# WEREWOLF®




PILOT
MANUAL

## MACINTOSH®

NOVA LOGIC™

# WEREWOLF®




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**MACINTOSH**

# LETTER FROM THE PRESIDENT

Dear Werewolf Player,

We at NovaLogic thank you for purchasing Werewolf®, our Kamov Ka-50 attack helicopter simulator.

It has been three years since the original release of Comanche Maximum Overkill™, which introduced the Werewolf as the Comanche's deadliest opponent. Since then the Ka-50 has flown combat missions and been shown publicly at air shows. Western air forces have had the opportunity to flight test this amazing bird and we are fortunate to have had the advice of a Werewolf test pilot, Simon Bradley, in putting together our simulation.

As you will discover, the Ka-50 is quite an aircraft. Its counter-rotating main rotors give it enormous stability and very different flight dynamics from the Comanche. This bird pulls 3 Gs. Check it out!

We have gone to great lengths to reproduce the unique look and instrumentation of the Werewolf cockpit. Familiarize yourself with the HID displays and try to take maximum advantage of all the information available to the Ka-50 pilot. There's no copilot aboard, so you better be ready to do it yourself!

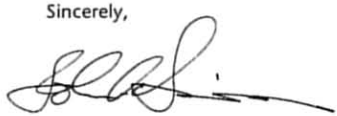
Werewolf shares with Comanche 2® MAC the many enhancements made to the original Comanche environment, including ground hulks and translucent smoke. Best of all, you can now test your skill against an opponent wilier than any computer AI: another human. Watch your six and your instruments because you are now playing The Most Dangerous Game.™ With Werewolf vs. Comanche NovaLogic offers the first of a series of multiplayer games, featuring the ultimate challenge of man against man (or woman).

Werewolf can be played with other Werewolves or with Comanche 2. You and a friend can play Comanche against Werewolf, using the two CDs you just bought. If your friend also owns Werewolf vs. Comanche (total 4 CDs), you can play cooperatively with other Werewolves against one or more Comanches or team up in a Comanche attack against the Werewolves. Of course you can still play either game as a stand alone.

Many dedicated gamers worked super hard to bring you Werewolf vs. Comanche. I hope you enjoy playing it as much as we did creating it. Let us know what you think.

Thanks for your support!

Sincerely,



John Garcia
President, NovaLogic, Inc.

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# NovaLogic Technical Support

The entire staff here at NovaLogic, Inc. would like to thank you for purchasing this copy of Werewolf®, the latest in our series of fine helicopter simulations for the Macintosh. We're committed to producing quality entertainment software that pushes the technological envelope. This commitment doesn't end when you purchase our games however, it's just begun. NovaLogic's Technical Support staff is ready to assist you.

## NovaLogic Technical Support Line: (818) 878-0325

If you need to speak to someone directly, our Technical Support Staff can be reached during normal business hours (Monday through Friday 9AM to 5PM Pacific Standard Time). To better assist you, a Technical Support staff member is likely to ask questions regarding your specific hardware set-up. Have this information handy. Also, be prepared to explain the exact nature of any problems you are experiencing. For example, write down the exact wording of any on-screen error messages you may be receiving.

## NovaLogic Fax Support Line: (818) 880-3448

You may fax your questions or comments to a member of Technical Support at any time day or night. To send us a fax, dial (818) 880-3448. Be as specific as possible regarding any problems you may be experiencing.

## NovaLogic Email Support Line: support@novalogic.com

You may email your questions or comments to a member of Technical Support at any time. Send your email to *support@novalogic.com* Again, to better assist you, please be as specific as possible regarding any problems you may be experiencing.

## NovaLogic Internet Website: http://www.novalogic.com

Those of you who have access to the World Wide Web may visit the NovaLogic website for up-to-the-minute product information, previews of coming attractions, game updates and screen shots, and a host of other NovaLogic goodies.

## NovaLogic Bulletin Board Service: (818) 880-3444

The NovaLogic BBS can be reached 24 hours a day for your convenience. It is offered to our customers as an alternative to visiting our website. You may log-on to the NovaLogic BBS via modem by dialing (818) 880-3444.

## Committed to Quality
## Dedicated to Excellence

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Preview Manual



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# GAME INSTALLATION

Werewolf MAC can be played entirely from the CD in order to save space on your hard drive. It is not necessary to "install" the game at all. But if you would like to increase the loading speed of the game, you may copy portions of it over to your hard drive. Before performing this operation, check the available free space on the drive.

## TO PLAY WEREWOLF MAC FROM THE CD:

1. Insert the Werewolf MAC CD into your CD-ROM drive.




2. Double click on the Werewolf MAC icon after it mounts in the Finder.
3. Double click on the application icon as shown in the window below to run the game.




## TO INCREASE THE LOADING SPEED OF THE GAME:

1. Choose a location on your hard drive for the Werewolf MAC files. Create a brand new folder for them and call this folder "Werewolf MAC".




2. Open the Werewolf MAC window by double clicking on the CD icon.
3. Drag the Werewolf MAC application icon and the Mission Folder from the CD window and drop them in the newly created Werewolf folder on your hard drive.




4. To run the game, double click on the Werewolf application icon on your hard drive. Make sure that the Werewolf MAC CD is still in your CD-ROM drive.

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# Werewolves on the Loose

: 0315 HOURS ZULU 27 MARCH 1999
: FIREBASE ZHUKOV... SOMEWHERE ALONG OUR BORDER

Following the "fall" of communism in the Soviet Union, little has improved. It's now 1999 and Russia is besieged on all fronts: Muslim Fundamentalists wage holy wars along the her southern borders, ethnic unrest in the Baltic region threaten to disturb a fragile alliance with Europe, terrorists brew trouble along the Chinese border, and Communist hard-liners and organized crime threaten Russia from within. The time for diplomacy has passed, comrade, and the time for action is at hand.

The success of the American attack helicopters prompted the Rodina (motherland) to create its own, the Mi-24, which we called Gorbach but NATO called "Hind." The Mi-24 served well, yet suffered at the hands of our American-supplied enemy in Afghanistan. In the quest for a more survivable platform, the Kamov team built what could be considered the most advanced, most ergonomically efficient attack helicopter in the world and the world's first single-seat attack helicopter, the Ka-50, Werewolf (designated Hokum by NATO).

It took almost two decades for the Werewolf to gain acceptance in the Russian military. In short, nobody believed that a single crew member could fly the helicopter and operate the weapons simultaneously. In the age of two-man gunships, a single seat aircraft had no place. The persistence of Kamov paid off, however, when the Ka-50 met its main rival, the Mi-28, in a threefold competition. The Ka-50 won all three legs of the competition by reducing the pilot workload to minimum levels and integrating the Ka-50 with other battlefield units. The Ka-50 doesn't need to find its own targets, it lets FACs (Forward Air Controllers) find the targets, then the Ka-50 kills them.

Enemies of the motherland have built a forward military base near our borders and intend to violate our national sovereignty by infiltrating our soil. These terrorist have stolen equipment from the Americans, including the new RAH-66 Comanche, and threaten the motherland with their vile plots. Tonight, comrade, you shall lead a group of Ka-50s on a preemptive strike against our enemy. The strike shall be swift and devastating, leaving no survivors. Send a clear signal to our enemy that aggression will not be tolerated nor can a shield of American "advisors" protect them. Find the enemy, destroy their armor, and down their Comanche helicopters before they have the opportunity to violate Russian soil. Tonight, our Werewolves hunt.

With these directives in mind, you climb into the cockpit of a Ka-50 Werewolf. The stars overhead provide the only light as you start the engine and activate your avionics. The Ka-50 is a simple, uncomplicated helicopter. It lacks the complex avionics found in Western counterparts because it relies on other battlefield units to find targets. Tonight, precise targeting coordinates have been relayed from intelligence satellites to your Werewolf's onboard computers. As you approach the target, laser designators operated by our elite, special forces comrades will provide last minute guidance corrections. Effectively, you will be guided to the targets through others' eyes.

Service Manual

After verifying all systems, you pull back on the collective and feel your Werewolf leap into the air. Depressing the left pedal, you rotate the nose of your helicopter to the desired heading. Unlike conventional designs, Kamov-built helicopters have no tail rotor. Kamov helicopters counter the torque generated by the main rotor by stacking two contra-rotating main rotors above each other. The lack of tail rotor lets you maneuver the tail of the Werewolf much closer to trees and other ground obstacles without causing serious damage. Pushing the cyclic forward, you ease the nose of the Werewolf down thereby forcing it to move forward.

You race toward the target at approximately 300 kilometers per hour, barely 20 meters above the ground. Slowing as you approach the target, your FLIR detects something ahead... a stolen RAH-66 Comanche heading in your general direction. Quickly, before you are detected, you arm an R-73 air-to-air missile. Locking the targeting system on the Comanche, you fire the missile and watch your adversary erupt in flames! Before more enemy forces can scramble you lock the targeting system on what appears to be the command building and request artillery support. Within moments the entire area is showered with doom from above. You hover just above the ground in the pass between two hills leading to the enemy encampment, picking off any units trying to escape the artillery induced annihilation. Before you can strafe them with your 30mm cannon, two Comanche crews get airborne. They and their Stinger missiles are coming for you.

In less time than it takes to tell, you lock your targeting system on the first Comanche and fire two R-73s in rapid sequence, hoping that while the first may well chase harmlessly after American flares, the second should find its target with devastating efficiency. Almost simultaneously, you lift the collective and pull back on the cyclic causing your Werewolf to lurch backwards. The flash of light you observe somewhere beneath your nose indicates at least one of the R-73s struck home. Pulling back you see the other Comanche clear the ridge at your 2 o'clock position and immediately fire a Stinger missile. Automatically, your defensive systems begin releasing flares which successfully mislead the incoming missile.

As the Comanche dashes past your right side toward the cover of a nearby hill, you slam the right pedal, point your nose at your adversary, and give chase. You manage to launch your last R-73 just as the Comanche ducks under the hill; your missile collides harmlessly into the hillside. Clearing the ridge only seconds behind the RAH-66, you lock your sights on it and open fire with your 30mm cannon. The FLIR view displayed on your tactical display monitor shows the impact of your bullets and subsequent smoke billowing behind the enemy aircraft. Another burst of 30mm rounds and the RAH-66 augers itself into a smoking crater.

You've earned three air-to-air kills, destroyed most of the enemy helicopter force while still on the ground, and now your fellow Werewolf pilots are razing the combat zone and eliminating any survivors. This particular group of insurgents will think twice before challenging the motherland again.

Not for Resale

# Table of Contents


Letter From The President ..... ii
NovaLogic Technical Support ..... iii
Credits ..... iv
Game Installation ..... vi
Werewolves on the Loose ..... vii
Table of Contents ..... ix
Chapter I Game Menus ..... 11
A. The Pilot Roster Screen ..... 11
1. Adding Pilots to the Pilot Roster ..... 12
2. Deleting Pilots from the Pilot Roster ..... 12
3. Pilot Roster Ranking ..... 12
B. The Main Operations Menu Screen ..... 12
C. The Menu Bar ..... 14
Chapter II How To Fly The Werewolf ..... 19
A. Primary Flight Controls ..... 19
1. The Collective ..... 19
2. The Cyclic ..... 20
3. The Rudder ..... 21
4. An Easy Aircraft to Fly ..... 21
B. Cockpit Avionics ..... 23
1. Pilot Views ..... 23
2. HUD and HID indicators ..... 23
3. Tactical Information Display ..... 26
4. Other Console Avionics ..... 27
5. Weapons System Controls ..... 29
6. Hands-Off Weapons ..... 31
Chapter III Multiplayer Gaming ..... 33
A. Multiplayer Modem Gaming ..... 34
1. Initiating a Modem Game ..... 34
2. Multiplayer Modem Victory Conditions ..... 36

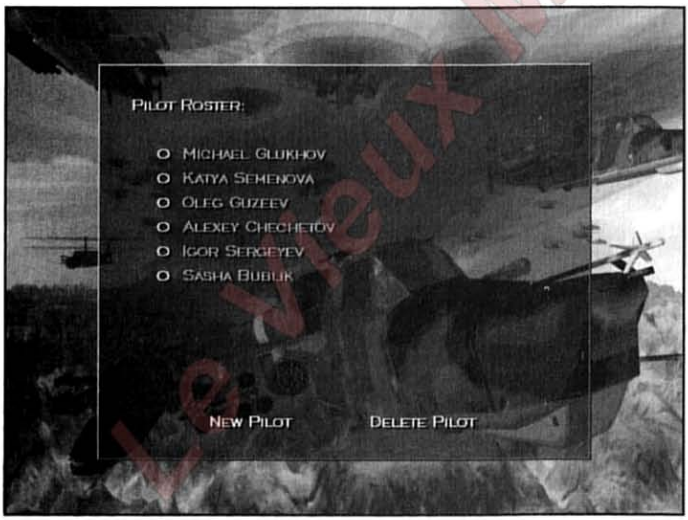

Le Vieux Manuel

B. Multiplayer Network Gaming ..... 36
1. Initiating a Multiplayer Network Game ..... 36
2. Network Play Victory Conditions ..... 37
Chapter IV Helicopter Strategy & Tactics ..... 39
Chapter V About The Werewolf ..... 43
Chapter VI Technical Specs ..... 57
A. Aircraft ..... 57
B. Land Vehicles ..... 59
C. Naval Vessels ..... 62
Chapter VII Hardware Configurations ..... 65
A. Joysticks ..... 65
B. Throttle ..... 68
C. Foot Pedals (Rudders) ..... 68
Glossary ..... 69
Werewolf Index ..... 78
Pilot Notes ..... 82
Player Reference Chart ..... 83, 85

Le Vieux Manuel

# Chapter I
# Game Menus

Once the game is properly installed on your hard drive you'll find that Werewolf is designed to have you up and flying in no time at all. This chapter explains the various Game Menu screens that assist you in getting started. It also details the menu bar options which enable you to tailor the game play to suit your particular hardware.




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## A. THE PILOT ROSTER SCREEN

The Pilot Roster is your squadron's Ready Room. This is the place where your pilots hang out between missions. In order to fly a Werewolf mission (either Single or Multiplayer) you first need to choose a pilot to represent yourself in the game. Several default pilots are already present on the Pilot Roster to help you get started. Select one of these pilots by "clicking" your mouse button on the pilot's name as it appears on your screen. The pilot's name is momentarily highlighted to indicate your selection.

## 1. Adding Pilots to the Pilot Roster

To add a pilot to the Pilot Roster, simply click your mouse button on NEW PILOT. A dialogue box appears prompting you to type in the name of your new pilot. When you are done, click on the OK button. Your new pilot is added to the Pilot Roster.

## 2. Deleting Pilots from the Pilot Roster

To remove a pilot from the Pilot Roster, simply click your mouse button on Delete PILOT. You are directed to select the name of the pilot you wish to remove. Once you have made your selection, a dialogue box appears asking you to confirm this selection.

## 3. Pilot Roster Ranking

Pilots are ranked according to the number of successful missions they have flown (and survived). This number appears to the left of the pilot's name. The pilot with the highest number of successful missions is listed at the top of the Roster. Pilots that have completed fewer successful missions appear in descending order.

# B. THE MAIN OPERATIONS MENU SCREEN

The Main Operations Menu screen is your launching point into the game.




## 1. Single Player Game

This option opens the SELECT CAMPAIGN dialogue box. On this dialogue box are listed the Werewolf campaigns.

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### a) Selecting a Campaign

Make a campaign selection by clicking your mouse button on the name of one of the six campaigns. After you make your campaign selection, a dialogue box appears which lists of all the missions that make up this particular campaign.

### b) Selecting a Mission

You are free to fly the missions listed here in any order to you wish. Make a mission selection by clicking your mouse button on the name of the mission you wish to fly.

### c) Mission Briefing

Once you have made a selection, a mission briefing appears which details this particular mission. After reading the briefing, you are given the two options; Accept Mission or Reject Mission. If you choose Accept Mission, you are placed in the cockpit of your Werewolf and the mission begins. If you Reject Mission, you return to the Select Mission dialogue box to choose another mission.

## 2. Multiplayer Game

This option enables you to begin a multiplayer game session. See Chapter III: MultiPlayer Gaming for details.

## 3. Your Stats

This option gives you access to your pilot's statistics. Listed on this screen are your pilot's cumulative score, number of victorious (successfully completed) missions, and the number of enemies this pilot has destroyed.

## 4. Choose Another Pilot

This option enables you to change pilots by granting you access to the Pilot Roster.

## 5. Ka-50 Overview

This option gives you a brief technical overview of your Ka-50 Hokum.




## 6. Demo

This option initiates a self-running demo of your Ka-50 Hokum in action.

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## 7. Credits

This option displays a list of the people who made this product possible.

## 8. Quit

This option ends your gaming session. Please hurry back.

*ESC- Pressing the ESC key at any time pauses the simulation and displays the Menu Bar across the very top of your screen. See below for details concerning the Menu Bar.*

# C. THE MENU BAR

Before you take off on your first mission, let's make sure that the combat simulator is precisely configured to your computer's hardware. To access the Menu Bar from the Main Operations Menu screen press the esc key.

At the top of the screen, above the shot of the Ka-50 in flight, you will see the menu bar appear with four menu selections and their respective options. Next to some of these menu options are keyboard alternatives that you may use without having to use the esc key to access the menu bar. You may use these keyboard shortcuts even while in the midst of your missions.

## 1. Menu

### a) About WEREWOLF

Pressing this selection will display the game credits.

## 2. File Menu

### a) Abort Mission +A

This option allows you to exit out of your present mission and go back to the Main Operations Menu screen for reassignment. You can abort a mission by pressing the esc key or by pressing the +A keyboard shortcut.

### b) Resume +R

Choosing this menu option during a mission will resume a paused game. This option functions as an alternative to pressing the esc key in order to resume play.

### c) Quit +Q

Selecting this option exits you from the game following a confirmation. You may access this option from the File menu or via the +Q keyboard shortcut.

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# 3. Edit Menu

## a) Undo, Cut, Copy, Paste, and Clear

These functions are disabled while Werewolf is running.

## b) Preferences

This menu option displays a dialog box allowing you to specify detailed information about your system. It also allows you to optimize Werewolf to run on your computer. If the program is not operating properly, or is running slowly, try changing these settings. If you want to reset your program preferences to their default settings, hold down the Option ⏎ key when you start the game.

### 1) Stereo

Click your mouse inside this box if you have external speakers and wish to listen to your sounds in stereo.

### 2) Engine Sounds

Click your mouse inside this box if you wish to hear engine noise.

### 3) Hi-Rez Anims.

Click your mouse inside this box to display animated sequences in high resolution.

### 4) Monitor Resize

Click your mouse inside this box to set the screen resolution to match the selected game resolution.

### 5) Use Quickdraw

Click your mouse inside this box to activate your Quickdraw Accelerator if available.

# 4. Detail Menu

These menu options allow you to configure the highest resolution of our Voxel Space graphic technology that your computer can handle. The faster your computer, the faster the game will play, and the more detail it will be able to show per frame. As a rule, the lower the detail you select, the faster the simulation will run. Experiment with the settings until you find the Detail Setting best suited to your computer's configuration.

## a) Terrain Detail

This option allows you to select the optimal level of detail for the speed of your computer.

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### 1) Low Detail

Changes your monitor to display a screen resolution of 320 x 240 pixels.

### 2) High Detail

Changes your monitor to display a screen resolution of 640 x 480 pixels.

