

TOMAHAWK is a real time flight simulation based upon the Hughes AH-64A APACHE Advanced Attack Helicopter. Features include 3D real-world view with buildings, trees, mountains, tanks and helicopters. Accurately simulated flight characteristics, air-to-air combat, ground attack, crosswinds, turbulence, cloud cover and night flying. Training modes and varying skill levels are incorporated for extra realism.

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TOMAHAWK

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HELICOPTER FLIGHT SIMULATION



2.99 · 2.99 · 2.99 · 2.99 · 2.99 · 2.99 · 2.99 · 2.99

TOMAHAWK

LOADING

Amstrad - Press CTRL+ENTER together.
Atari - Hold down START+OPTION and switch on machine. Press Play then RETURN.
Commodore 64 - Press SHIFT+RUN/STOP.
Spectrum - LOAD***.

OPTIONS

To choose from menu press appropriate number key - Amstrad/Spectrum. Use joystick to move symbol, press button to make choice - Atari/C64.

MISSION 1 - FLYING TRAINING

Used for helicopter familiarisation and developing ground attack skills. Enemy ground forces will not return fire.

MISSION 2 - COMBAT

A short mission to destroy enemy ground forces and return to base.

MISSION 3 - COMBAT

Liberate the entire map from enemy occupation.

MISSION 4 - COMBAT

Support allied ground forces on the front line in their attempt to occupy the entire map.

DAY OR NIGHT

Night-time vision is achieved using computer-enhanced infra-red imaging.

CLEAR OR CLOUDY

An additional level of realism with selectable cloud base. Once in cloud cover instrument flying is necessary.

CLOUDBASE

Selectable from 50-1000ft. Only applicable if CLOUDY conditions chosen.

CROSSWINDS AND TURBULENCE

Extra realism for the experienced pilot.

PILOT RATING

Affects potency and accuracy of enemy forces.

CONTROLS

THROTTLE - Controls engine speed. Normally set to fully open unless practising engine-off landings. Assisted by computerised auto-throttle.

COLLECTIVE - Vertical lift control for take-off and hovering. Thrust control for level flight.

CYCLIC - Tilts aircraft backwards/forwards and rolls left/right.

RUDDER - Yaws aircraft left/right.

DOPPLER MODE - Changes mode of radar. Modes available are Beacons (B), Landing Pads (H), Ground Attack (T), or Air-to-Air Combat (Lightning Symbol). In each mode select next objective using the N key.

WEAPON SYSTEMS & TARGET ATTACK

When in combat mode weapons systems are activated. Select between guns, rockets or missiles using the P key. Guns and rockets must be aimed manually using crossed and diagonal sights respectively. Missiles use the TADS (Target Acquisition and Designation Sight) system to track targets. When a target enters the TADS the square outline solidifies and the sight remains locked onto the target. Ranges are 2000ft for guns, 4000ft for rockets, 3.1mils for Hellfire missiles.

During combat enemy fire is indicated by a flashing border. The panel will flash if you are hit. The sky will flash when ground forces destroy each other (mission 4). Damage is indicated by the Doppler helicopter symbol. Approaching enemy helicopters are indicated by a warning symbol flashing on the Doppler if you are not in air-to-air combat mode.

SCORING - Points scored depend on target and weapon used to destroy it, thus:

Weapon Used	Field Gun	Tank	Helicopter
Gun	20	-	100
Rockets	10	20	50
Missiles	5	10	25

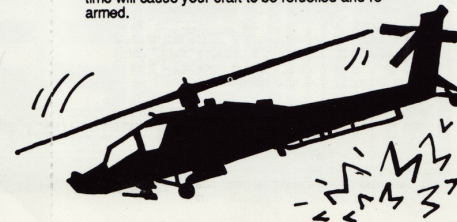
It is not possible to destroy a tank with guns.

MAP

The Map is used to show positions of aircraft and beacons. In combat modes it also shows enemy occupied areas. Selecting the Map whilst sitting on a pad enables your helicopter to move between sectors using the joystick (or arrow keys in some versions) thus you can simulate control over several aircraft by moving about. In combat missions allied areas are blue, enemy ones red. Flashing blue or red sectors indicate the presence of opposing forces in a territory.

COMPLETION OF MISSION

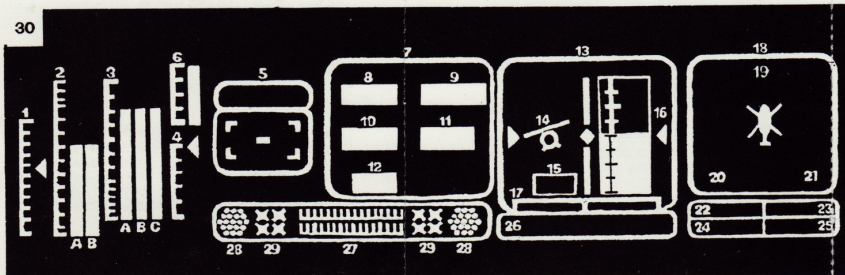
A mission is completed when all enemy forces have been destroyed and the helicopter has been returned to a landing pad. Cut engines and stop rotor for a mission report. Landing on a helipad at any other time will cause your craft to be refuelled and re-armed.



