind using the Outside camera. You can use this view for the training, but the most realistic experience, of course, requires you to use the cockpit camera. If you use the outside view, turn on the 2D instrument panel (default is on). Inside the cockpit, you may find the 2D panel the easiest to use, but you can also use the 3D-cockpit panel.

FORWARD FLIGHT

Let us first look at flight maneuvering with plenty of forward speed.

At a speed of 40 knots or more, you will find that the helicopter is particularly easy to control, and in many ways behave like a fixed wing aircraft. Below 40 knots, auto coordination will be disabled and the handling changes considerably, so stay out of that regime for now.

For all forward flight exercises, set up a flight session as described above, and in addition, select the flying helicopter symbol at the “Start position” entry.

Straight and Level

When you enter the simulation, you should already be set up for straight-line flight. Now, we just need to keep it that way. In this exercise, you will only need to use the collective and the pitch control of the cyclic. To do so, first look at the vertical velocity indicator, and adjust the collective until the needle settles at zero. Do not concentrate only on the needle, but get a feel for the delay in between moving the collective and a new vertical speed being established. When you are satisfied, move on to controlling

your airspeed at the same time. If the airspeed indicator shows you are slowing down, lower the nose a little and vice versa.

Changing Speed

When you are able to fly level at a fixed speed, try to change airspeed while maintaining altitude. Do this by deciding on a new, higher airspeed, and accelerate towards it by putting the nose down. Note how you lose altitude at the moment the nose goes down. Your main rotor lift is about the same as before, but it is now pointing more forward and less up, so you are consequently dropping. The proper way to accelerate is, therefore, to add a little collective as you put the nose down.

The next step is to decelerate to a lower speed, while staying at the same altitude. Tilting the lift vector backwards by raising the nose accomplishes this, however, perhaps surprisingly, you now have to decrease the collective a bit to stay level. The explanation for this is that the rotor and body are now transforming some of your forward energy to extra lift. If you pitch up strongly, you will hear the main rotor pick up speed. Be careful not to over speed the rotor, though, as it might break apart.

Turns

A turn is made by banking, which will point the lift vector towards the inside of the turn. As you do this, you will decrease the upward pointing component of your lift vector, so you will have to add more collective. As you start practicing level turns, note your altitude and your heading on the horizontal situation display before entering the turn, and decide the heading at which you will exit the turn.

If you are used to flying fixed wing aircraft, you will be tempted to pull back on the cyclic to get the lift required to turn. However, Doing so will just make you slow down. Instead, keep the nose low enough to maintain airspeed.

It is a good idea to adopt a favorite angle of bank, and always use that when turning, which will give you a good idea of your turning radius and the time to complete a turn – this will be much harder if you use a different bank angle each time. Your bank angle could be a modest 30 degrees, where the rotor is only required to produce 15% more lift than in level flight. Or, you could opt for 45 degrees, where 41% more lift is required. This means the helicopter will feel 41% heavier, also described as pulling 1.41 G's. A higher bank angle will be impractical, as 60 degrees of bank will require you to pull 2 G's, which is not possible if the helicopter is heavily loaded with fuel and cargo – see the section on stalls below – and you will also be fighting the bank limiter of the AFCS.

As a rule of thumb, you should start rolling out of the turn when the remaining heading change is half of your bank angle.

So, let's practice turns: Start flying straight and level, and make a mental note of your altitude and airspeed. Slowly, increase the bank to 30 or 45 degrees while watching the vertical velocity indicator. Increase collective to keep the VVI needle at zero, and keep turning while maintaining airspeed and altitude. Then, level out while decreasing the collective to establish straight and level flight.

When you are getting the hang of it, decide on a new desired heading before entering the turn, and exit the turn at precisely that heading.

Climb and Descent

Climbing while flying straight ahead is quite simple: Adjust the collective until the desired rate of climb is achieved. The engines have to work harder, so watch the over torque warning lights. Around an airspeed of 70 knots, you will be able to climb at a rate of about 2000 feet per minute with full tanks, while at both lower and higher speeds, performance will be less.