## b) Gamma [⌘]+[G]

Press this key to toggle the brightness of your monitor between four different levels of brightness. Once the desired level of brightness is reached, it will cycle back to the darkest setting.

## c) Clouds

This option allows you to turn the cloud backgrounds On or Off. On some computers this is the best way to maintain a high frame rate with no loss in play quality. Use your mouse to place a checkmark next to this menu entry if you want to turn cloud backgrounds On.

## d) Small Pixels

Use your mouse to place a checkmark next to this menu option to improve your graphic detail. This option reduces the size of your individual on-screen pixels.

## e) Haze

Use your mouse to place a checkmark next to this menu option to turn on atmospheric haze.

## f) Reflections

Use your mouse to place a checkmark next to this menu option if you wish to have reflections appear on water surfaces.

## g) Frame Rate Lock

Use your mouse to place a checkmark next to this menu option if you wish to limit your computer to a maximum framerate of 12 frames per second.

# 5. Control Menu

This menu allows you to change the audio component of the game. It also allows you to configure your hardware control devices.

## a) Sound

This menu option lets you control the volume of your Sound and Voice Effects. A pop-up menu will appear allowing you to set the volume of your sound and voice effects between zero and seven (with the loudest being

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seven).

### b) Music

This menu option lets you control the volume of your music. A pop-up menu will appear allowing you to set the volume of your music between zero and seven (with the loudest being seven).

### c) Keyboard

Select this option if you want to use the keyboard to control your helicopter. This option is set by the program as the default control option. The keyboard can control all functions of the simulator.

### d) Mouse

Choose this option if you are planning on using a regular mouse or a controller that emulates the mouse as your flight controller.

### e) ThrustMaster

Choose this option if you wish to use the ThrustMaster Flight Control System (FCS). Refer to the illustration in Chapter VII: Hardware Configurations for operating instructions.

### f) Gravis

Choose this option if you wish to use one of the following Gravis products: Firebird, Mousestick, or GamePad. Refer to the illustrations in Chapter VII: Hardware Configurations for operating instructions.

### g) Throttle

Choose this option if you wish to use a seperate throttle controller such as the ThrustMaster WCS or CH Pro Throttle. Refer to the illustration in Chapter VII: Hardware Configurations for operating instructions.

### h) Pedals

Choose this option if you wish to use a seperate pedal controller such as the ThrustMaster RCS. Refer to the illustration in Chapter VII: Hardware Configurations for operating instructions.

## 6. Options Menu

The Ka-50 Hokum utilizes a Helmet Integrated Display (HID) system for the pilot to manage the navigation and weapon systems. These HID Display Options control the amount of information visible through your Helmet Integrated Display. Use your mouse to place a checkmark next to the option as it appears on the menu to activate the following options.

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## a) Artificial Horizon

This option controls the display that shows your present "pitch" (whether your bird's nose is up or down) and your helicopter's roll (left or right bank).

## b) HID Indicators

This option controls the Helmet Integrated Displays that report your Werewolf's present physical position and status. This setting will simultaneously turn "On" or "Off" the following HID indicators: Radar Altimeter, Rate of Climb Indicator, Heading Velocity Indicator, and Speed Indicator Display.

## c) HID Compass

Disables/enables the compass display along the upper edge of the HID.

## d) Missile Cam

Changes your view while in TAS Camera mode. When this display is engaged, your Archer or Vikhr missiles will relay closing views of the target.

## e) Rotor Mixed w/ Cyclic

When disengaged, the rotor and cyclic can now function independently via the joystick and the rudder pedals (or keyboard), providing for more precise and realistic movement.

## f) Altitude Stabilizer

When disengaged, the Werewolf's pitch is no longer held stable by the computer. This requires greater pilot emphasis on altitude control.

## g) Auto Chaff

Lets the on board computer dispense chaff as needed.

## h) Auto Flare

Lets the on board computer dispense flares as needed.

LA View Manual

# Chapter II
# How To Fly The Werewolf

## A. PRIMARY FLIGHT CONTROLS

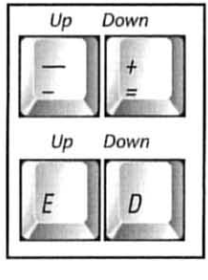
Visually, helicopter flight controls resemble jet fighter flight controls. There is some kind of control stick for the right hand, some kind of throttle/power for the left hand and a pedal for each foot. That's where the similarities between rotary-wing and fixed-wing flight controls end.

### 1. The Collective

The Collective, located under your left hand, controls the amount of lift generated by the main rotor by controlling the pitch of the main rotor blades. The collective in most helicopters is a long arm attached at one end to the cockpit floor. The pilot holds the arm much like a relay runner holds a baton. The arm pivots at the connection point to the floor. The pilot "pulls" the collective up to increase lift and "pushes" it down to decrease lift.

Do not confuse the collective with throttle. The throttle controls the engine RPM while the collective controls the pitch of the rotor blades. Helicopters have separate throttle controls, but are usually left at a constant setting during flight. Since it is rarely necessary to adjust throttle during flight we have not included separate throttle controls in Werewolf. Users with analog throttle controls, such as the Thrustmaster WCS Mk II and TQS, will note that sliding the throttle backwards results in increased torque. This operation is "backwards" from throttle controls in other flight simulations because it more accurately simulates the movements made with the left hand to control torque.

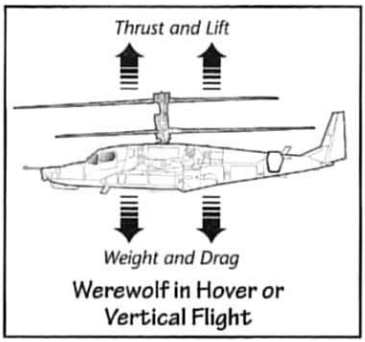
The main rotors provide the only source of thrust available to the helicopter. That thrust, which is generated directly downwards from the rotors, must be used to lift the helicopter as well as propel it. Since this thrust is pointed directly downward when the helicopter is straight and level, the thrust only lifts the helicopter. In order for the helicopter to climb, torque must be increased via lifting the collective. To make the helicopter move forward (or backward), the cyclic must be moved in conjunction with the collective.



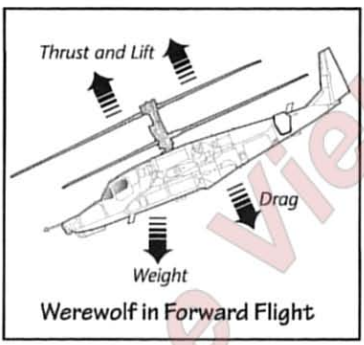

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## a) Collective Control

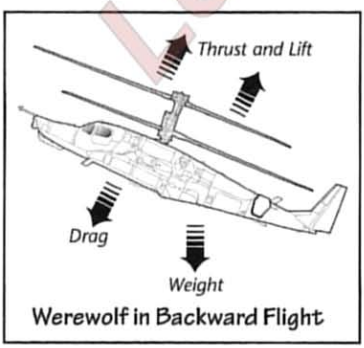
Any analog throttle device, such as the throttle control on the CH Flightstick or the Thrustmaster WCS Mk II, can be used for collective control. Keyboard users increase torque with the dash [-] key or the [E] key and decrease torque with the equal [=] key or the [D] key.



Werewolf in Hover or Vertical Flight



Werewolf in Forward Flight



Werewolf in Backward Flight

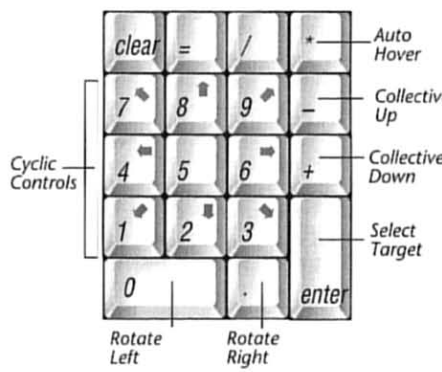
## b) Collective Indicator

Situated on the left side of the screen next to the left tactical display, two bar graphs labeled "C" and "T" indicate the current collective and throttle settings, respectively. Note that the throttle is set automatically by Werewolf's onboard computers to provide the requested amount of collective.

# 2. The Cyclic

The "control stick" in a helicopter is called a cyclic. The cyclic controls pitching and banking the helicopter. As with a normal aircraft, pushing the cyclic forward lowers the nose, pulling the cyclic back raises the nose, and moving the cyclic to either side banks the helicopter to that side.

Unlike fixed-wing aircraft, pushing the nose down does not necessarily mean the aircraft will descend. As described in the collective section, the thrust generated by the main rotors is pointed directly downwards. Tilting the body of the aircraft therefore tilts the direction of the generated lift. Pointing the nose down cause the lift to be pointed somewhat behind the helicopter. Less lift is generated directly downwards (which may cause the




Le vieux Marnier

helicopter to descend slightly) but the lift pointed behind the helicopter pushes it forward. Likewise, pulling the nose up points lift forward and slows the helicopter until eventually if flies backwards.

When flying, if you need to accelerate increase collective while simultaneously pushing the cyclic. Lowering the nose creates a greater horizontal component thus increasing speed, while increasing collective increases the overall amount of lift being generated, thus maintaining altitude.

### a) Cyclic Controls

The cyclic can be controlled with either a standard joystick, with the arrow keys located between the main keyboard and numeric pad, or with the arrow keys on the numeric keypad.

## 3. The Rudder

The main rotors continue rotating at the same speed regardless of the pitch of the blades. Increasing the blade pitch (to increase lift) also increases drag, thus making it harder to move rotate the blades, therefore requiring more torque to actually turn the rotor. The laws of physics tells us that for every action there is an opposite reaction. When a helicopter is not firmly planted on the ground, the torque generated by the rotor in one direction causes the helicopter body to rotate in the opposite direction.

Obviously, a helicopter spinning madly is of little tactical use. Therefore, most helicopters make use of tail rotors to offset the main rotor's torque effects. The Kamov design bureau, however, took a different approach to controlling torque. Kamov's trademark is a contra-rotating main rotor which uses two main rotors stacked one above the other rotating in opposite directions. The torque generated by each main rotor cancels out the torque generated by the other, thus eliminating the need for a tail rotor.

The pedals still affect yaw by controlling the relative speed of the two rotors. By increasing or decreasing the speed of one of the rotors the natural torque effects yaw the aircraft left and right in a controlled fashion. Pressing the left pedal moves the nose to the left, pressing the right pedal moves the nose to the right.

### a) Pedal Controls

The pedals can be controlled with any device connected to the X-axis of the second analog joystick port, such as Thrustmaster RCS pedals. The pedals can also be controlled with the 0 and . keys on the numeric keypad.

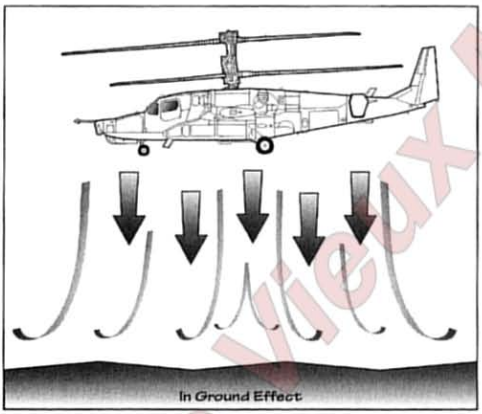
## 4. An Easy Aircraft to Fly

Helicopter flight is an exercise in coordination. Moving the cyclic alters the vertical lift component, therefore requiring a change in collective to maintain altitude. Changing collective changes the amount of torque on the main rotors,

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therefore requiring simultaneous change of the tail rotor pedals. In short, every movement of any of the three controls generally requires compensating movements in the remaining two controls.

Werewolf is different. Being a product of the modern era, it uses a computer monitored fly-by-wire(FBW) flight control system. The pilot's controls are not directly connected to any of the control surfaces. Instead, they are connected to an onboard computer that analyzes the inputs and determines what the pilot is asking the aircraft to do. The computer then alters all controls simultaneously to accomplish that task, generally making the Ka-50 quite easy to fly. If you're up for the challenge of flying a more conventional helicopter, you can disable some of the "automatic" flight controls using the "Options" menu. The FBW flight controls offers some advantages not available to older helicopters, such as auto-hovering mode.


In Ground Effect

## a) Auto Hovering

Pressing the ⊡ key on the numeric keypad orders Werewolf to immediately stabilize into a hover at low altitude. This is an effective way to slow the helicopter while maintaining a stable altitude, especially before crossing a ridge or exposing your aircraft to potential enemy fire.

## b) In Ground Effect

At low altitudes, the air thrust downward from the main rotors rebounds upward after striking the ground creating an extra cushion of lift. This is called "In Ground Effect (IGE)." Generally speaking, at low altitude once you've provided enough collective to become airborne, In Ground Effect provides enough additional lift to keep you airborne at a constant height over rolling terrain.

*In Ground Effect has its limits. Do not expect it to instantaneously thrust you above steep cliffs and mountains.*

## c) Wind

Wind plays a major role in aerial navigation. When floating unsecured above the Earth, no matter how fast you're moving, wind will push your aircraft. A steady wind will cause long-term navigational errors requiring you to make compensating course corrections. Gusty winds will suddenly push your aircraft one direction, sometimes dramatically depending on the strength of the wind. Read the pre-mission briefings carefully for available weather reports.

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# B. COCKPIT AVIONICS

Although it looks intimidating, the Werewolf cockpit is built around a simple concept: the pilot has enough work to do already, so keep the cockpit simple. Despite its complex appearance, the cockpit is actually quite intuitive and easily mastered.

## 1. Pilot Views

You have eight primary view controls, four internal views and four external views. The four internal views are:

- 1 - Forward View - also known as the Cockpit View
- 2 - Left-side View - view out the left side of your helicopter
- 3 - Right-side View - view out the right side of your helicopter
- 4 - Rear View - view out the rear side of your helicopter

The external view controls are:

- 5 - Panoramic View - The HID and Targeting information remains but all cockpit framework disappears.
- 6 - Chase View - Shows your aircraft as seen from an imaginary observer directly behind the helicopter.
- 7 - Drop Camera - Places a camera on the ground at a fixed point. The camera monitors your helicopter at all times.
- 8 - Active Last Drop Camera - Returns you to the view of a previous drop camera if you've released more than one.

## 2. HUD and HID indicators

The Werewolf uses a combination of a Head-Up Display (HUD) and Helmet Integrated Display to convey flight and weapons management data to the pilot. The HUD consists of a Plexiglas plate above the instrument panel. Flight information is projected on the transparent plate, allowing the pilot to see critical displays without looking down into the cockpit. The targeting sight, however, is connected to the pilot's helmet. Information is displayed on a small, transparent monocle which covers one of the pilot's eyes.

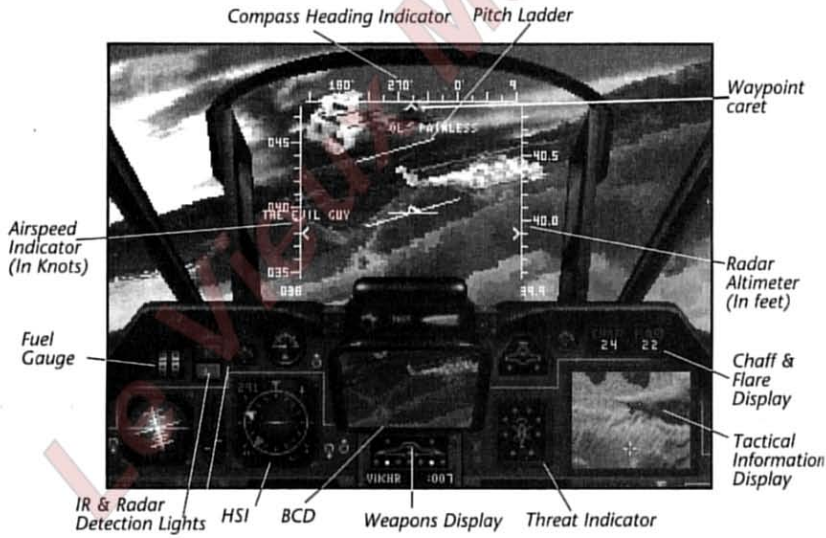
This Helmet Integrated Display (HID) technology is similar to that of the HUD, except the gunsight is displayed no matter where the pilot looks. The pilot may target and release weapons simply by turning his head. Because the display monitors where the pilot is looking, targeting information is sometimes overlaid over the instrument panel.

Review Manuel

For the purposes of describing their functions, we will discuss the HUD and HID indicators together in one section:

## a) Pitch Ladder

Located in the center of the HUD, the pitch ladder consists of a series of parallel horizontal lines. Each line represents 5° of pitch as indicated by the small numbers adjacent to each line. "Straight" lines indicate positive pitch, or pitch above the horizon. Angled lines, resembling an upside down "v" indicate negative pitch, or pitch below the horizon. The lines scroll up and down through the HUD as the helicopter's nose moves up and down. The line at the center of the HUD indicates where the helicopter's nose is currently pointed. For example, if the -5 angled line is located in the center of the HUD, the helicopter's nose is pointed down 5° below the horizon.




## b) Radar Altimeter

The Radar Altimeter is a bar gauge located along the right side of the HUD. It indicates your altitude Above Ground Level (AGL). Altitude can be also be described as above Mean Sea Level (MSL). MSL means how high you are above sea level while AGL describes the exact distance between you and the ground. For example, suppose you are hovering 200 ft. above a 10,000 ft. mountain. Your altitude is 10,200 ft. MSL, but your radar altimeter will read

200 ft. AGL. The tape scrolls up and down to indicate changes in AGL altitude and the number directly below the tape indicates the exact altitude AGL.

## c) Airspeed Indicator

The Airspeed Indicator is located along the left edge of the HUD. It indicates your current airspeed, with the number located beneath the tape giving your exact airspeed in knots. 1 knot = 1.15 miles per hour. A knot equals one nautical mile (2000 yds.) per hour.

## d) Compass Heading Indicator

The Compass Heading Indicator is located along the upper edge of the HUD. It indicates your current heading where north equals 360° or 000°, east equals 090°, south equals 180°, and west equals 270°. The number (or letter) located exactly in the center of this display indicates your current heading.

Located along the Compass Heading Indicator is a waypoint caret. When the caret is centered on the display it indicates that you are heading directly toward that particular waypoint.

## e) Weapons and Targeting

When you acquire a target, the HID will highlight the target by superimposing a symbol over the object. The available symbols are:

### 1) Targeting Symbology

| | | |
|---|---|---|
| Green Diamond | = | Friendly (on air or ground) |
| Grey Diamond | = | Inert, neutral target |
| Red Diamond | = | Enemy aircraft |
| Yellow Diamond | = | Enemy on ground |
| Flashing Diamond | = | Mission goal |

### 2) Friend or Foe Tagging

In the Multiplayer mode (discussed in a later section), live players are distinguished by a triangle tagged onto their helicopter from your forward cockpit view. A live enemy player is denoted by a red triangle; a live friendly player will have a green, inverted triangle tag.

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# 3. Tactical Information Display

The Tactical Information Display (TID) is located along the right edge of the instrument panel. It displays a variety of information depending upon its selected mode of operation. The number of goals remaining is shown along the top edge of the TID.

## a) Digital Map F1

The digital map shows an overhead view of the OP zone. The [ and ] keys decrease and increase view magnification, respectively. Objects on the map are color coded for rapid recognition:

Orange = Airborne Threat
Yellow = Ground-based Threat
White = Neutral Unit (such as fuel tanks)
Green = Friendly Aircraft
Blue = Friendly Ground Unit

The digital map is updated based on your on-board surveillance systems. Not all targets are necessarily detectable by your helicopter and consequently are not displayed on the overhead map.