INSTRUMENTS

- 1 - Collective lever position - zero to full.
- 2 - Torque % - A/B engine 1/2.
- 3 - RPM % - A/B/C Engine 1/Rotor Blades/Engine 2.
- 4 - Throttle Indicator - zero to full.
- 5 - TADS - Red = Hostile, Blue = Friendly. Includes range.
- 6 - Fuel Level - zero to full.
- 7 - Pilots visual display unit.
- 8 - Speed, in knots. Forwards/backwards indicated by colour change.
- 9 - Altitude.
- 10 - Time to objective - hours, minutes.
- 11 - Vertical Speed Indicator - VSI - feet/second.
- 12 - Distance from objective - feet or miles.
- 13 - Artificial Horizon.
- 14 - Roll Symbol (not Amstrad).

- 15 - Roll Angle - shown as a tilting horizon on Amstrad.
- 16 - Pitch Angle.
- 17 - Sideslip (drift) indicator.
- 18 - Doppler.
- 19 - Compass Heading towards which helicopter is pointing.
- 20 - Bearing of objective.
- 21 - Track - flight path direction.
- 22 - Engine failure indicator.
- 23 - Weapons system failure indicator.
- 24 - Nav computer failure indicator.
- 25 - TADS failure indicator.
- 26 - Score.
- 27 - 30mm Chain Gun Ammunition.
- 28 - Rockets.
- 29 - Hellfire missiles.
- 30 - Engine temperature gauge.



SUMMARY OF CONTROLS

Note that joystick can be used for CYCLIC in all cases. Fire button fires guns. Joystick is essential for Atari/C64 versions. Use port 2 for C64/Atari, choose joystick type from menu on Spectrum.

Function	Amstrad	Atari	C64	Spectrum
Roll Left/Right (CYCLIC)	Cursor L/R	Joystick Only	Joystick Only	5/8
Pitch Up/Down (CYCLIC)	Cursor U/D	Joystick Only	Joystick Only	7/6
RUDDER Left/Right	Z/X	Z/X	Z/X	CAPS SHIFT/Z
COLLECTIVE +/-	Q/A	Q/A	Q/A	Q/A
THROTTLE +/-	W/S	W/S	W/S	W/S
Doppler Mode	C	C	C	C
Next Objective	N	N	N	N
Select Weapon	P	P	P	P
Map	M	M	M	M
FIRE	SPACE BAR	FIRE	H	H
Pause	H	H	H	H
Return to Menu	ESC	CONTROL/ RETURN	CONTROL/ RETURN	BREAK

PILOT'S NOTES

Take-Off - Reduce COLLECTIVE to minimum. Increase THROTTLE to full. Wait for engine and rotor RPM to reach 100%. Increase COLLECTIVE until lift-off occurs. Reduce COLLECTIVE till VSI reads zero to hover. Turn on the spot using RUDDER.

Transition to forward flight - Increase COLLECTIVE to between 80-100% Torque (decrease if overtorque warning occurs). Tilt nose of helicopter downwards 15-30 degrees using CYCLIC. Reduce COLLECTIVE till VSI reads zero for level flight. To speed up increase torque using COLLECTIVE.

Turning - Over 60kts use CYCLIC to roll left/right. Below 60kts RUDDER can be used to assist turns.

Slowing - Use CYCLIC to raise nose of helicopter. Reduce climb rate by reducing COLLECTIVE. As speed drops below 60kts increase COLLECTIVE to counteract sink rate. Return to level flight as speed approaches zero. Adjust COLLECTIVE for VSI of zero to hover. Aircraft can also be slowed by repeatedly banking left and right or by applying rudder if speed is under 60kts.

Landing - From hover lower COLLECTIVE to achieve a VSI of less than 12ft/sec. A rolling touchdown can be accomplished provided that VSI is less than 12ft/sec and speed is less than 60knts.

Taxiing - With engine/rotor RPM at 100% raise COLLECTIVE to 20% torque. Helicopter will move forwards, use CYCLIC to accelerate/decelerate use RUDDER to steer.

Backwards and Sideways Flight - As for forwards flight except that CYCLIC is used to raise nose (backwards) or roll (sideways).

Torque Turn - A method of producing a rapid 180 degree turn and climb. With forward speed over

100kts raise the nose to 70 degrees pitch. When speed drops to 60kts release stick and use RUDDER to alter heading by approx 160 degrees. Release RUDDER adjust roll to zero and accelerate with nose down attitude.

Autoration - Equivalent to gliding in a fixed wing aircraft. If engines are operative can be used for rapid height reduction, use COLLECTIVE to reduce altitude. Below 200ft increase COLLECTIVE and use CYCLIC to raise nose to reduce descent rate. If engines have failed use collective lever to control rotor RPM whilst descending. Before touchdown raise collective lever to reduce VSI to less than 12ft/sec.

Limitations of Apache - Maximum permissible speed 197knts in a dive. Above 210knts Apache will shed a rotor and crash. Maximum pitch +/- 90 degrees. Maximum roll +/- 11 degrees. Demanding too much power from engines (over-torquing) will cause engine failure.

Technical Data - Hughes AH-64A APACHE

Performance:
Maximum Speed - 197knts.
Maximum Cruise Speed - 162knts.
Ceiling - 20,000ft.
Max Climb Rate - Greater than 1450ft/min.
Endurance - 1hr 50min to 2hr 30min depending on weapon load and mission profile.

Other Data:

Engines - 2 General Electric T700-GE-701 turboshaft. 1695 shp each.
Dimensions - Rotor Diameter 48ft. Tail Rotor Diameter 9ft 2in. Length 58ft 3in. Height 15ft 3in.
Weight - Empty 4996kg. Primary mission weight 6665kg. Max take-off weight 8006kg.
Armament - One Hughes M230A1 chain gun 30mm automatic cannon. Up to 16 Rockwell AGM-114A Hellfire laser-seeking anti-armour missiles or up to 76 2.75 inch rockets.