Descent is also a simple process - simply lower the collective to produce less lift. Make use of a shallow descent whenever possible, and you will avoid two dangers: A steep descent may result in rotor over-speed, and the nose is blocking sight of where you are going.

When you are comfortable with climbing and descending while flying on course, you can try combining these with a gentle turn.

Using Reference Attitude

Moving the cyclic stick in the helicopter, you will feel a force that will try to push it back into a neutral position, very similar to the centering force of a computer joystick. Flying at a certain attitude, especially at high speeds, will require you to constantly push the stick. This can be quite tiresome, and will adversely affect the precision of your input. When you have established a desired attitude, you should press and release the Sync/Trim Release button, which, while referencing attitude, will then change to your current attitude, and you can relax the forces on the cyclic.

Asymmetric Lift and Retreating Blade Stalls

The rotating wings of the helicopter makes it able to do things no fixed wing aircraft could attempt, but there are also some problems associated with using rotors for getting lift. While hovering, all blades move through the air at the same speed, but as the helicopter starts moving forward, the situation gets more complex.

To continue the example we will need some definitions: We will call the blades on the left side of the advancing blades and those on the right side of the retreating blades.

At high-speed forward flight, the advancing blades will have a tremendous airspeed, as the total airspeed is the sum of the helicopter speed and the rotating speed. On the other side, the retreating blade will move much slower, as the two speeds are applied in the opposite direction here. As the rotation speed increases with radius, the tip of the retreating blade will still move through the air at a fair speed, while the innermost section with very little rotational speed will move backwards through the air.

As difference in speed means difference in lift, the angle of attack (AoA) of the advancing blade is decreased, and the AoA of the retreating blade is increased to compensate for this. If no compensation were made, the helicopter would start rolling to the right as soon as it moved forward.

At some point, increasing the AoA of the retreating wing does not help anymore, as it fails to produce more lift, and subsequently stalls. In this retreating blade stall, lift is lost on the right side of the helicopter, and you will start to roll to the right and lose altitude.

To recover from a retreating blade stall situation, you will have to lower the forces on the rotor by lowering the collective and centering the cyclic. Resist any temptation to try to roll in the opposite direction using the cyclic, as it will only make things worse!

For obvious reasons, the best strategy to embrace is avoiding a stall entirely. This means that you should be very cautious when maneuvering at high speeds, and take care to note the conditions: heavily loaded helicopter, high altitude, warm weather and low air pressure, as all can contribute to hastening the stall process.
The retreating blade stall begins at the root of the blade, and moves outwards if the load increases further. You will still be able to fly with the inner section stalled, and the outer part producing adequate lift. In this case, the inner section will produce turbulence and vibrations, warning you of a fully developed stall if you increase the rotor load.

HOVERING

The ability to fly at low speed, and even hover in place, is what makes the helicopter the best and only choice for performing certain missions. Handling the helicopter at low speed is a very different task from forward flight, and generally involves a great deal of control manipulation, including the pedals, which are rarely used at high airspeeds. During the hover, you will rely mainly on visual references, and your instruments are of little use. To start with good visual feedback, select a mission that takes place over ground, such as the “Car Crash” rescue. Even if you prefer the cockpit views, you should initially try some of the external views, as these are better for examining the mechanics of hovering.
To get started right away, select the hovering helicopter symbol at the “Start position” entry. Note that hovering start is not available for the free flight missions. When you jump into the mission, you will be in “hover augmentation mode,” which means that the flight computer keeps your ground speed and vertical speed at zero. When you are ready, disengage hover augmentation by pressing the “H” key (default key assignment).

Ground Effect
First, let us get proper control over your height. There is a fair chance that you will start out with a collective position that is far away from the required hovering parameters, so you may be initially climbing or descending rapidly. Adjust the collective until you achieve zero vertical speed. Now, try to change the collective position a little, and observe a peculiar effect: When you are quite close to the ground, about a rotor diameter or less, you will seem to settle at a certain height, depending on the collective position. This is called the “ground effect”. The ground is increasingly deflecting the downward flow of air from the main rotor as you get closer, and this in turn increases rotor effectiveness. Essentially, it requires less power to hover the closer you are to the ground, which is also why two maximum hover altitudes are listed in the technical specifications: A quite high ”In Ground Effect” altitude, and a lower ”Out of Ground Effect” altitude.
Some tricky situations may occur: If you are hovering over sloping ground, the down flow can escape easier, and ground effect will be reduced. When taking-off from the roof of a tall building, you should be careful when passing over the edge away from the building, as the ground effect will suddenly disappear.