## b) Mission Status F2

As the name implies, this screen indicates how many mission goals remain not destroyed.

## c) Operational Status F3

The Operational Status Indicator shows a graphical representation of your helicopter, illustrating what (if any) systems have been damaged either by enemy fire or by colliding with the ground.

### 1) Rotor Damage

A damaged rotor will cause the helicopter to spin. Depending on the severity of the damage, the helicopter may merely be difficult to fly or outright unflyable.

### 2) Engine Damage

Damaged engines will limit altitude and speed.

### 3) Battle Computer Damage

If the Battle Computer becomes damaged holding a target lock becomes difficult. This may eliminate some of your weapon choices. For instance, the Vikhrs require a laser locked on the intended target until impact. Further damage can keep it from working altogether.

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### 4) Weapon Mount Damage

The external weapon mounts can be damaged which prevents your long range weapons, such as the Vikhrs, Archers or rockets, from being fired.

### 5) Cannon Damage

If the cannon becomes damaged, no firing will occur. To prevent further damage to the helicopter by a misfire, the onboard computer will automatically disable the cannon.

### 6) Tactical Information Display Damage

When the Tactical Information Display (TID) is damaged your Target Acquisition System (TAS) will no longer function.

*TACTICAL INFORMATION DISPLAY SUMMARY*

| *FUNCTION* | *LEFT* | *RIGHT* |
|---|---|---|
| *Digital Map* | F1 | F5 |
| *Threat Indicator* | F2 | F6 |
| *TAS* | F3 | F7 |
| *Last Mode* | D | A |
| *Next Mode* | W | S |
| *Zoom Map Out* | < | < |
| *Zoom Map In* | > | > |

## 4. Other Console Avionics

### a) Weapons Display

Centered along the bottom edge of the instrument panel, the weapons display indicates the currently selected armament type and the quantity of that weapon remaining.

### b) Threat Indicator

The Threat Indicator gives you a visual indication of objects which threaten your aircraft. Showing a top-down view with your aircraft at the center, the threat indicator illuminates lights in the surrounding ring to indicate bearing to the source of the threat. The top of the circle represents directly ahead of your aircraft, the bottom represents directly behind your aircraft, and the right and left sides represents the right and left sides of your helicopter, respectively.

The Threat Indicator searches for radar emissions used for weapons guidance, laser emissions used for weapons guidance, and sudden sources of heat (such as a missile's motor). As such, you can often receive warning of inbound rockets (which use no type of laser or radar emissions for guidance)

Levieux Manuel

because of the heat they generate.

## c) Countermeasure Display

Chaff and Flares are used to decoy radar-guided and heat-seeking missiles, respectively. Chaff consists of aluminum foil and other types of metallic strips designed to create a false radar image. Flares produce a bright flash of heat designed to lure heat-seeking missiles away from the intended target. Both are normally deployed automatically by the helicopter's defensive systems; however either may be manually deployed by pressing the [ key for chaff or the ' key for flares. The countermeasure display, located along the right side of the instrument panel, details the quantity of each device remaining.

## d) Collective/Throttle Display

Two bar graphs directly left of the Battle Computer illustrate the level of collective input and the amount of throttle required to supply it. As pilot, you select the desired collective level. The helicopter's onboard computers automatically adjust throttle to provide the required collective level. If your engine takes damage, it may become unable to run high enough to supply the requested level of collective.



## e) Fuel Gauge

Located in the upper left corner of the instrument panel, the fuel gauge indicates how much onboard fuel remains. The motherland frowns on pilots running out of fuel during a mission.

## f) Warning Panel

Next to the fuel gauge, the three warning lights "**IR**," "**R**," and "**L**" work in conjunction with the threat indicator. While the threat indicator notes the direction to the threat, the warning panel indicates the type of threat. The L Warning lamp only illuminates during Multiplayer missions when you are locked by another human player.

**IR** = Heat-seeking missile
**R** = Radar-guided missile
**L** = Laser-guided missile

## g) Battle Computer Display (BCD)

Directly in the center of the instrument panel, the Battle Computer Display (BCD) shows a view of the currently selected target as seen by the targeting systems. It also displays the distance (in meters) the currently selected target is located from your aircraft.

Ka-52 Manual

If no target is selected, the display shows the view directly ahead of the aircraft. If the Weapon Camera is activated the BCD will automatically switch to the "missile eye view" when a guided weapon is released.

### h) Gear Display

Located above the threat indicator, the Gear Display indicates the operational status of the landing gear.

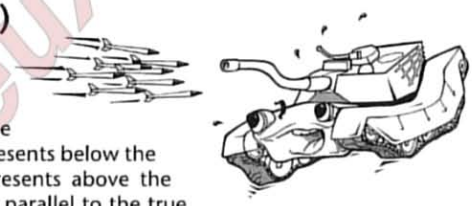
### i) MSL Altitude Indicator

Between the warning panel and the BCD, the circular gauge indicates altitude above Mean Sea Level (MSL). See the HUD section above for details on the differences between MSL and AGL altitude.

### j) Horizontal Situation Indicator (HSI)

The HSI is a combination of a compass and a navigational system. The large circle represents a compass with the top indicating north. The green arrow indicates the heading to the nearest base while the orange arrow indicates your current heading. When the orange arrow overlays the green arrow you are headed directly toward the nearest friendly base. The numbers in the upper left corner of the HSI indicate the number of meters to base.

### k) Attitude Indicator (ADI)



Left of the HSI, the ADI shows the flight attitude (current pitch and roll) of your helicopter by mirroring the function of the pitch ladder on the HUD. The dark sector of the ball represents below the horizon, while the light sector represents above the horizon. The horizontal lines remain parallel to the true horizon at all times. The center of the display indicates where your nose is currently pointed.

## 5. Weapons System Controls

The Werewolf carries one of the most formidable weapons payloads of any attack helicopter in the world. Besides the usual lethal assortment of high-tech missiles and low-tech rockets, the 30mm cannon gives the Werewolf a devastating bite at close range.

### a) 30 mm 2A42 II Cannon [Z]

The variable-rate 30 mm cannon carries two 300-round ammunition cans which are separately loaded with armor-piercing and explosive rounds. The

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cannon is extremely resistant to jamming, even in the dusty conditions encountered in low-level flight. Located in the fuselage near the helicopter's center of gravity, the cannon is electrohydraulically driven with a 30 degree elevation and 15 degree azimuth range. The powerful 30mm shells can easily penetrate most armor plating.

The cannon is slaved to the Battle Computer and automatically follows the Target Indicator on the HID.

### 1) 2A42 Ammunition

2A42 ammunition is armor piercing and particularly effective against armored vehicles or hardened structures.

### 2) High Explosive Incendiary (HEI)

An alternate shell to the 2A42, HEI ammunition contains a high explosive incendiary filler which is particularly effective against light armored vehicles, aircraft, and troops in the open.

*Note: The 2A42 and HEI are fired from the auto cannon. When you first select the cannon, the currently loaded shell type will be armed. If you reselect the cannon while it is already selected, the other shell type will be loaded.*

## b) 80 mm Rockets [X]

The Werewolf fires heavy 80 mm rockets either individually or in pairs. These weapons are unguided; the angle of the launching platform determines how far the weapons will travel but they will only travel in a straight line. The Battle Computer automatically sets the launch pitch when a target is acquired.

These weapons can be used to strafe larger areas by manually setting the pitch of your helicopter then ripple firing a volley of rockets as you move the helicopter's nose.

## c) AT-9 Vikhr Laser-Guided Missiles [C]

The AT-9 Vikhr, or "Whirlwind," laser-guided missiles are the Werewolf's primary claws. Capable of penetrating 900mm (35 inches) of reactive armor, the AT-9 packs quite a punch. Its range exceeds that of most low-level surface-to-air defense systems, thus allowing the Werewolf to attack from a safe standoff distance.

The missile requires a constant laser-lock on the target throughout its entire time of flight. Accordingly, you must unmask (leave cover) long enough to locate a target, lock it with the TAS, and wait for the missile to strike. Fortunately, the Vikhr follows the laser-lock even if the laser-lock moves. You can fire multiple missiles staggered a few seconds apart, then switch the

Le Manuel

target lock after each missile hits a target. You can let subsequent missiles continue toward the original target if the first missile misses or fails to destroy it, or switch locks and guide the missile to a new target inflight. Since all missiles are inflight simultaneously, this significantly reduces duration of the attack and therefore the amount of time you expose yourself to the enemy.

Be warned, however, the missiles move quite fast. If you switch targets the missile will try to turn to the new target, but may be unable to make the turn in time or may have already passed the new target. Try to lock a closer target first, then redirect subsequent weapons toward more distant targets in order to provide yourself the maximum possible targeting time.

### d) R-73 Archer Air-to-Air Missiles V

The Werewolf carries up to four R-73 heat-seeking, air-to-air missiles. This same missile is carried by the MiG-29 fighter and operates completely fire-and-forget; once the missile has acquired a target and been launched it requires and accepts no additional guidance from the launching platform. If the enemy ducks behind a hill out of view of your Werewolf, the R-73 in mid-flight will continue to track the target until it either strikes, misses, or the view of the target is obscured.

## 6. Hands-Off Weapons

### a) Artillery Fire B

The Werewolf was designed to operate in conjunction with other units on the battlefield. The helicopter's computers know at all times its precise location. Once locked onto a target, the Battle Computer derives the precise location of the target. When you call for fire support, the Battle Computer transmits the exact coordinates of the target to the Command and Control network. Support forces provide artillery fire support with deadly accuracy thanks to the Werewolf's precise navigational systems.

If available in a mission, this is the most destructive weapon at your disposal. This is a fire-and-forget system. The main disadvantage is that since it takes time for the shells to reach their destination, they are less effective against fast moving targets. The accuracy of your navigational systems, however, guarantees exact target strikes.

### b) Wingmen Support N

Wingmen will occasionally be assigned to you during various missions. In general, your wingman will fly conservatively and stay in ground cover, however, when you select the Wingman Support option, he assumes a targeting position and engages your currently selected target. As you switch

Manuel Officiel

target locks, your Battle Computer transmits the target info to the wingman who subsequently attacks the specified target. When heavily outnumbered, careful coordination with your wingman may be the only way to win a mission. The wingman cannot be ordered to engage targets on his own. He will remain glued to your helicopter until you order him to attack. He will maneuver into the open, destroy the specified target(s), then maneuver back to your wing.

### *WEAPON CONTROL SUMMARY*

| *ACTION* | *KEY* |
|---|---|
| *Previous Weapon Selection* | I |
| *Next Weapon Selection* | J |
| *Fire Salvo (2 x 80mm Rockets)* | M |
| *Select 2A42/HEI Cannon* | Z |
| *Select 80 mm Rockets* | X |
| *Select AT-9 Vikhr Missiles* | C |
| *Select R-73 Archer Missiles* | V |
| *Select Artillery Support* | B |
| *Select Wingman* | N |
| *Fire Selected Weapon* | space |

Le Viet Manuel




# Chapter III
# Multiplayer Gaming

Although Werewolf offers a challenging set of single-player missions, you have not experienced the full excitement until you've scoured the battle field along with your comrades. You can now fly cooperative missions with other live players flying Werewolves like you or compete head to head against Comanches also being flown by human players. Operating in conjunction with other human players brings you one step closer to a greater understanding of the Russian military experience. Although our western counterparts dispatch lone hunter/killers, our tactical doctrine prefers sending forces out in groups, "Were-wolfpacks" if you will.

Defense of the motherland depends on smoothly integrating the coordinated efforts of everyone on the team. When you're flying with your comrades, success depends on the quality of the original plan, the ability of everyone to execute their piece of the plan, and (most importantly) the ability of everyone to react and compensate when the plan inevitably breaks down. As the old military adage says; "No battle plan survives contact with the enemy".

No artificial intelligence comes close to matching the capability of the human mind. A human player will always operate with greater flexibility and adaptability than a computer-controlled counterpart. This allows for significantly more complex battle plans and there's just no way to simulate that level of interaction and cooperation without actually flying with another person.

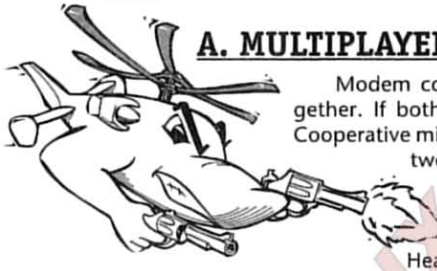
Besides being able to execute more complex battle plans, live players have the ability to react immediately to sudden changes in battlefield conditions. The chaotic confusion that besets every battlefield (known as the "fog of war") can cause a well-designed battle plan to disintegrate in a matter of seconds. Live players have the ability to reassess the situation and make immediate compensations, like covering a wounded ally's retreat or redeploying to a new target because other helicopters were forced to abort.

There is no finer accomplishment than leading three comrades into battle and emerging victorious. The thrill of real-time interaction with other humans in a virtual combat environment is difficult to explain until you've actually experienced it. Shooting down that Comanche and saving the life of a comrade adds a dramatic element to the simulation that isn't there when everything is merely computer generated "ones and zeros". Defeating a human opponent or assisting

Preview Manuel

a fellow live Werewolf pilot is significantly more challenging, and therefore more rewarding, than defeating an entire horde of computer-controlled adversaries.

As hard as the chopper jocks at NovaLogic have worked on providing you with realistic artificial intelligence, no computer simulation can ever measure up to the cunning and unpredictability of a live human opponent. Therefore, Werewolf comes complete with a comprehensive set of Modem or Network multiplayer options. Now you and your friends (up to four players can participate in Network play) can experience the fun of flying together. The multiplayer environment is versatile enough to allow all of you to cooperative toward achieving a common set of goals or compete against each other to see just who is the best pilot on the block.



## A. MULTIPLAYER MODEM GAMING

Modem connections allow you and a friend to fly together. If both of you decide to fly Werewolves, a list of Cooperative missions to choose from is made available. If the two of you decide to fly opposing helicopters (i.e. you fly a Werewolf while your friend insists on flying the Comanche), the two of you are given a set of specially designed Head to Head missions.

# 1. Initiating a Modem Game

Initiating a multiplayer game via Modem is quick and simple. It's designed to get you and a friend up and flying in no time. Before you start however, the two of you will have to agree beforehand which of you will be the session "Initiator" and who will be the "Receiver". Once you have decided on your roles, you're ready to begin.

## a) Beginning a Multiplayer Modem Connection

1) Starting from the Main Operations Menu, select the Multiplayer Game menu option. A inset menu box appears with two menu options:

Begin Network Game
Begin Modem Game

2) Select Begin Modem Game.

3) Once you select Begin Modem Game, a new inset box appears with the following menu options:

Dial Modem
Wait for Call
Setup Modem

Leerexemplar

## b) Setting up your Modem

1) Before you and your friend can connect, you need to insure that your modem has been properly setup. Both parties should select the Setup Modem option and perform the steps indicated below.

2) Once you have selected Setup Modem, a Modem Options inset box appears. You are required to enter a Init String in the window provided. Note that there is a default init string already entered in the window for you. Use this default string unless you are experiencing problems. If you are having difficulties getting your Modems to connect, consult the Read.me file on the Werewolf CD for additional init string information.

3) Select the port where your Modem is located. This menu option defaults to Modem Port.

4) Select the type of phone you are using to transmit data, either Tone or Pulse.

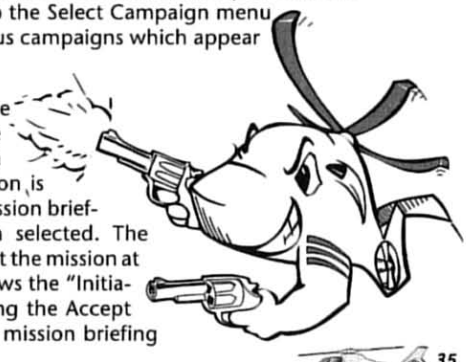
5) Press OK to return to the Begin Modem Game dialogue box.

## c) Making the Connection

1) You are now ready to make your Modem connection. Assuming that you are the designated "Initiator" , select the Dial Modem menu option. Enter the phone number of the modem you are connecting to in the window now provided. When you have finished typing in the number, press DIAL.

2) If you have been designated the "Receiver", your job is simple. You need to select the Wait for Call menu option and sit back while the "Initiator" does his/her thing. Note that you can press the Esc key to abort the connection process at any time. Aborting the connection returns you to the Multiplayer Game screen.

3) Once the "Initiator" enters the phone number of the modem and presses DIAL, the call will made initiating the modem connection. Upon connecting, the "Initiator" is given access to the Select Campaign menu screen. Choose any one of the various campaigns which appear on this menu.



4) After choosing a campaign, the "Initiator" is now required to choose a mission from the Select Mission menu screen. Once a specific mission is chosen, the "Initiator" is shown a mission briefing text applicable to the mission selected. The "Initiator" may either Accept or Reject the mission at this point. Rejecting the mission allows the "Initiator" to select a new mission. Pressing the Accept Mission button sends a copy of the mission briefing

Preview Manual

text to the "Receiver" who has been patiently waiting all this time.

5) The "Receiver" now has the ability to Accept or Reject the mission. If the mission is rejected by the "Receiver", the "Initiator" must start over and select a new one. If the mission is selected by the "Receiver", the mission is loaded and play begins.

## 2. Multiplayer Modem Victory Conditions

### a) Head to Head Victory

These missions often become something of a "horse race". The player that is first to destroy all of his/her assigned mission goals is the winner. Of course it's hard to destroy mission goals if you keep getting shot down and having to start over on your base. When the mission is concluded, you receive a mission summary detailing your individual performance.

### b) Cooperative Mission Victory

These missions are more difficult in that precise cooperation and coordination is required but less difficult in that you have all the time you need to complete your mission. Victory is achieved when you destroy all of your assigned mission goals. When the mission is concluded, you receive a mission summary detailing your individual and collective performance.

# B. MULTIPLAYER NETWORK GAMING

Network play gets as close to the real thing as most of us are likely to get. You and up to three other players can link together and fly joint missions, either cooperating with each other against a common enemy or fighting against one another in Comanche vs. Werewolf team showdowns.

## 1. Initiating a Multiplayer Network Game

Initiating a multiplayer Network game via Modem is quick and simple. It's designed to get you and your friends (opponents) up and flying in no time. Before you start however, the group will have to agree beforehand on who will be the session "Initiator" . Once this decision has been made, you're ready to begin.

### a) Beginning a Multiplayer Network Connection

1) Starting from the Main Operations Menu, select the Multiplayer Game menu option. A inset menu box appears with two menu options:

Begin Network Game
Begin Modem Game

2) Select Begin Network Game.

3) Once you select Begin Network Game, a new inset box appears with the following menu options:

Preview Manual

Create Head to Head Game
Create Cooperative Game
Join Network Game

## b) Preparing for Network Play

Up to four players can participate in Network play simultaneously. Before beginning a Network session, one player must be designated as the "Initiator". The "Initiator" is responsible for making play decisions for the group. It is best if everyone decides beforehand who the "Initiator" is going to be. The other members of the play group will be "passive" partners during the mission selection phase.

1) The designated "Initiator" must select one of the two main play options(Head to Head Game or Cooperative Game) from the Network Game menu. In order to play a Head to Head game, at least one of the other players must be flying a Comanche. You cannot select a Head to Head game if everyone happens to be flying a Werewolf (i.e. everyone is on the same side).

2) Players not designated as the "Initiator" must choose the Join Network Game option from the Network Game menu. After choosing this option, they must wait for the "Initiator" to finish doing his thing. At that time, they have the option of joining in if they like the mission conditions set by the "Initiator".

3) Once a play option has been selected, the "Initiator" is now required to choose a specific campaign from the Select Campaign menu screen.

4) Once a campaign has been chosen, the "Initiator" is now required to choose a specific mission from the Select Mission menu screen.



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5) Once the "Initiator" chooses a specific campaign and mission, the network game is initialized. These choices now appear on the screens of all the other participants. They are now given a chance to enter the game by clicking on the name of the mission as it appears on-screen.

6) As the other players log in agreeing to the mission selection, their callsigns (name) appear on everyone's screen. When all participating players have logged in, the "Initiator" presses the Start Game button to begin play.

## 2. Network Play Victory Conditions

### a) Head to Head Victory

The side (group of players) that first destroys all of their assigned mission goals is the winner. Concentrate on destroying goals rather than air combat. Getting shot down only delays your inevitable victory. When the mission is concluded, all players receive a mission summary detailing their individual and collective performance.

### b) Cooperative Mission Victory

Victory is achieved when players destroy all of their assigned mission goals. Take your time. You're not on the clock. When the mission is concluded, all players receive a mission summary detailing their individual and collective performance.

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# Chapter IV
# Helicopter Strategy & Tactics

## A. GENERAL SURVIVAL HINTS

Most of the time you'll operate your helicopter independently, even during multiplayer games. Each helicopter will maneuver after its assigned target on its own with mission success depending on each person completing there assignment. As such, you must understand the basic helicopter tactics.

### 1. Altitude Considerations

Always remember, altitude is bad. The higher you fly, the more people that will see you. The more people that see you, the more likely someone will shoot at you. When you're flying a helicopter in combat altitude is the epitome of evil.

Fly low, hugging the surface just high enough to prevent colliding with obstacles. Called Nap Of the Earth (NOE) flying, low altitude flight minimizes your exposure to enemy fire. Flying close to the ground isn't enough, however. Flying over a mountain top, even if you're only 50 ft. above the peak, still exposes you to more potential fire than flying through a ravine. You must stay low to the ground, but you must also choose "low ground" to fly over. Hug the base of hills and mountains, fly low through ravines, and never fly directly over a ridge unless there's no other way around.

### 2. Duck and Cover Tactics

Sometimes, in order to get where you need to go, you have no choice but to pop over a ridge or move across an open plain. Charging headlong across open territory bears a striking resemblance to suicide. Instead, look for objects, hills, or ridges between you and your desired destination. Move at high speed from object to object, stopping to "mask" yourself behind each. Slowly and gently maneuver your helicopter until you can see around the obstacle and search for enemy positions. If no enemy is visible, make another high-speed run to the next obstacle and repeat the process. This is obviously slower than proceeding straight across the open area, but often prevents the enemy from spotting you or at least prevents him from shooting at you once you've masked behind the available terrain.

Le Manuel



MASKED
Firing Position

UNMASKED
Firing Position

## 3. Masked and Unmasked Firing Positions

As you can see by the diagram above, firing from a Masked position is much safer than moving out into the open and firing from an Unmasked position. It decreases the amount of time that your helicopter is exposed to hostile fire. It also allows you to set up an ambush attack and trigger it at a time and place of your own choosing. Always try to place obstacles between yourself and the enemy. Since you are airborne, line of sight problems work out in your favor. Vehicles on the ground are unable to compensate for obstacles as easily as you can in your helicopter. Use this to your advantage.

Most of your weapons travel along a direct, straight-line path meaning there can be no masking obstacles between you and your target when you fire. Even your guided air-to-ground missiles which can maneuver requires a laser constantly locked onto the target. Since the laser travels in straight line, a clear and unobstructed view of the enemy is still required. If you can see the enemy, however, he can see you. If he can see you he can shoot at you.

Therefore, while it is necessary to unmask to fire you must minimize how long you expose yourself. Generally, maneuver to a terrain masked position near the desired firing position. Gently maneuver the helicopter into the open, quickly search for enemy targets, then remask. Determine which targets you wish to attack, then briefly unmask and release your ordnance. As described in the Weapons section, you can ripple fire multiple laser-guided missiles, then switch the target lock while the missile is inflight thereby engaging multiple targets while minimizing missile flight times.

If the enemy detects you when you unmask, they will determine how much of a threat you pose to them based on your proximity and altitude. The closer and higher you are, the more of a threat they perceive you to be. The enemies will

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generally turn to face you to attack. If you remask, they will usually continue to monitor your last position, waiting for you to unmask again. Subsequently, you may wish to maneuver to a new position before engaging the enemy.

## 4. Following Fire

You have two other weapons at your disposal during some missions: a wingman and artillery support. Artillery is especially effective due to the accuracy of your guidance system which subsequently ensures highly accurate artillery fire. As described above, demask long enough to lock a target and request artillery support. Then, remask and wait for the shells to fall. After the downpour ceases, move into the combat zone and destroy any survivors. This tactic is possible, but less effective, with your computer-controlled wingman since you must lock the targets the wingman attacks. You must continually unmask to select a new target, thereby exposing both you and your wingman to enemy fire.

## 5. Defensive Maneuvering

Most weapons are unable of maneuvering around terrain. Some guided weapons, however, can maneuver around obstacles as long as the guidance system remains locked on you. To evade unguided weapons, simply move your helicopter or duck behind cover. To evade guided weapons, you must maneuver behind an obstacle such that the guidance system (either located on the launcher or the missile depending on the weapon type) loses lock. In general, to be safe, attempt to obscure both the launcher and the missile.

Some missiles climb rapidly then dive on the target. Generally, these weapons move very fast during the dive and subsequently cannot maneuver as well. Often lowering your altitude will move you out of the missile's engagement envelope as well as possibly mask you from its guidance system.

Flares and chaff work well to decoy heat-seeking and radar-guided missiles, respectively, but are not 100% fool proof solutions. Use them liberally (preferably allow "automatic" release from the inflight menu bar), but do not rely solely on them.

# B. THE MULTIPLAYER ENVIRONMENT

Operating with other human players allows a much wider variety of tactical options. The following "formation tactics" utilize two-ship formations. Obviously, players can expand the basic idea to incorporate larger numbers or multiple two-ship formations.

## 1. Drag and Ambush Tactics

In air combat, the word "drag" equates to the phrase "sucker punch." In essence, a drag gives the enemy such a juicy target that he can't resist engaging. A successful drag, however, always has a trap set for the enemy. The Drag and Ambush tactic positions one helicopter hidden safely behind some large obstacle.

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A second helicopter moves forward to the enemy position, then reverses course and runs away. In many cases, especially against human opponents, this will lure enemy helicopters into chasing the second helicopter. The chase, however, leads the enemy directly past the first helicopter who ambushes the enemy. The ambush requires careful timing; the "drag" helicopter is exposed to enemy fire during the entire chase. The longer the drag continues, the more likely the friendly helicopter will be shot down.

## 2. Drag and Pursue Tactics

Drag and Pursue works similar to the ambush, except the "lure" helicopter does not reverse course. It proceeds normally allowing the enemy to maneuver in behind it. Meanwhile, the second friendly helicopter moves up from behind and engages the enemy.

## 3. Crossfire Attacks

The Crossfire attack engages the enemy from two directions simultaneously. This requires precise coordination and communication between the attacking helicopters to ensure they arrive on station at exactly the same time.

## 4. The Echelon

Echelon formation works best when the formation moves into a combat area after artillery. The helicopters fly close formation and each monitor an assigned "arc." Each helicopter only engages targets in the assigned arc. This tactic exposes all helicopters involved to substantial enemy fire and should be used only in lightly defended areas or areas which have been previously bombarded with artillery.

## 5. Deception and Attack Tactics

Deception and Attack is one of the oldest military tricks around. Quite simply, one helicopter exposes itself, draws the enemy's attention, then remasks. Meanwhile, a second helicopter maneuvers behind the enemy and attacks from the rear.

# C. FORWARD AREA REFUELING POINTS (FARPS)

Helicopters have severely limited ranges and move very slowly compared to fixed-wing aircraft. The Army therefore, establishes helicopter bases near to the front lines in order to minimize the amount of time and fuel helicopters spend in transit between their bases and the enemy. These bases are called Forward Area Refueling Points (FARPs). All Single Player and Multiplayer missions include a FARP. You begin each mission situated at your respective FARP. If you crash or are shot down during a MultiPlayer mission you rejoin the game from your FARP.

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# Chapter V
# About The Werewolf

## THE ORIGINS OF THE WEREWOLF

### Werewolf With Wings

*by Frank Colucci*

Before the old Soviet Union could send your fathers to Afghanistan in Mi-24s, the old Soviet Air Force had to make them officers, Communists, pilots, and finally helicopter pilots. The Russian Army doesn't have to make good Communists any more, but it still makes officers and pilots, and it still needs attack helicopter pilots like you in this dangerous world. NATO called your aircraft Hokum - a falsehood or fraud. The chief designer at the Kamov design bureau favored Werewolf. It took nearly 15 years after the first prototype flew to get the Kamov Ka-50 into attack helicopter regiments, but today you fly the toughest, most lethal rotorcraft ever built. The Werewolf was designed with two primary missions: sweep the skies of enemy helicopters and deliver precise firepower in support of the ground advance. Unlike its Western counterparts hovering and hiding behind rocks and trees, the Ka-50 was meant to keep moving and to stay out front of our armored forces. Unlike even the most advanced Western attack helicopters, the Werewolf was designed to fly and fight with a single pilot.

More than any helicopter before, the Ka-50 is a modern, multi-sensor fighter aircraft, complete with an ejection seat. Dr. Mikheyev at the Kamov Scientific and Technology Company gave us an attack helicopter as easy to fly as a fixed-wing fighter and probably more deadly than any tactical fighter. His Werewolf is a coaxial helicopter with two three-bladed rotor systems stacked one atop the other and turning in opposite directions. It wears no tail rotor, but it has lifting wings to carry weapons and big vertical tail fins with an airplane-like rudder. The coaxial rotor system makes the Ka-50 very stable yet very maneuverable and very agile. The Werewolf works differently from helicopters like our little Mil trainer with its single big main rotor and small tail rotor. If you understand the differences you can get the most out of it.

Helicopters generate lift with their rotors and they control themselves in pitch, roll, and yaw by changing the pitch of their rotor blades. Greater pitch takes a bigger bite of air, and, to a point, gives more lift or more control power. Most helicopters use collective and cyclic sticks and foot pedals for control. The collective stick in your left hand changes the pitch of all main rotor blades

Unofficial Manuel

together. Pull collective up, and you increase pitch all around the turning rotor disc and go up. Push collective down, and you decrease pitch toward zero and descend. The center cyclic in your right hand changes pitch over different segments of the whirling rotor disc. It pitches the nose up and down and rolls the fuselage left and right. Push the cyclic left and you increase blade pitch on the right side of the disc. The helicopter rolls or banks left. Push the cyclic forward and the blades pitch up on the trailing portion of the disc. You point the nose down. All of this took some ingenious mechanical engineering to mix control inputs, and today we use flight control computers to keep things working smoothly throughout the flight envelope.

Helicopters with a single main rotor need an anti-torque device to keep the fuselage from turning in the opposite direction. The anti-torque tail rotor perfected in America by our own Igor Sikorsky obviously works, but it consumes power that could go to the main rotor and generate more lift. Loss or damage to the tail rotor also means loss of control at low speeds or in a hover, and the essential anti-torque device is always vulnerable to enemy fire or accidental impact with trees, terrain and buildings. An unprotected tail rotor can mangle people on the ground or aboard ship. Significantly, a tail rotor also puts a burden on the pilot who has to work the pedals constantly to compensate for changes in power and main rotor torque, as well as keep the helicopter on course. The pilot using radios, maps, and weapons, particularly low over the battlefield at night, is busy enough without a machine that takes extra attention to fly.

## Coaxial Concept

Some of the early, unsuccessful helicopters of the 1920s and 1930s had coaxial layouts and Nikolai Kamov demonstrated a coaxial rotor system on his little Ka-8 flying motorcycle in 1947. In a coaxial system, the torque of the two contra-rotating rotors is cancelled out automatically as the pilot adds or reduces power. The effects of wind gusts on one rotor are nullified by the effects of the other. In the 1950s, Kamov's more practical Ka-10 and Ka-10m were evaluated by the Soviet navy and the Ka-15 flew passengers and cargo in military and civil operations. The Ka-20 had the power of twin turbine engines and the Ka-25 went aboard Soviet naval vessels in the 1960s to fly anti-submarine warfare, surface surveillance and targeting, and general utility missions. The Ka-25 was a compact, stable helicopter that saved space aboard ship and needed only one pilot. It led to the bigger, more powerful Ka-27 sub-hunter and the Ka-29 marine assault helicopter.

The Ka-50 won an attack helicopter competition with the Mil Mi-28 in part because the coaxial design had unique advantages for Russian Land Forces Army Aviation. The Werewolf without a tail rotor was less vulnerable to ground fire. Coaxial rotor systems promised high maneuverability and agility for air-to-air combat. And while the controls of a coaxial helicopter work the same as those in a helicopter with one main rotor, the workload of flying is reduced, so one pilot can get on with the business of killing things.

A coaxial helicopter fights high aerodynamic drag from the double rotor hubs and associated controls, but it has advantages in maneuverability (how much you can change direction) and agility (how fast you can do it). Like a helicopter with one main rotor, pulling up or pushing down on the collective stick of a coaxial helicopter increases or decreases the pitch on all blades at once to rise or descend. Movements of the cyclic still increase or decrease pitch equally on the same portion of each rotor disc to roll the helicopter left or right or pitch the nose up or down. Unlike a helicopter with a long tail boom, the coaxial machine groups all its heavy parts around the main transmission, so it has about half the roll and yaw inertia. The two rotor systems set high above the fuselage are also on a long lever arm, so pitch and roll forces are powerful and control responses fast. Dr. Mikheyev originally incorporated moving elevons on the wings of the Ka-50, but the roll response of the coaxial rotor was so good the wing control surfaces were abandoned.

Yaw rates in a coaxial helicopter are also very high. Pedal movements left or right apply differential collective - while pitch on all the blades of one rotor increases, pitch on all the blades of the other decreases proportionally. The difference in collective pitch creates a difference in torque between the rotors, and the fuselage yaws opposite the direction of the imbalance. For a hovering coaxial helicopter, yaw is fast and precise. You can spin to meet an enemy head-on without overshoot or oscillation. Because you're sitting near the center of gravity under the main rotor mast, you can yaw fast without the dizzying sensation felt by a pilot sitting at the end of a long, swinging fuselage.

In forward flight, the wings of the Werewolf contribute lift, and they increase the G capability in maneuvering turns. The Ka-50 has a maximum load factor of 3G. That seems puny compared to 9G fighter jets, but it is ample for the low-altitude, low-speed world of helicopters. Coaxial helicopters nevertheless have limits as speed increases, and without careful design rotor blades flexing up and down with higher control loads could meet in a catastrophic mesh. The solution is to change directional control mechanisms. In forward flight with airflow building over your vertical fins, the flight control computer automatically reduces differential collective and lets the Ka-50 rely on its conventional, but very effective rudder to steer. The pilot never knows the difference.

## Fight Like a Werewolf

The transition period to learn to fly the Ka-50 is very short, and in just a few hours, you'll know why this machine is so special. For an attack helicopter designed for both air-to-ground and air-to-air combat, the coaxial rotor system has powerful advantages. Two rotor discs means the overall disc loading is far less than that of a single-main-rotor helicopters. Dr. Mikheyev calculated the coax without a power-hungry tail rotor generated 12% more lift than a single main rotor design. That's an obvious benefit to a crane-type cargo helicopter that spends much of its time hovering like the civil Ka-32. It's also important to a fighter helicopter in air-to-air combat since maneuverability is a function of specific excess power. With two 2,200 hp turboshafts, the Ka-50 has plenty of installed

power, and it can use that power to change flight path velocity rather than fight its own torque.

The agility of rotor systems is usually characterized in terms of effective hinge offset, a measure of the lever arm between the flapping hinge (or the flexing composite element that serves as a flapping hinge) and the hub. The American Comanche with its rigid composite flexbeam rotor has about 10% effective hinge offset—high for the sake of agility. The articulated (hinged) rotor system of the Werewolf has only about 3 degrees of offset. Its moderate offset is nevertheless countered by the lever arm of rotors set high above the transmission. When the pilot moves the cyclic, the Werewolf pitches and rolls - fast. Likewise, when the pilot stomps on a rudder pedal, differential collective makes the Werewolf yaw - fast. Move the stick slightly to one side and you accelerate in sideways flight with only about 10 degrees of bank. The coax can achieve high sideways speeds and impressive sideslips.

For the combat pilot, all of this matters only to put weapons on target. The Werewolf has a 30 mm cannon essentially fixed to fire forward. The rockets on your wings fire forward. You use the high yaw rates of the Werewolf to point the weapons. Sideways flight without high angle of bank can be used to line up with a target you've approached off-center. In some flight conditions, the Ka-50 gives you what the Americans sometimes call Super Maneuverability to point your nose and you weapons where you want, regardless of the direction of flight. Coupled with the off-axis missile firing capabilities through your helmet sight and the autotracker in your targeting system, the Werewolf is trouble, a fighter or destroyer, like no other.

The Americans tried a coaxial rotor system and turbojets on their XH-59 Advancing Blade Concept (ABC), but they never went on to solve the problems of high weight and hub drag. Nevertheless, the U.S. Army pilots privately considered their experimental coaxial helicopter a superb Hind killer to counter our Mi-24. Twenty years later, we answered the challenges of the coaxial rotor system and put the Werewolf on the battlefield... because we wanted a superb Comanche killer.

## Bloodline of the Werewolf

The Great Patriotic War (World War II) was won with combined arms (air, armor, artillery, and infantry) fighting the Germans on the flat Russian steppes. The legendary Illyushin IL-2 so critical to the fight was an assault bomber, a Sturmovik made to support ground forces with close-in firepower. The same philosophy gave us our first dedicated assault helicopter, the Mil Mi-24. Our Ka-50 follows the same mold but differs from these predecessors. It still fights in a combined arms team to protect our tank and motorized rifle battalions on the ground, but it has an additional mission to kill helicopters in the air. If the Mi-24 was a rotary wing assault bomber, the Ka-50 is a destroyer or fighter.

Lexington Martin

Russian Land Forces Army Aviation came out of the Soviet Air Force Frontal Aviation. Some of the first Mi-24 pilots made the transition from MiGs. Even when we were in the Air Force we took orders from a Ground Forces commander. Frontal Aviation assigned Tactical Air Armies to military districts of the old Soviet Union and to Groups of Soviet Forces deployed to Eastern Europe. We still organize our helicopters in squadrons and regiments, but now we're officially part of the Land Forces. Russian land warfare doctrine determines how we fight, and it shapes the helicopters we use.

Over impassable terrain, helicopters give an army mobility and flexibility. They haul troops, supplies, and artillery and haul it fast. We learned a lot about helicopters from the U.S. Army in Vietnam. The Americans like to mount air assaults with their troop carriers escorted by gunships. Their Huey and Cobra gunships brought firepower down to serve the Army like no jet fighter could, and they could operate under weather ceilings that kept jets out of the fight.