The air cushion below the helicopter will only exist when your airspeed is low, so as soon as you start to move, the ground effect will be reduced. This also goes for hovering in wind: You may have zero ground speed, but if your airspeed is considerable, the ground effect will weaken.

Manoeuvre During Hover
When you have established a steady hover altitude, you should practice moving around. Keep the ground speed low to stay in the ground effect, and be prepared to support the aircraft with a little collective if you start sinking.
Your forward and backward speed is controlled with cyclic movements in the same directions. When moving backward, you should, of course, be absolutely certain that there are no obstacles behind you.
Side to side motion is similarly controlled with sideward movements of the cyclic. Notice that even at a completely level altitude, you will drift a little to the left. This is an undesired effect of the tail rotor: When it pushes the tail to cancel torque, it also pushes the entire helicopter a little. So, a completely stationary hover actually means that you have to bank slightly to the right.
The AFCS keeps your heading steady while in a hover, but you can rotate about your vertical axis using the pedals.
When you have practised all these motions one by one, it is time to do them all at once. A most rewarding exercise is to find an isolated object like a tree, and hover in a perfect circle around it, while always pointing the nose at the tree.

Hovering Climb and Descent
Large altitude changes while hovering should generally be avoided. You will, of course, have to make height adjustments in the hover, but that should be all. Climbing with near zero airspeed is very inefficient, as it is much better to accelerate to about 70 knots and climb at that speed.
Descending in a hover should be avoided, because you cannot really see where you are going. Also, you can enter a dangerous situation called “Settle with Power”, which is described below.
If you make a sufficiently fast vertical descent, you will move along with the air that your main rotor has just thrown downwards. This air is very eddy and turbulent, so it will be a rough ride. This air will be re-ingested by the main rotor, and thrown downwards once again, an event which is useless to you: The air will form a vortex around your main rotor, and you will drop like a rock. If this happens near the ground, you are obviously in trouble. You can get out in two ways: Pull the collective all the way up to use all the available engine power to get out - maybe you have the power, maybe not. The other way is to lower the collective, to fall even faster, and enter auto-rotation (see below). Both methods can be combined with putting the cyclic forward to get some horizontal speed. In general, avoid near-vertical powered descent at a higher rate than 500 feet per minute.

Hover Augmentation
By now, you have found out that hovering is hard work, however it can be a lot easier if you use the Hover Augmentation mode of the flight computer. As described in the instrument section, it will zero your ground speed, and maintain a fixed radar altitude. Using cyclic fly-through, you can position yourself very precisely horizontally, and set your height using the Hover Beep switch. Via the Flight Director Slew button, you can also fly at a fixed ground speed.
In this simulation, you will have to perform other crew duties, other than just those of the pilot. When acting as hoist operator, you will find the hover augmentation mode invaluable.

Transitioning From and to Hover
You have already tried modest forward speeds while hovering. To enter the forward flight regime, accelerate by holding the nose low. For safety reasons, the best way to accelerate from a low altitude hover is to stay level until an airspeed of at least 50 knots has been reached. Some cyclic movement will be required to maintain altitude during the acceleration: As you pitch down in the hover, you will loose upward lift, and weakening of the ground effect will cause a further loss of lift. So, at low speed, you will have to increase collective. As speed increases above about 20 knots, you will gain lift, and you can lower the collective a little again. This is called "translational lift," and happens because the lift is now created by moving through a large amount of air that is pushed down a little, instead of pushing a lot on a small amount of air, as is the case in the hover. The latter case happens to be the least effective.
When you want to decelerate from forward flight to hover, it should again be done at low altitude to avoid a steep hovering descent afterwards. At high speed, you will have plenty of lift due to the translational lift state, and thus converting forward speed to lift. So, here the collective will be low, and you should take care not to over-speed the rotor. As speed becomes lower, you will lose lift and you will have to increase collective, which will eventually force you to hover and take advantage of the ground effect.

TAKE-OFF AND LANDING

By now, you should be able to fly the helicopter pretty well. Now, all we need is to figure out how to get off the ground, and back down to earth again. To start on the ground with the engines shut down, select the helicopter on ground symbol at the "Start position" entry.

Starting Engines
It is recommended that you perform the start-up procedure while using the cockpit view (Possibly with the transparent cockpit function turned on).
The following is a start-up checklist adopted for the simulation. You might be able to cut a corner or two if it seems too tedious.

(Note: the following procedure is only applicable for "Realistic" flight modes. "Easy" flight mode has a simple one button start procedure)

BEFORE STARTING ENGINES

- Wheel brakes – SET .....("B")
- Check full free movement of all cyclic, collective and pedals
- Collective – NEUTRAL

If you are using an analogue collective control, set it to zero lift, which is about one-third up from its lowest position.

- Hover Augmentation – OFF.....("H")
- Hoist – IN, no cargo attached.....("W")
- Cabin door – CLOSED .....("F9")
- Both fuel flow levers – OFF .....(SHIFT "E" and SHIFT "T")
- Rotor brake – ON .....("R")

The casual pilot could cut away most of the steps outlined above, but now for the important operations:

STARTING ENGINES

- Engine 1 – START .....("E")

You can check the fuel flow control lever's (FFCL) position visually by panning the view to the centre of the roof. It takes 15 – 20 seconds to reach full gas turbine RPM.

- Engine 2 – START .....("T")
- Rotor brake – OFF .....("R")
- FFCL – BOTH FORWARD .....("E" and "T")
- Low RPM lights off – CHECK

Your rotors should now be at 100% RPM, and your co-pilot will verbally confirm that you are ready for take-off.

Take-Off
Increase collective until you are airborne, and establish a hover. If your nose is not already pointing into the wind, now is a good time to make it so. Put the nose down to accelerate to 50 knots or more, and then begin a climbing turn towards your first way point. Take the gear up, if desired – the gear must be up if you are to fly faster than 135 knots IAS.

Landing and Shut-Down
As you close in on the landing site, notice the wind direction from observing windbags, or review your weather briefing. Carefully scan the surroundings for obstacles, and then plan your approach. Whenever possible, you should fly past the landing site in the downwind direction at about 500 ft AGL, turn around, and make the final approach upwind. On the downwind leg, perform the before landing check:

BEFORE LANDING CHECK

• Hover Augmentation – OFF.....("H")

The Talon deck arresting system should only be engaged when landing on ships. This will assist in getting a firm touchdown on a rolling and heaving deck. Several single missions will allow you to practice using the Talon.
As you fly the final leg, make a shallow descent while transitioning to a hover a few feet over the landing pad. Make sure not to enter the settle with power condition during this phase. Now, lower the collective to touch down.

When you have landed, you may shut down immediately:

SECURE CHECK

• FFCL's – IDLE DETENT.....(SHIFT "E" and SHIFT "T")

• Both fuel flow levers – OFF .....(SHIFT "E" and SHIFT "T")

• Rotor brake – ON. .....("R")

Now, enter headquarters for your de-briefing, a visit to the men's room, and maybe even a cup of coffee or a nap, while the ground crew prepares the Dolphin for the next flight.

EMERGENCIES

A helicopter is a sturdy machine, but still, there is always a remote chance of a malfunction. By far the most likely cause of a malfunction is improper handling by the pilot.

Autorotation
Probably the most common reason for people to be reluctant to enter a helicopter is "what happens if the engines quit?" They don't realize that a helicopter is usually much safer than a fixed wing airplane in such a situation.
If a power loss occurs, due to engine or gearbox failure, the main rotor will loose RPM and you will drop out of the sky if you don't act quickly. The solution is to enter autorotation. If you let air flow up through the main rotor, it will behave just like a windmill. You will have to lower the collective immediately as a power loss is detected. If you wait too long, the rotor will slow down, and it will be very difficult to increase your RPM's again. The best RPM for autorotation is about 110% - be careful not to go much higher, as you may destroy the main rotor. Moving through fresh air is the best for auto-rotations, as well as achieving powered flight. The best airspeed is 70 knots, where you will be descending at a rate of about 2000 feet per minute. At higher or lower airspeeds, the rate of descent will be even higher.
So what is the point? The rate of descent is clearly too high for a safe landing! In the rapidly spinning main rotor, you have stored a colossal amount of energy, So when you pull the collective, this energy can for a brief moment slow your descent enough to touch down gently.