By 1966 the Soviet Air Force had a requirement for an armored frontline helicopter that could carry assault troops behind enemy lines and provide heavy firepower in support of an armored advance. Nikolai Kamov first proposed the Ka-25F coaxial rotor helicopter for the battlefield requirement, then offered the tandem-rotor V-50 to lift the weight of extra armor. The Mil design bureau used the drivetrain of its Mi-8 transport as a starting point for what would become the Mi-24. Mil won the competition and for more than 20 years continued to be the sole supplier of Soviet Air Force helicopters.

## Hind Sights

The Mi-24 first flew in 1969 and entered service in 1972, When it began to fill our helicopter regiments in Germany, NATO called it the Hind. We sometimes called the later Mi-24D "Gorbach" or "Hunchback" because of its shape. Using the Mi-24, we learned how to use attack helicopters. The Americans found a new mission for their attack helicopters after Vietnam. If war broke out in Western Europe they expected to kill our tanks with hovering Cobras firing missiles from defilade or terrain mask. Helicopters hiding behind hills and trees were of course harder to hit than those in open sky and wire-guided TOW anti-tank missiles couldn't be steered to a target from a moving helicopter. The U.S. Army taught pilots nap-of-earth (NOE) flying where helicopters crawled between the trees. We remembered our fight on the flat steppes where there were no trees.

By 1974 we too had come to recognize the helicopter as a tank killer, but Russian military art stresses speed and mobility to keep offensive pressure on an enemy. Instead of hovering behind rocks and trees, Russian attack helicopters would keep moving and shooting with the armored advance. We used tactical formations of three Mi-24s, two down low out front and a commander behind in high overwatch, ready to pounce on anything that fired at the low aircraft. The Mi-24 was big and heavy, but it was armored and fast. As an assault helicopter, it had cabin space for eight troops; as an attack helicopter it carried rockets, a nose machine gun, and the AT-2 anti-tank missile.

The early AT-2 Falanga was a Manual Command to Line of Sight (MALCOS) missile steered by radio signals. The weapons operator in the nose of the helicopter had to keep the missile in sight and fly it into the target. A difficult task under the best circumstances. The AT-2 later received Semi-Automatic Command to Line of Sight (SACLOS) guidance like the American TOW missile. SACLOS let the gunner keep his telescopic sight and his eye only on the target. Nevertheless, it took two aviators to fly and shoot. Compounding matters, our first real enemy didn't even use tanks.

The Mi-24s first went to Afghanistan in 1979 months before we rushed in at full-strength to shore up the mess in Kabul. It was not the place for a fast-moving armored advance. We were fighting an army of dukhi, or ghosts, on a battlefield carved into mountains and with no front lines. Temperatures around 20°C reduced engine power 15 to 20%. The early Mi-24s were underpowered to begin with and they proved surprisingly vulnerable to gunfire. Aircraft crashed in the mountains simply because they ran out of power in the low density, high altitude air. The armored shields inside the big glass nose of the Mi-24 were not enough protection. Crews who survived shoot-downs and crashes were tortured to death by the enemy. If your helicopter went down, you saved the last bullet in your sidearm for yourself.

Our tactics turned back to the Circle of Death system used by IL-2s in the Great Patriotic War. Four or eight gunships would fly a circle at 1,000 meters, staying above ground fire. Each ship took a turn diving on the enemy to shoot rockets or drop bombs. Timed right, the attack of the next diving helicopter could cover the escape of the one before and, with enough firepower, we might even successfully rescue a downed crew.

We started building larger formations of attack helicopters with flights of four stepped up higher to avoid the guns. Sometimes air assault formations would include 20 Mi-8 troop transports and Mi-24 gunships. We used old AN-2 biplanes as Forward Air Controllers (FACs). The FACs orbited for hours above the reach of rebel guns. In 1984 we received the Mi-24D with improved power, more armor, and better weapons. With the Mi-24, we began escorting truck convoys with helicopters. The newer Mi-24s had low-light television, and later thermal imagers, letting us fight at night as well.

Things changed for the worse in 1986 when the Americans started giving our enemy the American made Stinger and British made Blowpipe shoulder-launched surface-to-air missiles (SAMs). We had forced a change in U.S. Army tactics in 1972 when we gave Strelas to the Vietnamese; now the Americans were getting even. These heat-seeking SAMs made us fly very low and fight more at night as well as caused the introduction of infrared engine exhaust suppressors, IR jammers, and flares. Officially, we lost 372 helicopters by the withdrawal in 1989, 31% of which were Mi-24s. Unofficially, the numbers were significantly worse. What we learned, however, shaped our next attack helicopter.

## Coaxing Competition

When Dr. Sergei Mikheyev became the Chief Designer of the Kamov design bureau in 1974, he knew there would be a successor to the Mi-24. An order from the Soviet Air Force would be a real prize. The Soviet Navy ordered helicopters by the dozen; the Air Force ordered them in thousands. The Americans were already designing their Advanced Attack Helicopter, the program which eventually produced the AH-64 Apache. Their competing YAH-63 and YAH-64 designs were meant to approach the fight NOE, then pop up at stand-off range and fire guided missiles. The Kamov design bureau made an unsolicited proposal in December 1977 to compete with Mil for a new Soviet attack helicopter. The Commander-in-Chief of the Soviet Air Force and the Deputy Minister of the Aircraft Industry supported the competition.

Both the Kamov and Mil teams knew their aircraft would have to combine powerful offensive weapons and armor protection. Thanks to the competition, both must supply high agility and maneuverability. A new mission was emerging for the attack helicopter. For all the talk of pop-up shooting from NoE flight, the U.S. Army still relied on air assault by helicopter, meaning attack and scout helicopters would find themselves escorting transports who could not sling heavy loads low through the trees. We had already determined that tanks were the best weapon for killing other tanks, and by 1979 we decided helicopters were best used to kill other helicopters. Our next attack helicopter had to be able to engage airborne and ground targets equally well.

The Americans had issued performance specifications for their Advanced Attack Helicopter program based on a hot day at high altitude. At first we though their requirements were extravagant, but the mountains of Afghanistan made us see their point. Our new attack helicopter had to hover out of cushioning ground effect at altitudes at least of 4,000 meters. Maneuverability and agility were the products of an efficient rotor system, and Kamov again looked to the coaxial helicopter for the solution while Mil used a single main rotor and tail rotor. Both teams built their aircraft around two TV3-117 turboshafts like those in the later Mi-24s.

The Coaxial rotor system recaptured lifting power otherwise lost to a tail rotor, giving the pilot the freedom of "uncoupled" flight where one control action did not demand countering movements of all other control devices. The coax could make flat pedal turns throughout its speed envelope and slip sideways with little bank. It combined lifting power with control power, but it paid a price in higher aerodynamic drag and greater empty weight. To match the speed of the Mil competitor, Dr. Mikheyev made some bold decisions. To gain another 8 to 10 knots, he reluctantly accepted the weight and complexity of retractable landing gear. To save the weight and eliminate the recoil yaw of a gun turret, he fixed his monster cannon near the center of gravity and restricting firing with only limited adjustments in elevation and azimuth. His boldest decision, however, was giving his attack helicopter only one pilot to save weight and reduce the frontal fuselage area as much as possible.

The Mi-24 usually flew with a crew of three: pilot, weapons operator, and flight engineer. Early versions seated all three in the front with the gunner at the nose and pilot and flight engineer side-by-side behind him. Later Mi-24s put the flight engineer in the troop cabin, but always there was a need for at least two aviators up front flying and fighting. An attack helicopter flying low, close to friends and enemies, has a cockpit workload far greater than that of a jet fighter at altitude. The American Advanced Helicopter Program had two seats for this reason. The Mi-28 used a similar arrangement. Dr. Hikheyev, however, knew a second cockpit would add at least 200 kg to the new helicopter. To offset the greater weight of the coaxial system, Kamov proceeded with the single-seat design.

A single seat attack helicopter needed a cockpit and systems that would not overload a pilot in combat. A coaxial helicopter was easy for the pilot to fly, and contour or terrain flying just above the trees was less overwhelming than picking your way through them. The Kamov engineers did extensive simulation studies and flew one of their coaxial Ka-27s in attack helicopter profiles with one pilot to validate their single-seat concept. Helicopter systems could be automated to give the pilot only the information needed to fly and shoot, but the business of searching for targets had to be done elsewhere. Pilots of the Mi-24 attack helicopters and Sukhoi Su-25 tactical jets in Afghanistan generally worked with Forward Air Controllers, either in the air or on the ground, and Soviet Army doctrine said an attack helicopter would never fight alone.

Tests showed a pilot looking for a target at 4 km had to fly at altitudes no lower than 35 to 70 meters over flat terrain or 100 to 245 meters over hilly terrain. At those altitudes controlling the aircraft with or without the autopilot was easy and with truly integrated aircraft, crew station, and weapons systems the attack helicopter mission could be flown solo. The Werewolf cockpit was originally based on that of the Su-25 jet. Over time it evolved into something more like a Kamov helicopter, still utilizing an Su-25-style Head-Up Display (HUD) but incorporating a moving map display and a sophisticated voice warning system. The voice warning system, using a woman's voice, announced malfunctions or advisories. A head-tracking, helmet-mounted sight provided a means to lock the telescopic sighting system with its missile guidance laser on a target as well as aim the gun at off-axis targets.

The coaxial Ka-50 inherited the designation of Kamov's earlier attack helicopter proposal. It flew for the first time on 27 July, 1982 and entered a direct competition with the two-seat Mi-28. The single-pilot concept was looked favorably upon by the Soviet Air Force generals who had flown the IL-2 against the Germans as well as by the colonels who had flown Su-25s against the Mujahedin. The Mil opinion that the attack helicopter mission could never be flown by a single pilot carried little weight with the fixed-wing fighter jocks who believed they had already accomplished exactly that. Pilots are also expensive to train and maintain, so the military favored a weapon that required only one precious aviator instead of two.

The Americans knew something was going on, and NATO dubbed their new worry "Hokum." There were those in the West who expected our next attack helicopter to be a single-seat fighter designed to kill their Apaches in air-to-air combat. Higher-ups in the American intelligence community didn't believe it. Some insisted the new shape in the their satellite photographs was a naval assault helicopter. We're told the U.S. Army went to the trouble of building a full-scale mock-up of Dr. Mikheyev's secret to see if it would float!

There were, however, Americans who realized their Apache's, Blackhawks, Chinooks, and the rest were at risk and that helicopter air-to-air combat was only a matter of time. Cobras fought Mi-24s for the first time in 1980 at the start of the long war between Iranian fundamentalist fanatics and our Iraqi allies. Sporadic helicopter versus helicopter engagements continued throughout the first Gulf War. An Iraqi Mi-24 actually killed an Iranian F-4 Phantom jet with a missile in 1982.

Around 1984, the Americans were conducting single pilot studies for their Comanche scout/attack helicopter. The U.S. Army ultimately decided on a two-pilot cockpit, at least in part because they liked having a co-pilot capable of bringing the aircraft home if the pilot was wounded. Both Mil and Kamov demonstrated cockpits with spaced steel armor would detonate rounds and dissipate their energy before the projectile reached the inner tub. Ground tests with brave volunteers proved the protected pilots could not only survive but keep functioning after 20 mm and 23 mm rounds struck the cockpit. Dr. Mikheyev also gave the Ka-50 pilot an ejection seat coupled with an explosive blade-separation system that offered the pilot an escape opportunity even when the Werewolf wasn't tough enough.

Crashworthy helicopters don't always crash with their wheels down. The U.S. Army had rejected the idea of ejection seats for combat helicopters in the early 1980s. They believed a helicopter with a working rotor could get a crew on the ground within the survivable limits of crashworthy airframes. They also worried that jettisonable rotor blades might blow off accidentally. We made the system work, and though it takes six seconds for the Werewolf to shed its blades, the K-37 ejection seat can carry you clear at altitudes down to 37m. You can trigger the ejection sequence with handles on the sides and front of your seat. Of course, your wingman had better stay clear when you punch out!

A preliminary technical evaluation by TSAGi, the central hydrodynamics Institute, said the Ka-50 had performance equal to the Mi-28 but was more compact, had lower manufacturing costs, and was less resource-intensive to build. Further tests compared the two aircraft for survivability. About 30% of the helicopters lost in Afghanistan fell due to tail rotor, tail rotor drive, or tailboom damage. A Mi-28 with its tail rotor shot away was out of the fight and probably out of the sky. The Ka-50, of course, has no tail rotor. Each aircraft had strong points, but by 1986 the Ka-50 was quietly winning the competition.

There remained the problem of how the single-seat attack helicopter would find its targets. Under some conditions, the Ka-50 could work alone, but even the toughest helicopter couldn't cruise around looking for targets in the face of NATO air defenses. The Mi-24s in Europe came to rely of Forward Air Controllers (FACs) in the lead regiments of tank, motorized rifle, and airborne divisions. Given a target by a ground or airborne FAC, we'd approach low and fast over the trees, then pop up to 100 m to acquire the target, shoot, then break away. Four Mi-24s approaching from different headings staggered their attacks with one breaking away as another fired. From the air the attack looked like a cloverleaf. On the ground, it confused defenses and kept heads down as one fire-breathing attack helicopter covered the retreat of another.

Whether the FAC rode in a tank, a helicopter, or a jet fighter the Ka-50 pilot would still need him to find the target. Voice radio was only one way to relay information from scouts to the Werewolf. Ground lasers could mark specific targets for a laser seeker, and thanks to the American Global Positioning Satellite (GPS) system, other means of digital targeting would be possible. The Werewolf pilot cued to a target 2 to 3 km away has 10 to 15 seconds to aim and fire weapons. At 5 to 6 km, he has 15 to 20 seconds. Clearly the Ka-50 needed a very survivable scout system on the battlefield, and the best idea seemed to be: buy both the Mi-28 (to play the hunter) and the Ka-50 (to play the killer).

The future of the attack helicopter in the Soviet Army was being planned when the world changed. The Soviet Union died. The Warsaw Pact disintegrated. The new Russian Army chose the Ka-50 as its new attack helicopter in 1991 but in the financial disarray of the broken Soviet Union, both Kamov and Mil scrambled for export sales and received only a trickle of funds to turn their impressive flying machines into full day/night weapon systems. In took almost a decade, but today the Werewolf is ready to fight.

## Werewolf at War

The Americans very graphically demonstrated the lethality of attack helicopters in Kuwait and Iraq during the second Gulf War. Using their low speed agility and the advantages of terrain, helicopters can also be lethal adversaries in air-to-air combat for both rotary and fixed-wing enemies. Ideally, the fighter helicopter pilot should use his weapons at maximum standoff range to strike without warning, then break off the engagement if the first pass is unsuccessful. Helicopters cannot outrun one another and traditional dogfighting is too much of a risk. Nevertheless, we expect most helicopter-versus-helicopter combat to occur in surprise encounters at close quarters and low speed. The American Comanche and French Gerfaut were the first Western helicopters designed with an air-to-air combat mission. The U.S. Army flew a series of tests with existing aircraft to provide solid engineering data on what made a good helicopter for air-to-air combat. The broad answers were as expected. Ample power margins, high yaw rates, and high roll rates lets the pilot put forward firing weapons on target. The Werewolf has all that and more.

The Klimov (formerly Isotov) TV3-117VK engines of the Werewolf are second generation turboshafts, not as fuel-efficient as the most current technology but electronically controlled for fast response in combat. Each engine generates 1,633 kilowatts (2,190 shaft horsepower, as measured by the Americans) with margins for hot-and-high operations. At 2,500 meters altitude, the Ka-50 still has a vertical rate of climb better than 10 m/sec. The coaxial rotor system is notable for its low disc loading and quick response, and the wings of the Ka-50 contribute lift and G at higher speeds. With a dash speed of 350 km/hr (189 kts), our Werewolf is faster than the American Comanche. With a maximum load factor of 3g, it is the equal of the Comanche and the French Gerfaut it is designed to confront.

The Americans put a high value on Low Observable, or stealth, designs, trying to reduce the visual, acoustic, IR, radar, and electronic signatures of the Comanche to elude sophisticated air defenses. The Ka-50 is not small, and with a standard takeoff weight around 10,000 kg it's about twice as heavy as the Comanche and about half again as heavy as the Gerfaut. Any attack helicopter around the size and weight of the American Apache is not hard to see, but the Werewolf was sized to carry heavy weapons and armored to take multiple hits. Night operations also deny the enemy use of many visually-sighted weapons. Coaxial rotor systems without noisy tail rotors can make a helicopter less noticeable to the ear. We lost Mi-24s to Stingers, so Kamov included infrared suppressors on the Werewolf's engines, an IR jammer along its spine, and Vympel decoy flare dispensers on the wing tips.

The Werewolf with its high stacked rotors and flat-faced fuselage fins is not radar Stealthy. But 95% of the helicopters downed in Vietnam were downed by hand-held infantry weapons, not radar-guided SAMs. Stealth styling and materials increase production costs and compromise ruggedness, while we used composite materials in place of metal only where they made good design sense. Battlefields of the future will probably have no fixed lines, and the attack helicopter out front in support of an advance is more likely to run across ground troops with guns than radar directed air defense networks. With armor, wingtip chaff dispensers, and weapons, the Werewolf is meant to fight, not hide.

Overall, the Ka-50 is protected by some 350 kg of steel armor. The basic structure of the helicopter is a torsion box beam 1 m wide by 1 meter high with the armored cockpit hung on the front. The gearbox is located on top with the engines on each side. The composite fuel tanks inside the box beam are filled with polyurethane foam to prevent explosions and seal themselves automatically if hit. In tests, they did not explode after 20mm hits, and the extinguishing system had the fire out in just 5 seconds. The cockpit tub proved it could withstand 23 mm hits. Other critical areas have similar protection. Composite rotor blades with the reinforcing fibers in spars and skins stop damage propagation and have proven their ability to keep flying after severe hits, and control actuators can be oversized and hardened to withstand hits. The tank-killing warhead of a Hellfire missile, or that of any of the surface-to-air missiles now in the world inventories, can indeed kill the Ka-50. But, bathed in groundfire or the 20mm rounds of a Comanche's gun, the Werewolf has a very good chance of biting back.

# Eyes and Teeth

The Americans always led us in the technology of helicopter avionics. We had FLIR (Forward Looking Infra Red) and NVG (Night Vision Goggles) but their high cost slowed development and Russia just couldn't replicate certain Western manufacturing technologies. We could indeed produce third-generation NVGs, but it took time to give the Werewolf and its Mi-28 scout a complete night vision package like the American Apache carries. We succeeded with hard work and some unwitting help from a British FLIR manufacturer. The day/night sensors of the Ka-50 are mounted in a nose turret, giving the means to hit targets found by our scouts.

You pilot the helicopter at night primarily with the night vision goggles. The Werewolf nose turret contains a daylight television, thermal imaging FLIR, laser seeker/rangefinder/designator, and a missile command laser. The sighting system has magnifications from six to 22 power, the lowest possessing the highest field of view for searching; the highest magnification possessing a narrow field of view for target pinpointing. You can steer the sensors manually or with your helmet sight, and you can lock them on targets marked by scouts with coded lasers or digital radio transmissions.