As soon as autorotation has been established, select wheels down and look for a spot to land. If there is room enough, the easiest way to land is to keep the forward speed of about 70 knots, and land like a fixed wing airplane. If you have the time, turn to face the wind directly, or you can also choose to enter a hover immediately above the ground, and land from there. This requires extremely good management of the energy stored in the rotor, and will require a lot of practice.
To stay safe, keep a combination of airspeed and altitude that will allow you to make an auto-rotating landing if you suddenly loose power. This means that you should avoid hovering or flying slowly at altitudes between 50 feet and 500 feet AGL, and not fly above 100 knots very close to the ground.
You can practice auto-rotations by retracting both fuel flow levers to the idle position, since this will remove all engine power, but you can quickly regain power by advancing the levers again.

Flame-Out
An engine may stop because it does not get any fuel, or because it has ingested smoke that stops the combustion. In case of a flame out, the torque and RPM bars for that engine will rapidly drop to zero. If both engines flame out, you will have to enter autorotation, but you should be able to continue flying on a single engine if you refrain from manoeuvre using a lot of power. In that case, dump as much fuel as you can afford.

You can attempt to restart the engine in the following way:

RESTARTING ENGINE IN-FLIGHT

• Identify failed engine
• FFCL – OFF .....(SHIFT "E" or SHIFT "T" twice, depending on engine)
• FFCL – IDLE.....("E" or "T")
• FFCL – FLIGHT.....("E" or "T", if engine ignites)

It is recommended that you practice single engine flight so you can get a feel for the manoeuvre that are possible in this state. Practice this by retarding one of the fuel flow levers to the idle position.

Gearbox Failure
If too much torque is used, the gearbox will eventually break, and you may lose transmission of power from one or both engines, or lose power to either rotor.
In a single engine gearbox failure, the engine RPM will stay nominal, while the torque drops to zero, in which case you may proceed with single engine flight as described above.
If transmission to the main rotor is lost, enter autorotation immediately and land.
If power to the tail rotor is lost, or it is damaged by a collision, the consequence depends on your flying state: In a hover or low speed flight, the nose will yaw strongly to the left, and the helicopter will rotate rapidly about its vertical axis in a counter-clockwise direction, in which case you should immediately enter autorotation, and land. During forward flight, the vertical tail fins will provide a stabilizing force, and a moderate

yaw to the left will be experienced, along with loss of pedal response. If possible, maintain a forward speed of at least 70 knots, and perform a power-on rolling landing. Otherwise, enter auto-rotation and land.

Rotor Collision
Main or tail rotor contact with any object should absolutely be avoided. Immediate destruction of the rotor will result.

NAVIGATION

Visual Meteorological Conditions
As you enter the helicopter, a list of way points specific for your mission has already been uploaded to the navigation computer. After take-off, you can simply turn to make the arrow point towards the first way point, and fly in that direction. It can be vital to execute the Med Evac mission as quickly as possible, so you should cruise at 120 to 150 knots. As you get within about two nautical miles of the way point, start visually searching for the target, and slow down if you are required to enter a hover. The selected way point will automatically be incremented when the mission at the current way point is completed. If the mission circumstances somehow change, you may manually select the next way point by pressing the "N" key (default key setting).

Instrument Meteorological Conditions
When the weather is changing from bad to worse, the requests for Med Evac assistance begin coming in, which means you could potentially be going to work when the sky is dark and the visibility is about zero. To accomplish a successful mission in such conditions, you will have to be able to fly well while only using instruments.
In training for these situations, set up a single mission to take place during night and in fog. Select to display the 2D instruments, and turn off the console so that the attitude indicator (ADI) is shown.
You now have to practice an efficient instrument scan: Start looking at the attitude indicator, which is by far the most important instrument when you cannot see anything outside. Then, scan the instruments systematically, going from right to left, and return to the attitude indicator. Do not dwell on any instrument for too long, or over analyze what it displays - just look at each for about half a second. When you return to the ADI, react to the picture of the situation you got, with much smaller corrections than you would use under visual conditions. Now, perform the next instrument scan, and so on. It is a good idea to climb to an altitude where you do not have to worry about collision avoidance during the cruise. Make extensive use of the autopilot and hover augmentation to reduce the workload. During landings and most of the Med Evac operations, you will have to acquire the goal visually.

Correcting for Wind
On a nasty flight, you may encounter wind speeds of 60 knots or even higher. This is a lot for helicopters with top speeds of between 120 to 160 knots and typical cruise speed of about 110-140 knots. Your ground speed will be strongly affected by head- or tailwind, and flying on course will be more difficult.
If you steer directly towards the way point arrow on the horizontal situation display, you will drift off course, and subsequently waste time and fuel. As an example, let us assume a cruise airspeed of 140 knots and a side wind of 60 knots. To stay on course, you will have to steer 23 degrees into the wind. Generally, you will not calculate a heading correction for wind, but will judge your actual direction of motion over the ground by looking at the terrain, and adjust your heading until the direction of your motion coincides with the direction of the navigation pointer.

FLYING IN EASY MODE

Easy
The "Easy" mode was created for people who do not care about how a real helicopter reacts, but who just want to thrill and excitement of speeding to spectacular rescues. The basic philosophy behind this mode is that pressing "Forward" means moving forwards and pressing "left" means moving left (and so forth). As a player, you will not have to be careful of how much power you give. Just hold the direction key down and watch the helicopter move smoothly. (In some way you could say the helicopter acts more like a fixed wing plane in this mode!).
Another simplified function in this mode is the engine start- and shutdown-procedures. In "Easy" mode the only key used is "R" (default key setting).

FLYING WITHOUT AFCS

So, perhaps you are a hotshot pilot who doesn't need any flight computer to hold your hand. Well, we'll see about that!
First of all, any sane pilot will use the AFCS as much as possible in order to perform optimally during the Vietnam Med Evac missions. Still, the flight computer is just another piece of equipment that can malfunction; so flying without AFCS should be practiced.

Controlling the helicopter without AFCS
Control of the helicopter is extremely demanding without the AFCS. You should have joystick or similar control of cyclic, collective and rudder - keyboard control will simply not do
It is recommended that you start experimenting with AFCS off when on the ground or in a hover. As explained below, the helicopter will be quite well behaved in pitch and roll response, while yaw motion will be very pronounced. Now you manually have to compensate for the torque on the main rotor shaft, so you will have to practice using the pedals in coordination with cyclic movements.

When you feel confident with hovering, you can try forward flight. Here, yaw control becomes easier as the tail fin stabilizes the helicopter in yaw. Instead, cyclic control

becomes tricky, mostly because the advancing and the retreating blades produce different amounts of lift; the neutral cyclic position moves quite a lot as you pick up speed. A simple trim function is available: When you press "0" on the keypad, the current cyclic position will immediately be used as the new centered cyclic position. You should trim before a large change is required, otherwise a nasty jump will result from the immediate change in trim. This is also the reason that you should be cautious when disabling AFCS in forward flight, as a large trim change will be required. As the speed gets higher, control will become more and more difficult, and speeds higher than about 100 knots are likely to result in loss of control.
As the flight computer is no longer restricting extreme attitudes, you can attempt to perform aerobatic maneuvers, like loops and rolls, but understand that this will be extremely difficult.