Day or night, targets marked by ground or airborne scouts appear on your head-up display. Any target you select can be fed into the inertial navigation system as a waypoint. If you choose a HUD target and engage the autopilot, the Werewolf goes there. If you chose to engage, the sensor turret locks on with a contrast tracker which aims the missile, rockets, or gun. Once you fire a laser-guided AT-9 missile the sensor turret stays locked despite maneuvers made by the helicopter. The AT-9 does not take long to reach its target. The R-73 air-to-air missile is a fire-and-forget weapon with its IR seeker capable of acquiring targets up to 60 degrees off your Werewolf's nose.

In addition to your TV and FLIR, the Werewolf adopted an IR Search and Track (IRST) sensor used by our supersonic jet fighters. IRST is an air-to-air search device that cues your nose turret to hot spots in the sky. It can see jets or helicopters, allowing you to lock the IR seeker of your missiles or the guidance laser in the nose turret on the target.

The primary weapon of the Ka-50 is the Vympel AT-9 "Whirlwind" or Vikhr missile. A laser-guided beam-riding missile, the AT-9 is not fire-and-forget, but can travel its 10 km range fast enough to be used as either an air-to-air or air-to-ground weapon. The 60 kg missile can devastate the armor found on most battle tanks. The warhead explodes with a 3 m lethal radius, inflicting serious damage on any object within three meters of the warhead's explosion. The Ka-50 can carry up to 16 AT-9s and your command laser can guide missiles launched by your wingmen to targets in your field of view.

Do Not Copy Manual

The R-73 also comes from our Air Force fighters. It can reach out to 40 km giving the Werewolf formidable air-to-air claws. You can carry up to four of these missiles, one per wing station.

The other weapons of the Ka-50 are effective against ground targets and helicopters. The 30 mm 2A42 cannon on the Ka-50 is the same gun used on the BMP-2 infantry fighting vehicle. It weighs about three times as much as an aircraft gun of the same calibre but can mangle nearly any ground target. The Werewolf cannon fires a 400 gram projectile with a muzzle velocity of 960 meters/second, drawing rounds from two separate ammunition bays.

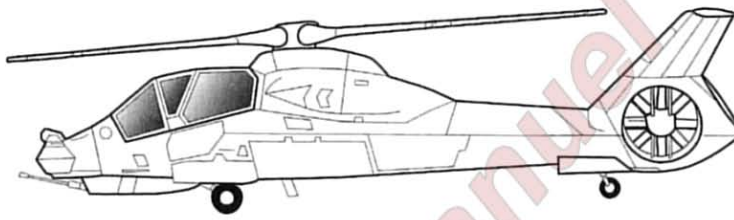
While turreted guns give helicopters off-axis weapons tied to helmet sights or steerable telescopic sights, the corkscrew ballistics of rounds fired off-axis make air-to-air fire control solutions difficult. The gun of the Ka-50 is on the right side of the fuselage to fire along the axis of the aircraft. It can elevate plus 10°, depress 60°, and move 15° to either the right or left. To aim the gun more than 15° off the aircraft's nose, yaw the helicopter to the desired direction.

Rockets have always been a favored weapon on Russian aircraft, and Afghanistan taught us we needed bigger ones. The Ka-50 carries up to eighty of our 80 mm rockets in four wing pods. Other rocket and gun pods are available to provide the range and weight of fire needed for any target, and unitary charge or cluster bombs up to 500 kg are an option. One more dramatic option for hard targets is the big AS-12 missile. The wing stations can also carry fuel tanks or support kits that enable the Werewolf to work for weeks in the wilderness.

We still work in flights of two or four, relying on scouts to find our targets. That does not mean you will not find targets of opportunity. Nor does it mean your scouts and wingmen will spot airborne threats first. The Ka-50 has been shaped by Russian military doctrine, and that doctrine stresses the value of the offensive. You can call for artillery fire on coordinates generated by your inertial navigation system, and you can direct fixed-wing tactical aircraft to targets with your laser.

The world has indeed changed. The big battle with NATO's standing armies was always the least likely of scenarios. As Russia finds it place in the 21st century, we face new threats inside our old borders and beyond. The Ka-50 is ready to fight wherever we must, and you must be ready to use it.

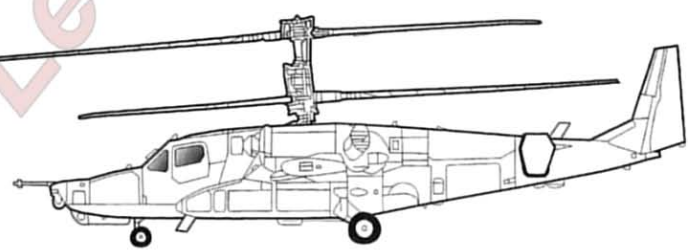
Le Hecks Manuel



RAH-66 Comanche

"Just as tanks have always been the most effective weapon against other tanks, helicopters are the most effective means of fighting other helicopters."

-Colonel M. Belov,
How to Fight Helicopters, Soviet Military Review



Ka-50 Hokum

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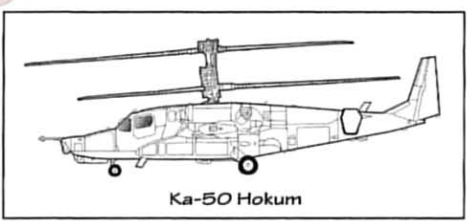
# Chapter VI
# Technical Specs

The following Technical Specs chapter is intended to give you a general description of the important friendly and enemy aircraft, land vehicles, and naval vessels you'll encounter in this simulation. The illustrations accompanying each briefing have not been drawn to scale. They have been included merely as a means of enabling you to visually identify the objects on the battlefield.

## A. AIRCRAFT

### Ka-50 Werewolf (Hokum)

Known as Werewolf to its Russian pilots, the Kamov Ka-50 Hokum is a very capable attack helicopter. It features dual contra-rotating, three-bladed main rotors which eliminate the need for a tail rotor. Although the prototype Ka-50 flew successfully back in 1982, the Werewolf did not enter low level series production until 1994. Russia has been actively marketing this helicopter to foreign buyers ever since. Had the Werewolf program progressed satisfactorily during the 1980s, it is possible that a number of these helicopters may have shown up in Iraq prior to Desert Storm.


Ka-50 Hokum

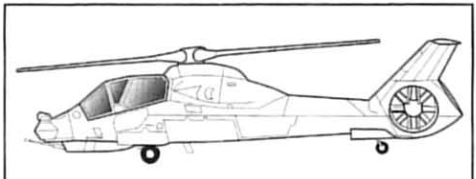
The Ka-50 features a comprehensive mix of air-to-air and air-to-ground weaponry. While its primary mission seems to be killing other helicopters, the Werewolf is well able to dish out death and destruction on the ground. It possesses a single barrel 30 mm chain gun (model 2A42) located along the right side of its fuselage. There are four external hardpoints able to carry a combination of up to twelve AT-12 Vikhr LGMs, eighty S-80 80 mm rockets (in four 20 rd. pods), or four AA-11 Archer heat-seeking AAMs.

Overall, the Werewolf is a typically solid Russian design. Its avionics are perhaps less advanced than those commonly available in the West, but they are tough, easy to maintain, and most importantly; they work! Its engines (two 2,190 shp Klimov turboshafts) give it a top speed of approximately 165 knots with an endurance of 2.5 hours. The helicopter's only major shortcoming is the reliance on a single pilot. Without a co-pilot (WSO), a Werewolf pilot is expected to both fly and navigate, fight and communicate. If the pilot is a good cockpit manager, he will do okay. The majority of Werewolf pilots however will tire quickly due to the stress of such a heavy workload.

Pavlov Manuel

# Boeing Sikorsky RAH-66 Comanche

The Boeing Sikorsky RAH-66 represents the U.S. Army's concept of what a reconnaissance/ attack helicopter of the future should be. It is fast, relatively light-weight, and packs a powerful punch. Most of all, the Comanche is quiet, hard to spot with the naked eye, and nearly invisible to enemy radar. Since the enemy can't hit what it can't see, the Comanche is superbly designed to survive on the 21st century battlefield. Even if detected, it can take hits from triple-A fire that would blast lesser helicopters from the sky.



RAH-66 Comanche

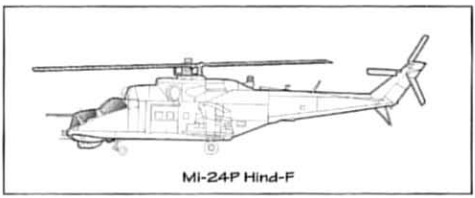
It's not enough just to survive, however. The Comanche sports the very latest in high tech electronic surveillance and targeting equipment. Its avionics are purpose-built for maximum commonality with the USAF's F-22 Lightning II. Day or night, this bird is made to hunt prey. The pilot is equipment with a Helmet Mounted Display (HMD) which acts as a pseudo-HUD allowing him to track objects independent of the helicopter's flight path. On the pilot's console are two multi-function monitors which can display a colorized moving navigational map, monochrome FLIR and magnified TV imagery, plus a variety of situational and targeting information.

The Comanche features two side-mounted weapon storage bays instead of external hard points. The bays are located internally to reduce the helicopter's radar signature. Each bay can carry up to three AGM-114 Hellfires, six AIM-92 Stingers, or a single rocket pod with four Hydra-70 rockets. In addition, the Comanche carries a three barrel 20 mm cannonwith 500 rds. of ammunition located in a chin mounted turret. The gun is slaved to the pilot's helmet. He only needs to look at a target to train his gun on it and then make it disappear.

The Comanche's five-bladed main rotor is powered by two LHTEC T800-LHT-801 turboshafts each rated at 1,380 shp. These engines give the RAH-66 a maximum speed approaching 175kts and a flight endurance of almost 2.75 hours. The engine exhaust is cooled and vented downward before being released into the surrounding atmosphere. This further reduces the Comanche's IR signature. The rear rotor is an eight-bladed enclosed system known as FANTAIL" This system has been credited with allowing the Comanche to fly sideways at well over 70 knots.

# Mi-24P Hind F

The Mi-24 Hind was a shock to Western intelligence analysts when it first appeared in the mid 1970s. The Soviet Union had fielded what looked to be every bit the flying tank. It scared the US military silly and touched off a minor "helicopter gap" arms race. Hundreds were exported (outside of former Warsaw Pact nations) during the early 1980s. These days production of the Hind helicopter is centered around manufacturing plants in Arsenyev and Rostov with more than 15 new Mi-24s built each month.



Mi-24P Hind-F

Live Fire Model

The early Mi-24s (models A, B, and C) boasted thick belts of armor able to withstand small arms fire and triple-A hits up to 12.7 mm in caliber. Later model Hind Ds, Es and Fs feature this same level of protection plus a comprehensive targeting and avionics package. Based upon some expensive lessons learned in Afghanistan, the Soviet's post-war Mi-24s were given an even greater offensive punch. The Hind Fs represented in this simulation all have an electro-optical (LLTV) sensor, radar, and FLIR. They carry twin GSh-30 30 mm cannons mounted in a chin turret. These guns are equally effective against helicopters as well as tanks. Externally hardpoints provide space to mount rocket pods and AT-6 Spiral air-to-ground missiles.

Although Mi-24s are beginning to show their age, the Hind F remains an extremely tough opponent. In the hands of a skilled crew it can be devastating and virtually unstoppable. Fortunately, the Hind F is primarily interested in blowing things up on the ground. This "flying tank" can withstand a lot of damage but is too cumbersome to maneuver effectively against a lighter aerial opponent.

## Hughes 500MD

The Hughes 500MD (McDonnell Douglas) was designed in response to the US Army's request for a light observation helicopter. In 1961, the OH-6A Cayuse won the Army's Light Observation Helicopter (LOH) competition. The 500MD is main beneficiary of the all knowledge gained during the development of the Cayuse program. Until the Comanche appeared on the scene, the 500MD could boast of having the most advanced avionics suite of any modern helicopter. This fast and maneuverable helicopter has been widely exported in both civilian and military versions. Chances are you'll run into one of these helicopters being flown by a bad guy at some point in your career.

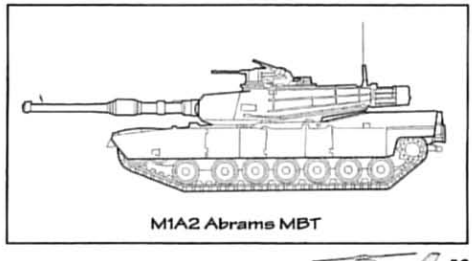

Hughes 500MD

Although not all weapon and avionic systems are licensed for use by foreign nations, even the most basic stripped down models remain lethal adversaries. Fortunately, most 500MDs you happen to run into are configured for reconnaissance or ground support operations. Even so, this nimble little helicopter is hard to spot in a dogfight. Its small cabin and blade radius allows it to get into tight hiding places. In combat, it has a nasty tendency to pop up at inopportune moments and maneuver in close. Let this one get on your "six" and it'll use its 30 mm M230 chain gun to carve up your bird like a Thanksgiving turkey.

# B. LAND VEHICLES

## M1A2 Abrams MBT

The M1 Abrams main battle tank is named in honor of Gen. Creighton Williams Abrams (1914-1974), the US Army Chief of Staff from 1972-1974. It is the first tank in history to be powered by a gas-turbine engine. Despite criticism of potential servicibility problems, the M1 in all its variant forms is the most potent fighting vehicle on the


M1A2 Abrams MBT

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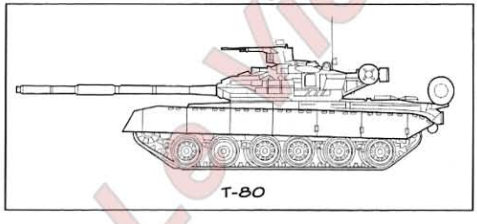
modern battlefield. Despite numerous clashes with well-equipped Iraqi armor units during Desert Storm, not a single M1 was lost to enemy action. Overall operational readiness exceeded 90% throughout the war.

The M1A2 is currently produced by General Dynamics at its Lima Army Tank Plant in Lima, Ohio. Almost 7,500 M1s have been built and delivered since 1982. The M1A2 model represented in this simulation features advanced Chobham ceramic armor providing the ultimate in protection to its crew of four. This honey-combed armor fiber makes the Abrams nearly impervious to ATGMs and HEAT rounds fired by other tanks. It carries a 120 mm smoothbore main gun made by Rheinmetall of Germany and redesignated M256. This is the same main gun used by Germany's Leopard 2 MBT. The gun is most famous for firing depleted uranium slugs used with APFSDS rounds (armor-piercing, fin stabilised, discarding sabot).

The M1A2 also features state of the art imaging and target acquisition systems. It can fight equally well during the day or night. This gives it advantages over other lesser equipped vehicles. During the Gulf War, Iraqi T-72s were consistently engaged and destroyed by US tanks before they knew what hit them. Over and over again, M1 platoons suddenly found themselves facing entire companies of Iraqi tanks. Invariably the Iraqi armor would be shot up by with little or no loss to the American crews.

## T-80 MBT

The T-80 is a fine example of Soviet heavy metal. This main battle tank (MBT) went into low level production at the Leningrad Kirov Plant (LKZ) in the mid 1970s. It entered service in 1976. Although the internal layout is similar to the earlier Soviet MBTs, the T-80 features a number of significant improvements. For one thing, the T-80 uses the same 125 mm 2A46 smoothbore main gun as the T-72 but with a more modern system of fire control which includes a laser rangefinder. This gun can also be used to launch 9M112 Kobra (AT-8 Songster) missiles. These wire-guided anti-tank rounds are controlled much like the TOW system used by US forces.


T-80

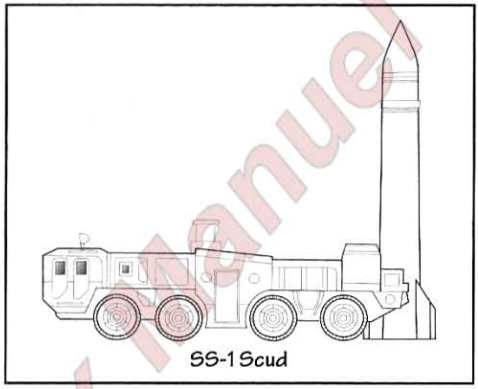
Though the T-80 is slowly being phased out and replaced by newer MBTs, it still remains very common among Russian units. This highly exported vehicle can be bought direct from the Leningrad showroom floor for $2.5 million. Thousands of these vehicles have been exported to the Third World so you are likely to run into them in any future conflict.

Represented in this simulation is the T-80BV model which features belts of explosive reactive armor, a thermal night sight, and a 12.7 mm machine gun. It has a combat weight of 45 tons and can travel at speeds of up to 45 mph. Its gas turbine engine is rated at 1,100 horsepower with a manual transmission featuring five forward gears and one reverse. This represents a noticeable power/ weight ratio improvement over its predecessors.

Lovick Friends

# SS-1 Scud

The SS-1 Scud is a Russian-made surface-to-surface missile system. Western media made this crude weapon a celebrity overnight. Before 1990, the average American citizen didn't know a Scud from a "Bud". But these days, everyone remembers the Scud. The massive amount of free publicity given it during the Gulf War must have made its makers very proud. To bad it is no longer in production. Many of the Scuds fired during the Gulf War were so old and poorly maintained that they broke up in flight.

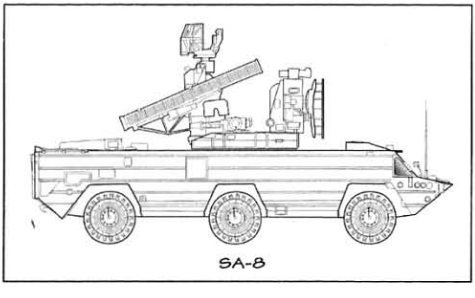

SS-1 Scud

Billed as the villain of Desert Storm, a Scud claimed the lives of more Americans than any other single event of the war. Serious analysts remain unimpressed by the Scud as a weapon of war, however. It lacks the accuracy , range, and payload necessary for practical military use on the battlefield. The Scud's 2,000 lb. high explosive warhead is insufficient to cause damage to face-hardened structures. Most importantly, the inertially guided Scud is totally useless against mobile targets and about as subtle to radar as a city bus.

As a weapon of terror on the other hand, the Scud is unsurpassed. In the 1980s, it was used during the Iran-Iraq war as a means of striking back at the other side's civilian population. In 1991, America was treated to a Scud report each night on television. We witnessed Israeli citizens taking to bomb shelters and donning gas masks. Casualties and damage were exceedingly light but people started dropping in the street from heart attacks. In short, this stubby little inconsequential missile was able to *terrorize* an entire country. The very fact that it generates such levels of fear makes this weapon dangerous. Scuds must be hunted down and eliminated wherever they are found.

# SA-8 Gecko

The Antey 9K33 Osa SA-8 (known by the NATO designation "Gecko") is a self propelled surface-to-air missile system. It also goes by the Russian name "Romb", meaning diamond. It was first introduced into service during the mid 1970s as a complete SAM system wrapped up in a single vehicle. That is to say, each individual SA-8 vehicle is capable of independently searching, targeting, then tracking enemy targets.


SA-8

In the late 1970s, the SA-8 underwent a major upgrade. The resulting modifications gave the missile a better ability to track hovering helicopters as well as helicopters with

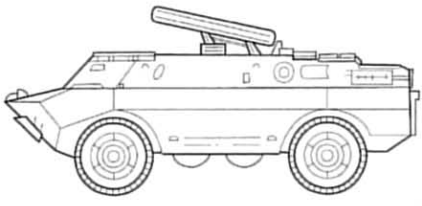
The Delux Manuel

spooling rotors still on the ground. This upgrade entered service in 1980 and is referred to as the Antey 9K33M. It was used by the Iraqi army during the Gulf War and has been credited with downing numerous Tomahawk cruise missiles.