The No-AFCS Flight Model

This section is just for the technically interested – there is not much here that will help you in flying the helicopter.
You might ask whether it is really the same helicopter simulation you are flying when turning the AFCS off, as it feels so different. The answer is yes, or at least, very close to yes… The AFCS is very successful in taming the flight characteristics of the helicopter so that it changes from a wild beast to a mild servant. Still, there is a change in the flight model: Gyroscopic forces were not fully implemented when the flight computer code was written, so when the AFCS is used, gyroscopic forces are disabled. The nice thing about the rapidly spinning main rotor is that it will try to keep its orientation just like a spinning top or a gyroscope. It stabilizes the helicopter around the pitch and roll axis.
Have you noticed that the axis of a slightly tilted spinning top changes direction, resembling a circle? This phenomenon is called gyroscopic precession, and affects all spinning objects, including main rotors. It appears as force acting on the rotating object, which makes the object behave as if the force was applied 90 degrees later in the rotation, if the body was not moving. E.g., the main rotor spins clockwise seen from above, and a force is pushing the rotor tip at the right side of the helicopter down. This will not make the right move down, but rather, make the tail go down and the nose goes up. As the right side is the location of the retreating blade, which produces less lift than the opposite side, you will feel a tendency for the nose to rise as you pick up speed. Gyroscopic precession has also to be taken into account when designing the controls. The example above shows that when the cyclic is pulled back, the angle of attack of the rotor blade to the right side should decrease while it increases on the left side, and the angle remains unchanged, front and aft.
The large amount of trimming required with AFCS disabled is more pronounced than in a real helicopter, because main rotors are flexible, either due to built-in hinges or a flexible material being used. This makes the blades "flap" as they rotate, neutralizing much of the trim forces. To make the calculations manageable, the rotor in this simulation is completely rigid. With the AFCS activated, the flight computer takes care of the extra trimming required. But with AFCS disabled, you have to take care of the extra work.

TROUBLE SHOOTING

If you are having problems with Vietnam Med Evac, this section might be able to help you. Please read through the following paragraphs before contacting your dealer or InterActive Vision A/S.

Optimizing for Speed

We spent a lot of time and effort making Vietnam Med Evac run as fast and smooth as possible. If you want the game to run faster, this section contains a few useful hints.

1. First of all, you should try changing the detail level settings in the setup menu. Move all sliders towards the left hand side of the screen (towards 0 %).
2. Pick a lower screen resolution in the Vietnam Med Evac start-up box.
3. Make sure you have the latest drivers for your graphics card installed. Contact you graphics card manufacturer for more information (You will most likely be able to download the drivers for free from the Internet).
4. Close all programs before starting Vietnam Med Evac. Programs running in the background might take processor power or RAM away from Vietnam Med Evac.

GLOSSARY

This small glossary contains explanations for terms and abbreviations, which are not explained in any other part of the manual.

Hot MIC	This defines a communication period where casual talk is prohibited. The "Hot MIC" is activated during hoists or other rescue procedures, and while it is on, all crew must use special voice commands and responses.
KIAS	Short for "Knots Indicated AirSpeed"
AFCS	Short for "Automatic Flight Control System"
HOV AUG	Short for "Hover Augmentation"
IAS	Short for "Indicated AirSpeed"
RPM	Short for "Revolutions Per Minute"

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Manual

Vietnam MED+EVAC

August 2nd, 1964. The U.S. Destroyer Maddox is on peacekeeping maneuvers in the Gulf of Tonkin, Vietnam, when it is attacked by North Vietnamese torpedo boats. The Maddox is attacked again on August 4th. And the world would never be the same again.

From the people who created the critically acclaimed Search and Rescue series comes the latest addition to the saga. **Search and Rescue: Vietnam MedEvac** is the next generation, stand alone successor to the storied series, placing you in command of the world famous UH1 "Huey" helicopter, as you fly rescue missions into the heart of war torn Vietnam during the American campaign. This adventure will be like nothing you've ever experienced before, as the war comes alive all around you. Buckle in, and fly into the fray - lives depend on your bravery and skill.

FEATURES:

- Renderware™ graphics with dynamic lighting, vertex shading, and extremely high quality textures.
- Realistic weather and environmental effects such as ocean waves, rain, fog, and wind.
- Authentic Vietnam conflict surroundings, such as enemy troops firing at you, and platoons on both sides waging war below you.
- Over 100 missions.
- Immersive layered sound effects and realistic audio speech communication.
- Easy and realistic flight modes cater to all skill levels, from the rookie pilot to the veteran chopper captain.

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