The SA-8 Gecko uses a "Land Role" H-band fire control radar centrally located on the top of the vehicle chassis between the two 3-round launch boxes. Tracking and guidance is also conducted by a monopulse J-band radar. As a back-up, each vehicle carries a TV-optical guidance system on-board just in case the radars are degraded due to heavy ECM.

## BRDM-2 w/ AT-5 Spandrel (BRDM-3)

The BRDM-2 is a Soviet-made amphibious scout car. It was first shown in public in 1966 and entered military service shortly thereafter. The typical Soviet motorised rifle division had a total of 28 of these vehicles assigned to its TO&E. This successful vehicle spawned a number of variants including one anti-aircraft version consisting of an SA-9 SAM launcher mounted atop the standard BRDM chassis. Represented in this simulation is the anti-tank BRDM-2 armed with AT-5 Spandrel missiles. It is sometimes referred to as a BRDM-3.



BDRM-2 w/AT-5 Spandrel

This variant was first seen in 1977. It carries a crew of two, a driver and vehicle commander. The vehicle commander is responsible for operating the AT-5 launcher located to the rear of the vehicle. Each vehicle carries five missiles inside the launcher. They are second generation wired-guided ATGMs much like the TOW missile system used by US forces.

These vehicles are fully amphibious. They are equipped with a single water jet propulsion system which allows the BRDM-2 to cross water obstacles at speeds of 2-3 mph. The crew compartment is airtight and over-pressurized to protect the crew from nuclear, biologiocal, and chemical (NBC) hazards. Comanche pilots should be aware that these vehicles also carry a 14.5 mm machine gun.

# C. NAVAL VESSELS

## Osa II Patrol Boat

Throughout its history the Soviet Navy has concentrated on building coastal defense craft rather than "blue water" vessels. Consequently, they have become very adept at constructing light but powerful patrol boats. This type of warship is characterized as being fast, nimble, yet packed full of modern anti-ship weaponry. The Osa II is one such vessel. It entered service in 1966 as a replacement for the Osa I and Komar class patrol vessels.



Osa II

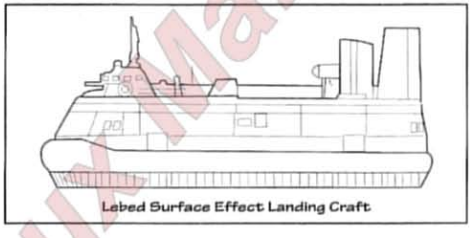
The Osa II is driven by three diesel engines which provide power to three separate propeller shafts. This tiny boat is able to sustain speeds up to 40 knots and has a combat

radius of just under 1,000 nautical miles. It is the epitome of what's termed in modern navy parlance; "an egg shell with a sledgehammer". An Osa II boat is unarmored and only 128 ft. long from stem to stern. (We're not talkin' the Queen Mary here.) One hit from a missile or bomb will be sufficient to send an Osa to the bottom. At the same time, an Osa carries a mighty hammer in the form of four SS-N-2B Styx anti-ship missiles. Of more importance to Comanche pilots however, is the Osa II's compliment of SA-N-5 SAMs and twin 30 mm AAA guns.

## Lebed Air Cushioned Landing Craft

The Lebed 'surface effect' (hover craft) landing craft entered service during that period of massive Soviet naval expansion during the late 1970s. They are designed for use as an amphibious assault vessel as well as an "over-the-shore" logistics platform. Each vessel is equipped with a bow ramp allowing for quick Roll On- Roll Off (RO-RO) operations.

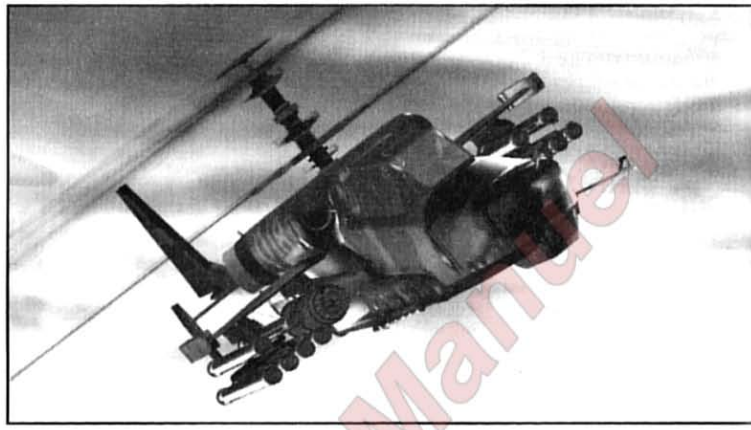
In combat, Lebeds are normally pre-loaded with men and material, then placed in pairs aboard an "Ivan Rogov" class LPD mothership. They are stored internally until such time as the Rogov reaches the assault point. Once offshore of the landing beach, the Lebeds exit the stern of the Ivan Rogov and proceed to the beach at speeds reaching 65 knots. Each vessel carries a single 30 mm CIWS (pronounced "Sea-Whiz") gatling gun to be used as an air defense weapon or to support the troops going ashore.



Lebed Surface Effect Landing Craft

When used as assault vessels, these craft normally carry two light MBTs or up to 120 marines and their equipment. Because they are "surface effect" or air cushioned, Lebeds can move directly onto the beach and perform dry insertions. When operating as re-supply vessels, these craft can carry over 40 tons of cargo. Again, these vessels can deliver supplies directly onto dry land obviating the need for ship-to-shore off loading.

Le Lieux Manuel



The Ka-50 "Hokum" (or Werewolf) breaks new ground for the Kamov design bureau. While all previous Kamov helicopter designs have been delivered to the Russian Navy, this one proved too good for the Army to pass up. It is clearly a product of the lessons learned in Afghanistan.

Unlike the Mi-24 Hinds series it replaces, the Werewolf makes no pretense about being used for mere transport. Lacking a passenger cabin, the Ka-50 is a true attack helicopter, combining maneuverability with an awesome punch. Not only does the Werewolf have excellent slow and hover speed handling, it is able to carry an array of sophisticated weapons.



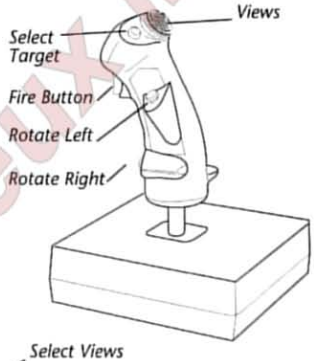
Le Vieux Manuel

# CHAPTER VII
# HARDWARE CONFIGURATIONS

## A. JOYSTICKS

Although you may play Werewolf using only keyboard inputs, most players find that using a joystick as a cyclic control more closely simulates actual flight conditions. Default joystick configuration files therefore have been included with your Werewolf CD ROM. Consult your joystick user manual for specific information on implementing the files provided. Examples of default joystick programming are illustrated below.

### 1. ThrustMaster Flight Control Stick (FCS)

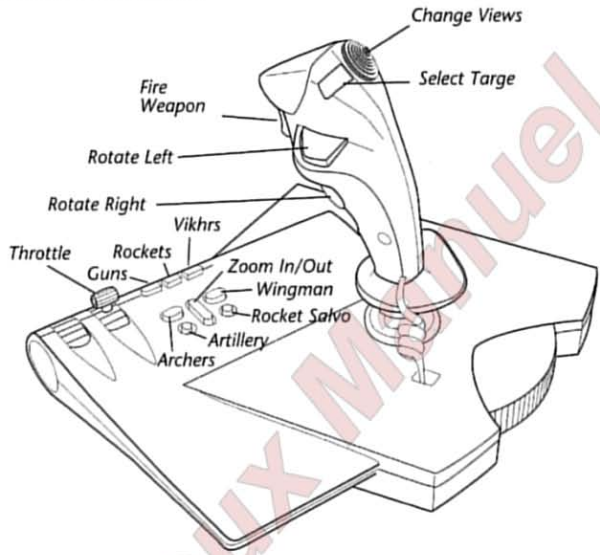



### 2. CH Flightstick Pro

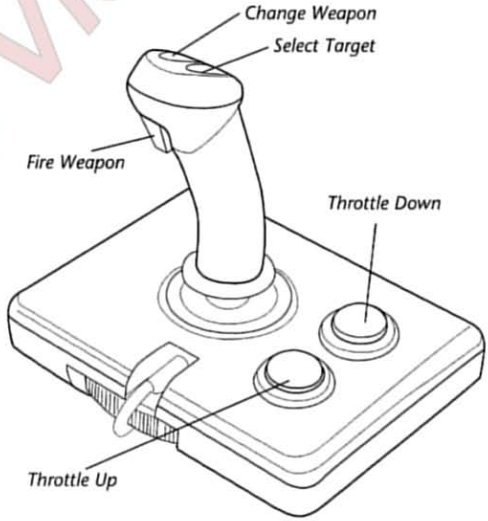



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## 3. Gravis Firebird

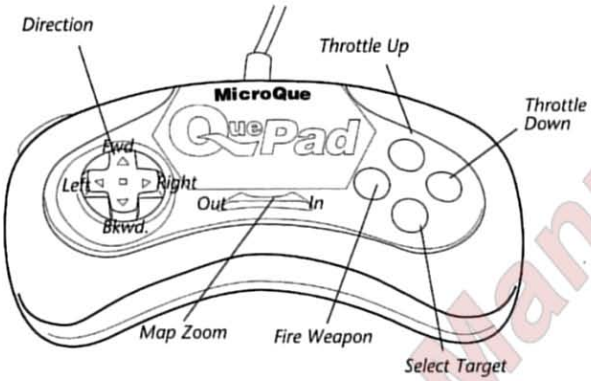



## 4. Gravis Mousestick




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## 5. Que Pad




## 6. Que Stick

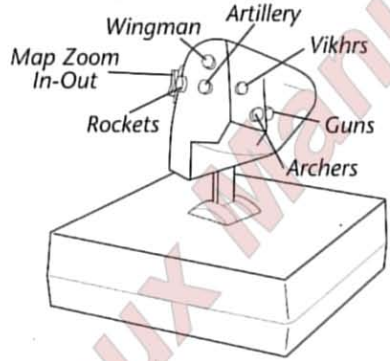



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## B. THROTTLE

Although you may play Werewolf using only keyboard inputs, most players find that using a throttle device as a collective control more closely simulates actual flight conditions. Default throttle configuration files therefore have been included with your Werewolf CD ROM. Consult your particular throttle device user manual for specific information on implementing the files provided. An example of default throttle programming is illustrated below.

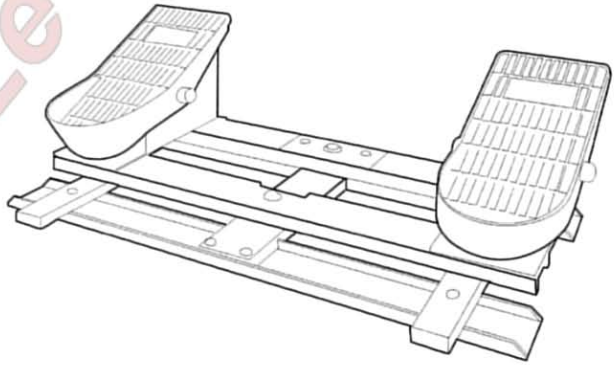
### 1. ThrustMaster WCS




## C. FOOT PEDALS (RUDDERS)

Although the actual Werewolf uses contra-rotating rotors to control torque instead of rudders, you may use foot pedals to simulate this effect.

### 1. ThrustMaster Pedals



Le vieux manuel




# GLOSSARY

This section of your User Manual contains definitions or explanations of unfamiliar words, terms, acronyms, and phrases. Spoken phrases or terms relating to audio prompts (alerts, alarms, enunciators, etc.) are italicized in the body of the text. Note that the words aircraft and helicopter are used interchangeably such that all helicopters are considered aircraft but obviously not all aircraft can be considered helicopters.

## A (alpha) *AL fah*

AAA : (Anti-Aircraft Artillery); commonly referred to as "triple A", refers to bullets, shells, or projectiles that are fired from guns on the ground. Normally, the term is not meant to include surface-to-air missiles (SAMs).

AAM : (Air-to-Air Missile); a missile that is fired from an aircraft in flight with the intent of shooting down another aircraft, e.g. Sidewinder, AMRAAM, Alamo, Apex, etc.

ACM : (Air Combat Maneuvering); a fancy term for dogfighting. The art of engaging enemy aircraft and shooting them down using a combination of maneuver and weaponry.

ADF : (Automatic Direction Finding); equipment used to process navigational signals.

*affirmative* : term meaning Yes, a positive response, opposite of *negative*.

AFV : (Armored Fighting Vehicle); another name for a tank or APC.

AGL : (Above Ground Level); refers to your altitude in relation to the actual elevation of the ground you are traveling over and not sea level.

AGM : (Air-to-Ground missile); a missile launched from an aircraft and directed at targets on the ground, i.e. the AGM-65D Maverick.

AH : (Attack Helicopter); as in (R)AH-66 Comanche.

AIM : (Air Intercept Missile); another name for U.S. air-to-air missiles, e.g. AIM-92 Stinger.

altimeter : an instrument which displays your altitude by measuring differences in air pressure.

AOA : (Angle of Attack); the angle between the chord line of the rotor blade and the direction of the relative wind. An indication of the "bite" your blades are making in the surrounding air mass.

APC : (Armored Personnel Carrier); an armored transport vehicle which offers troops some measure of protection from small arms fire and shrapnel.

ASL : (Above Sea Level): refers to your altitude above sea level and not the actual altitude above the terrain you are passing over.

aspect angle : a comparison of flight paths between the target and the attacking aircraft, usually referenced from the attacking aircraft's perspective, i.e. head-on aspect, tail aspect, etc.

Eagle Manuel

ATO : (Air Tasking Order); a secret list scheduling what targets are to be hit and when.

avionics : the electronic components and subsystems onboard an aircraft, a catch-all phrase that can be used to denote just about anything that moves, blinks, or beeps.

## B (bravo) *BRAH voh*

*bandit* : an aircraft that has been positively identified as enemy or hostile, a bad guy.

BDA : (Bomb Damage Assessment or alternatively Battle Damage Assessment); a post-strike estimation of the damage caused to a particular target.

bearing : horizontal direction to or from a given point, a compass heading usually given in degrees through 360°.

*bingo* : a term used to describe a condition in which an aircraft has only enough fuel remaining to return to base.

*blade time* : term for the number of flight hours a pilot has spent in the aircraft.

blood chit : a cloth pass carried by pilots in case they are shot down behind enemy lines. The pass (written in several languages) promises a reward to anyone who helps return the downed pilot to friendly forces.

*Bogey* : an aircraft which as not been positively identified, basically just an unknown blip on the radar.

bolo : a mistake, a "screw up".

bolo badge : slang name for a Purple Heart medal. The thinking is if you are awarded a Purple Heart, you must have screwed up or "bolo-ed" somehow.

bounding overwatch : a tactic by which two helicopters advance across the battlefield in stages, one providing cover while the other moves forward.

BVR : (Beyond Visual Range); a term indicating that a target is too far away to be seen with the naked eye.

## C (charlie) *CHAR lee*

callsign : the nickname by which you are known throughout your squadron, e.g. "Sandy405", "Slick", "Mongo", "BigRick", etc.

CAP : (Combat Air Patrol); a term which usually refers to a defensive sortie or air-to-air mission centered around a particular fixed location.

CAS : (Close Air Support); used to indicate tactical aircraft used to attack enemy ground targets in conjunction with friendly forces on the ground.

C³I : (Command, Control, Communications and Intelligence); pronounced *See-Three-Eye*; a term for the infrastructure responsible for battlefield management.

chaff : passive form of electronic countermeasure, metallic strips usually carried in a pod or dispenser aboard an aircraft that when released disrupt radar tracking and/or target acquisition much like an electronic smoke screen.

*check fire* : an order given to cease firing according to a current ROE.

cherry hop: your first flight in a Comanche.

closure : rate at which two objects are approaching each other.

collective : pilot control used to "collectively" change the pitch of the main rotor blades, enabling you to control the helicopter's altitude.

creep : a slow, stealthy reconnaissance patrol or mission, as in "to go on a creep".

cyclic : pilot control used to selectively change the pitch of the main rotor blades, enabling you to control the helicopter's direction of flight.

Le Voux Manuel

# D (delta) *DELL tah*

ditch : bailing out of an aircraft, see ejecting.

*down* : term used to describe any piece of equipment which is taken out of action due to maintenance, something which won't work until repaired.

*dust-off* : slang term for medevac (medical evacuation) flights, e.g. "Tango Two Charlie, we have two whiskey-india-alphas. Request an immediate dust-off."

# E (echo) *ECK oh*

ECM : (Electronic Counter-Measure); usually refers to chaff, flares, or other means of interfering with enemy radar or radio transmissions.

ECCM : (Electronic Counter Counter-Measure); refers to things done to minimize the effectiveness of ECM.

ECCCM : (Electronic Counter Counter Counter-measures); There's really no such thing but you get the idea how this electronic warfare stuff works.

egress : leg of flight plan from a target location, the route an aircraft takes after striking a target.

ejecting :common term for bailing out of a damaged aircraft, pilots are equipped with an ejection seat which blasts them free from the aircraft.

EW : (Electronic Warfare); usually refers to jamming, signal intercept, etc.

# F (foxtrot) *FOKS trot*

FARP : (Forward Area Refueling Point); a semi-permanent operating base close to the action where helicopters can be armed and refueled.

*fast mover* : slang for a high performance, fixed wing aircraft.

FEBA : (Forward Edge of the Battle Area); the front line, a demarcation line indicating the point at which friendly troops are separated from the enemy.

FFAR : (Folding-fin Aircraft Rocket); rockets which extend their guidance fins after being ejected from their pod containers.

final approach : the last leg of traffic pattern flown by an aircraft getting ready to land, a flight path consisting of a line extending back from the runway centerline intersecting with the base leg.

First Team : industry name for the Boeing/ Sikorsky employees and sub-contractors working on the RAH-66 project.

flak : (flugabwehrkanone); a German word for triple AAA fire, seldom used anymore except as a slang term for petty annoyances, e.g. "I caught some flak from the Captain for being late again today."

flare : a magnesium pyrotechnic which is released from an aircraft, a countermeasure designed to attract the IR sensor of a heat-seeking missile.

FLIR : (Forward-Looking Infrared); an IR imaging system that contrasts differences between objects and background temperatures. Although commonly thought of as a means of viewing objects at night, a FLIR also can be used in daylight to see through smoke, haze and even camouflage.

FLOT : (Forward Line of Own Troops); something pilots in fast moving aircraft have always had trouble discerning, see FEBA.

flush : a precautionary scramble from airbase to avoid being caught on the ground.

Fly-By-Wire : aircraft controls which are actuated by electronic rather than mechanical

Le Fix Manuel

means.

*FM* : *(friggin' magic);* a profane term used by pilots to describe how and why some things just seem to turn out the way they do.

F-Pole : the distance between yourself and the target at the moment your ordnance impacts, an important consideration for helicopter pilots.

fratricide : term used to describe the act of shooting up friendly troops by mistake, in training this is referred to as a "blue-on-blue" incident.

## G (golf) *GOLF*

G force : the force of gravity, one G is a measure of gravity equal to the force exerted on a stationary object at sea level.

GCI : (Ground Control Intercept); a radar command installation responsible for vectoring friendly fighters and targeting enemy aircraft for SAMs.

G.I.B : (Guy In Back); slang term for your Weapon System Operator (WSO).

GLOC : (G-induced Loss Of Consciousness); cute phrase which means blacking out due to positive G stress forcing blood from the brain and into the lower body. This is more of a problem for pilots in high performance fixed wing aircraft, though. Chances are your rotors would break off under heavy G stresses long before you would ever black-out.

GPS : (Global Positioning System); a highly accurate satellite-based navigation system.

ground speed : speed of the aircraft in relation to the actual distance being traveled on the ground.

## H (hotel) *hoh TELL*

heading : horizontal direction of flight given as a compass heading where 0°/360° equals magnetic north, 90° equals east, 180° equals south and 270° equals west.

*heater* : pilot slang for a heat-seeking (IR) missile.

HEI : (High Explosive Incendiary); term used to classify the ammunition used by the RAH-66's 20 mm cannon.

HID : (Helmet Integrated Display); an imaging system, somewhat like a HUD, which superimposes flight and weapon symbology directly onto your helmet visor.

HOTAS : (Hands On Throttle and Stick); refers to a throttle and stick design which allows a pilot to operate his aircraft's flight and weapon systems using actuators located right on these devices.

HUD : (Head-Up Display); a transparent display containing flight/ weapons symbology that is set directly in front of the pilot. The idea is to give the pilot access to information without forcing him to avert his gaze from outside the cockpit, i.e. allowing him to keep his head-up and looking around rather than starring at gauges.

## I (india) *IN dee ah*

IADS : (Integrated Air Defense System); a multi-layered air defense plan consisting of many different elements which are bound together by comprehensive radar coverage.

ILS : (Instrument Landing System): an all-weather means of controlling the

Le Fauconnier

three- axis movement of an aircraft using a radio-frequency beacon, normally used in the context of assisting a pilot attempting to land during periods of low or no visibility.

ingress : the approach leg of flight plan to a target location.

IGE : (In Ground Effect); the beneficial lift produced by the deflection of rotor downwash when operating near to the ground.

IR : (Infra-Red); used in the context of missiles able to track targets based on sensors able to detect radiated energy.

# J (juliet) *JEW lee ett*

jamming : term used to describe an active attempt to create signal interference to prevent an enemy from using his radar or radio.

jinking : erratic gun-defense skidding maneuver designed to spoil an attacker's firing solution.

# K (kilo) *KEE loh*

Ka : a military prefix used in identifying aircraft produced by the Russian design bureau Kamov.

KIAS : (Knots Indicated Air Speed); term used to refer to your helicopter's airspeed, a knot is one nautical mile (2,000 yds) per hour.

*Knock It Off* : terminate fighting maneuvers immediately.

# L (lima) *LEE mah*

LHX : (Light Experimental Helicopter); acronym for the U.S. Army's Comanche design program.

LOH: : (Light Observation Helicopter); pronounced "loach", generic name for any reconnaissance helo but primarily refers to the OH-6 Cayuse.

Loach : slang term for a light observation helicopter or LOH

Longbow : nomenclature referring to the long range millimeter radar and targeting designator used on the Apache. Only a third of the Comanche fleet will be issued the Longbow radar system.

Low Observable : stealth features of an aircraft which reduce or eliminate an enemy's ability to detect it.

LZ : (landing zone); the place where helicopters drop off troops and equipment, a "hot" LZ is one that is still under enemy fire when landing operations take place.

# M (mike) *MIKE*

MANPRINT : (Manpower Integration); electronic and software system which essentially allows the helicopter to maintains itself, freeing the pilot to perform other tasks.

marking : leaving smoke contrails or otherwise making aerial detection easy, (i.e. The F-4 Phantom was a famous case. Its engines caused it to trail a thick cloud of smoke.)

masking : term used to describe the conscious act of using terrain to block (or degrade) the ability of an enemy's sensors to detect your aircraft.

*MayDay!!!* : an emergency call, the anglicized version of *m'aidez*, a French word

Le Nieux Manuel

meaning "Help Me!!", normally said three times in rapid succession.

MBT : (Main Battle Tank), see AFV.

merge : the point at which two or more opposing aircraft meet or cross paths during an ACM engagement.

MFD : (Multi-Function Display); acronym referring to cockpit monitors which can be configured to display various flight/weapon data.

Mi : a military prefix used in identifying aircraft produced by the Russian design bureau Mil.

MiG : a military prefix used in identifying aircraft producing by the Russian design bureau Mikoyan-Gurevich.

MiG country : slang term for enemy territory wherever it is found.

MSA : (Minimum Safe Altitude); go below the MSA and you're asking for trouble.

## N (november) *noh VEM ber*

nautical mile (nm) : nautical mile equals 2000 yds or 1.15 statute miles.

*negative* : a term meaning no, the opposite of roger, a non-affirmative response.

NOE : (Nap of the Earth); a flight path which hugs the ground in order to avoid detection.

*No Joy* : opposite of Tally, no visual or radar contact with enemy aircraft.

NOTAR : (No Tail Rotor); term used to describe a helicopter design which does not use a tail rotor to offset the torque produced by the main rotor.

## O (oscar) *OSS cah*

ordnance : term referring to bombs, rockets, missiles carried by the aircraft, basically anything that can be fired, shot, dropped or launched.

OTH : (Over the Horizon); usually used in the context of missiles being fired at long distance targets which are masked by the curvature of the Earth.

## P (papa) *pah PAH*

pad alert : a readiness condition which requires pilots to occupy their aircraft and be ready to take-off at a moment's notice.

padlocked : a term referring to a pilot who cannot take his eyes off a target for fear of not being able to spot it again.

*pickle* : slang term for releasing ordnance; (as in to *pickle* off a rocket).

pitch : measure of aircraft motion around its lateral axis, controlled by input to the elevators, helicopters also control the pitch of their rotor blades to take larger or smaller "bites" out of the surrounding air mass.

$P_k$ : (probability kill); the percentage chance that a given munition will result in a target kill.

pop-up : a sudden climb from a low altitude, refers to a maneuver used to minimize an aircraft's exposure to hostile fire during a target ingress.

Pucker Factor : method of rating particularly a hazardous mission or flight situation.

pull-pitch : term used to describe adding collective control to quickly gain altitude or slow the forward/ downward motion of the helicopter.

*PUNTS* : (People of Utterly No Tactical Significance); derogatory acronym used by the British army and subsequently adopted by US soldiers during the Persian Gulf War to denote just about anyone that got in the way of combat

Levi Lux Manuel

operations.

*push* : military term meaning "go to", e.g. "Tango Six Leader to Tango Six: We've received orders to *push* the primary target."

## Q (quebec) *keh BECK*

R (romeo) *ROW mee oh*

radar : (Radio, Detection, and Ranging); a device which detects objects by bouncing radio waves off them.

RAH-66 : (Reconnaissance Attack Helicopter); military nomenclature used to denote the Boeing/ Sikorsky RAH-66 Comanche.

relative wind : direction of wind in relation to the chord line of the helicopter's rotor blade.

ROE : (Rules of Engagement); a set of instructions letting pilots know under what conditions it is okay to shoot at somebody.

*roger* : a term meaning yes, an affirmative acknowledgment.

*RTB* : (Return to Base); radio call indicating that the receiver should immediately return to base.

RWR : (Radar Warning Receiver); pronounced "raw"; a network of sensors around the aircraft which alert the pilot when radar emissions are detected.

## S (sierra) *see AIR rah*

saddled : pulling alongside another aircraft in formation flight and assuming a stable position relative to that aircraft.

SAM : (Surface to Air missile); a missile which can be fired at aircraft from either a fixed site or mobile launch vehicle, e.g. SA-9 Gaskin.

SAR : (Search and Rescue); highly trained teams of guys that 'come getcha' should you be forced to eject from your aircraft. Also, CSAR (Combat Search and Rescue).

scramble : quick take-off, usually an emergency situation.

Scud : a Russian-built SSM that uses inertial guidance, inaccurate but effective as a terror weapon, made famous during the Gulf War.

SEAD : (Suppression of Enemy Air Defenses); a mission designed to destroy or otherwise hinder the effectiveness of an enemy's air defense.

signature : the telltale indications of an aircraft's presence, such as its radar cross-section or IR emissions.

situational awareness : refers to your mental ability to read a given tactical situation, being aware of what is going on around you.

*six* : in clock terminology, your "six" is behind you or 180° from your direction of flight, (i.e. "Hey, check my *six* for Bandits, you guys!!!"

shooter : any aircraft in a formation that is designated to release ordnance.

slick : an aircraft is flying with no external equipment or ordnance that would create drag.

snap shot : a gun attack with a high angle-off perspective.

sortie : one flight mission by one aircraft.

*spike* : an indication from the RWR sensor that a radar beam has passed over your aircraft.

*splash* : a terms used to indicate an air-to-air kill or weapons impact on ground target by an outside source which is illuminating the target.

spooling : term that refers to winding up the helicopter's rotors to their lift producing

Leyleux Manuel

or operating speed.

SSM : (Surface-to-Surface Missile); a missile with a very large warhead designed to be fired from a ground installation or mobile launcher at ground targets, e.g. Scud, FROG, etc.

stall : the separation of airflow from the upper surface of a wing or rotor blade, an aircraft is subject to stall at any altitude and any speed, a common mistake is to equate a stall with engine failure.

Standard European Day : term used to describe a helicopter's ability to hover at 2,000 ft. on a typical 75 day.

strike package : group of different aircraft combined to perform a single mission. For example, a single strike package may consist of fighters, bombers, EW, and AWACS aircraft.

Su : a military prefix used in identifying aircraft produced by the Russian design bureau Sukhoi.

Super Team : name for the Bell/ McDonnell Douglas employees and industry sub-contractors working on the RAH-66 project.

## T (tango) *TANG go*

*tally-ho!* : sighting of a confirmed target, opposite of *No Joy*.

target rich environment : an area of operations has many eligible targets to attack.

terminal leave : leave taken by a person in the military just before being discharged from the service, watch yourself on some of these missions or the phrase "terminal leave" may take on a whole new meaning.

TLAR : (That Looks About Right); method of bombing using unguided munitions and gut instinct.

TOL : (Take-Off and Landing); a complete flight cycle.

Top : slang term for the senior Non-Commissioned Officer (NCO) in the unit, usually holds the rank of a Master Sergeant(E-8) or Sergeant Major (E-9).

torque : the reactive forces acting in opposition to the action of the main rotor. If uncorrected, a helicopter's fuselage would turn in the direction opposite of its rotors.

tracers : projectiles which are coated with a phosphorus substance that ignites making them visible to the naked eye.

trailer : the last aircraft in a formation.

triple-A : see AAA.

tumbleweed : refers to a pilot with no situational awareness, a clueless individual, basically someone just waiting to get shot down.

Tu : a military prefix used in identifying aircraft produced by the Russian design bureau Tupolev.

*two-shipper* : standard flight of two aircraft, lead and wingman.

## U (uniform) *YOU nee form*

UH : (Utility Helicopter); as in the UH-60 Blackhawk, usually denotes a transport helicopter .

unmask : moving from behind cover so that you become visible to enemy observers.

*unobtanium* : a needed material or piece of equipment that you can never seem to get your hands on when you need it.

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# V (victor) *VIK tah*

$V_c$ : velocity (closure); speed at which two objects are approaching each other.
$V_{ne}$ : velocity (never exceed); speed at which you begin to risk structural damage to the aircraft.
$V_{max}$ : velocity (maximum); a maximum safe speed for a particular altitude.
vector : a compass heading (direction given in degrees).

# W (whiskey) *WISS key*

water-walker: a Comanche pilot who can do no wrong, a helicopter hero whose accomplishments are legendary.
waypoint : a pre-set fixed navigational point which is tied in to your auto-pilot flight controls, a designated point in the sky.
*weapons free* : a condition related to your ROE; a term used to describe full freedom to fire weapons within a given air space.
*weapons hold* : the opposite of weapons free, a directive to cease firing or not to begin firing.
*weed-whacker* : a low flying helicopter.
Werewolf : Russian name for the Ka-50 Hokum helicopter.
*winchester* : a term used to describe an aircraft which has no ordnance remaining.
whiskey check : humorous term used to describe a flight crew that chucks your personal equipment out of the helicopter rather than setting down inside an LZ to off load it. If there's a bottle of whiskey inside, it'll break when your duffel hits the ground.

WSO : (Weapon Systems Officer); pronounced "Whizzo", another name for your co-pilot, your backseater responsible for operating much of the on-board targeting and weapon systems, see GIB.

# X (xray) *ECKS ray*

# Y (yankee) *YANG key*

yaw : measure of aircraft motion around its vertical axis, in helicopter flight yaw is controlled by the tail rotor, see torque.

# Z (zulu) ZOO loo

zulu time : military time using Greenich Mean Time as the common standard, e.g. "Be on the pad and ready to go at 1315 hours zulu."

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# Werewolf Index


## Symbols

2A42 Ammunition 30
30mm 2A42 II Cannon 29
80mm Rockets 30

## A

About Comanche 14
Airspeed Indicator 25
Altitude Stabilizer 18
Artificial Horizon 18
Artillery Fire 31
Attitude Indicator (ADI) 29

## B

Battle Computer Display (BCD) 28

## C

Chaff 28
Chase View 23, 81, 83
Clouds 16
Collective 19
Collective Controls 20
Collective Indicator 22
Collective/Throttle Display 28
Compass Display 25
Countermeasure Display 28
Crossfire Attacks 42

Cyclic Controls 20

## D

Deception and Attack 42
Defensive Maneuvering 41
Drag and Ambush Tactics 41
Drag and Pursue Tactics 42
Drop Camera 23, 81, 83

## E

Echelon formation 42
Engine Damage 26
External view controls 23

## F

Flares 28
Fly-by-wire (FBW) 22
Following Fire 41
Forward Area Refueling Points (FARPs) 39, 42
Fuel Gauge 28

## G

Gear Display 29

## H

Head-Up Display (HUD) 23
Helmet Integrated Display (HID) 17, 23
HID Indicators 18
High Explosive Incendiary (HEI) 30
Horizontal Situation Indicator (HSI) 29

## I

Individual Tactics 41
Initiating a Modem Game 34
Initiating a Multiplayer Network Game 36

## K

Kamov design bureau 21
Keyboard Short-Cuts 14

## M

Keyboard Alternatives 14
Main Operations Menu 12
Menu Bar 14
Menu Options 14
Missile Cam 18
Mission Briefing 13
MSL Altitude Indicator 29

## O

Operational Status Indicator 26


Le Mieux Manuel

## P

Panoramic View 23, 81, 83
Pedal Controls 21
Pilot Roster 11
Pitch Ladder 24
Preferences 15

## R

R-73 Archer 31
Radar Altimeter 24
Radar Altimeter Display 18
Rotor Damage 26
Rudder 21

## S

Selecting a Campaign 13
Selecting a Mission 13
Sound/Voice Effects Volume 16

## T

Tactical Information Display 26
The Cyclic 22
Threat Indicator 27
Torque 19

## V

Victory Conditions 36
Vikhr Laser-Guided Missiles 30
Voxel Space 15

## W

Warning Panel 28
Warranty 79
Waypoint caret 25
Weapon Mount Damage 27
Weapons and Targeting 25
Weapons Display 27
Wind 22
Wingmen Support 31


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**Старший Лейтенант "Катяа"**
**Пилот Оборотень Ка-50**

*** 1st Lieutenant "Katya"**
**Werewolf Pilot Ka-50**

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# Pilot Notes

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# PLAYER REFERENCE CHART




DETACH HERE

### Pilot Views

1 - Forward View
2 - Left-side View
3 - Right-side View
4 - Rear View
5 - Panoramic View
6 - Chase View
7 - Drop Camera
8 - Last Drop Camera

### WEAPON CONTROL SUMMARY

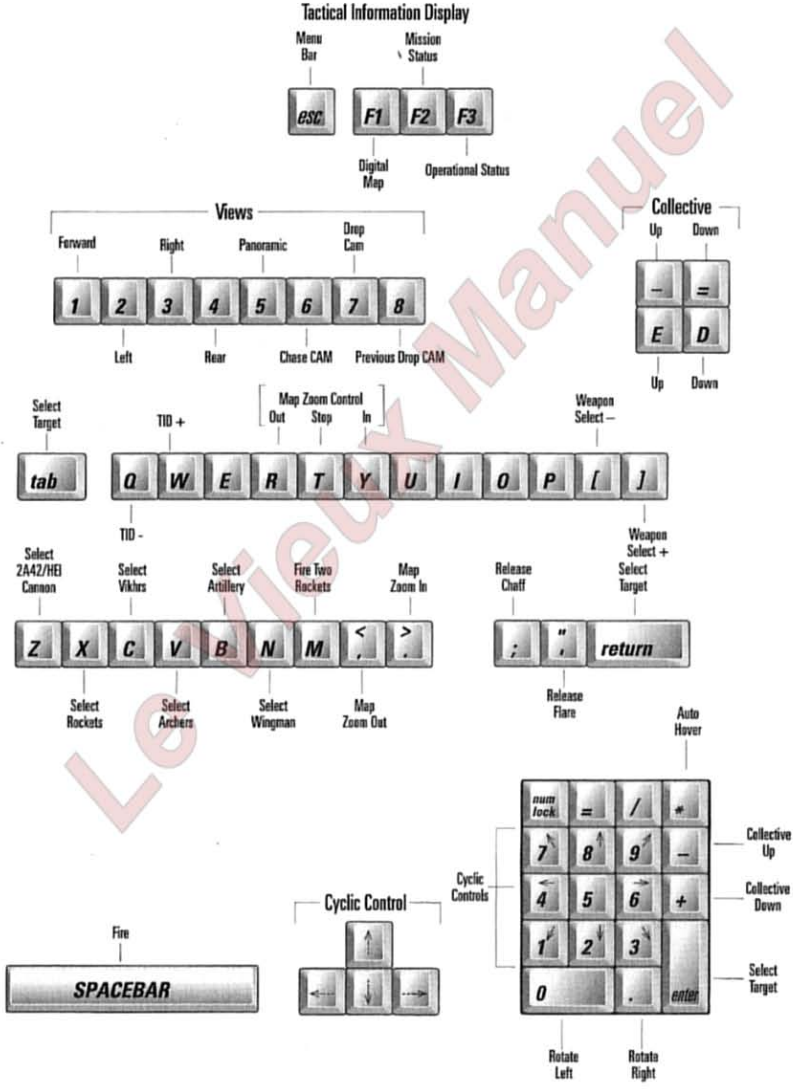
| ACTION | KEY |
|---|---|
| Previous Weapon Selection | I |
| Next Weapon Selection | J |
| Fire Salvo (2 x 80mm Rockets) | M |
| Select 2A42/HEI Cannon | Z |
| Select 80 mm Rockets | X |
| Select AT-9 Vikhr Missiles | C |
| Select R-73 Archer Missiles | V |
| Select Artillery Support | B |
| Select Wingman | N |
| Fire Selected Weapon | SPACE |

### TACTICAL INFORMATION DISPLAY SUMMARY

| FUNCTION | LEFT | RIGHT |
|---|---|---|
| Digital Map | H | H |
| Threat Indicator | F2 | F8 |
| TAS | F3 | F9 |
| Last Mode | Q | A |
| Next Mode | W | S |
| Zoom Map Out | < | < |
| Zoom Map In | > | > |

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9596