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Special thanks to Paul "Goldwolf" Whittingham for creating the guide icons.
“HELIICOPTERS SUCK!” is the first thing I said when I crashed my Huey for the first time. This is what many people among the flight sim community think as well. Choppers are slow, blocky, noisy, sluggish... who would want to be a glorified taxi driver when you could be Maverick and save the world at Mach 1.5?

Well, you should! Why? Simply because helicopter pilots have one of the most dangerous jobs in the world. You have to be one hell of a pilot to fly one of those. Or batshit insane. Or a bit of both. Flying a helicopter is challenging, and one of the most rewarding experiences I ever had in a flight sim. Have you ever seen “We Were Soldiers”? Have you read “Chickenhawk”? Both highlight the incredible courage of Huey pilots, and the skill needed to fly these machines. The Vietnam War was a brutal war, incredibly taxing on the men on the ground, but also the men in the air as well. Bruce “Snake Shit” Crandall, Robert Mason, Ed “Too Tall” Freeman... read about what these men did at the Battle of la Drang, and you will understand the importance of “slicks” and “gunships”, even for the grunts on the ground. Helicopters revolutionized modern warfare, and I feel it is a privilege for us to have access to a module like the DCS Huey, especially since Belsimtek created it in partnership with Bell Helicopter.

Flying helicopters is difficult, much more difficult than flying an airplane. Helicopters are marvellous and totally insane creations. They seem unnatural, intricate and many pilots who come from the jet or prop plane world have difficulties to learn to fly helicopters since it requires a different way of thinking. I had the chance to meet a real life Huey pilot who was kind enough to show me the basics of how to “think” like a chopper pilot. I will attempt to share what I learned from him with you, and hopefully you will benefit from it like I did.

It took me many tries, many crashes, a lot of cursing... but in the end I realized that the DCS UH-1H Huey is one of the most fun and interesting modules I ever had the chance to fly. Real-life helicopter pilots agree with me on this: the Huey you are about to fly is one of the finest modules ever made flight model wise. If you think you learned to fly choppers from ARMA, Take On Helicopters, FSX or Battlefield, think again. You’ve seen nothing yet. The Vortex Ring State is one brutal wake up call.

“Peter Pilot” is the nickname given to novice helicopter pilots. At the beginning, we all suck. Get used to it, and you won’t feel as frustrated as I was in the beginning. The human brain is just not engineered to think like a helicopter... but with proper training and a bit of practice, you will get the hang of it in no time. Understanding is half the training, so put your thinking cap on.

Give the Huey a chance, and I promise you that you will not regret it.
During the Vietnam War, life expectancy for chopper pilots was right down there with that of an infantry ground pounder.

The facts are cold and stark: Approximately 12,000 US Helicopters flew in the Vietnam War. Approximately 5,000 were destroyed. That means 42% of the aircraft that spent time in the air crashed or were shot down...nearly 3 out of every 7 that flew. Approximately 40,000 US Helicopter pilots flew in the Vietnam War. Approximately 2,202 pilots were killed, along with 2,704 crewmen. For those with their hands on the joystick, that means 5.5% never made it back. Considering that the average pilot flew 4 times a week, he could expect that during his tour in Vietnam he was flying up against the Grim Reaper on 11.4 of his flights. That means that every 4.5 weeks he faced death. In soldier talk, his life expectancy was 4 and a half weeks... basically, a month.

This makes you think, doesn’t it?

What's often forgotten in this is that helicopters weren't built to fly around empty. They carried cargo... usually human cargo. Soldiers. One of the best helicopters for this task was the UH-1D Iroquois, unofficially nicknamed “Huey”.

The Bell (model 205) UH-1D (1963) had a longer fuselage than previous models, increased rotor diameter, increased range, and a powerful Lycoming T53-L-11, sporting 1,100 shp, with growth potential to 1,400 shp. A distinguishing characteristic of this ship was its larger cargo doors, as well as its twin cabin windows. The UH-1D was stretched so that it could carry up to 12 troops, with a crew of two. The first UH-1D reached Vietnam in 1963. With a range of 293 miles (467 km) and a speed of 127 mph (110 knots), it was a formidable troop carrier. With so many people on board, it was also a formidable death trap when it went down.

The UH-1H was an improved UH-1D, with the Lycoming T53-L-13 engine of 1,400 shp (1,000 kW) installed, plus the pitot tube relocated from the nose to the roof, to reduce ground damage to it. "Hotel" models were created by upgrading "Deltas" with the more powerful engine. The first YUH-1H flew in 1966 with deliveries of production models starting in September 1967. The "Hotel" model Huey was produced in larger numbers than any other model, with 4,850 delivered to the US Army alone. The "Hotel" model was widely exported and was also built under license in Germany, Italy, Japan and Taiwan.

Overall, the Huey is one of the most renowned helicopters of its time.
CONTROLS SETUP
These controls should be mapped to your joystick and are essential. Names on the left column are what you should look for in the “ACTION” column of the Controls Setup menu in DCS. Description of action is on the right column.

CONTROLS FOR FLYING

- COMMUNICATION MENU
  ALLOWS YOU TO USE RADIO MENU WHILE FLYING
- ARMAMENT SELECTOR UP / DOWN
  ALLOWS YOU TO QUICKLY SWITCH GUNS/ROCKETS
- PILOT TRIMMER
  FORCE TRIM
- EXTERNAL CARGO HOOK/UNHOOK
  HOOK/UNHOOK CARGO (SLING LOADS)
- FLARE DISPENSE
  DROPS FLARES
- FLEXIBLE SIGHT ON/OFF
  DEPLOYS/RETRACTS COPILOT’S FLEXIBLE SIGHT
- NIGHT VISION GOGGLES
  NIGHT VISION GOGGLES ON/OFF (RSHIFT+H)
- PILOT WEAPON RELEASE / GUN FIRE
  FIRES GUNS AND/OR ROCKETS
- PILOT’S RADIO TRIGGER ICS (FACULTATIVE)
  INTERCOMM SWITCH (IRL USED TO TALK TO CREW)
- PILOT’S RADIO TRIGGER RADIO
  MICROPHONE SWITCH (IRL USED TO TALK ON RADIO)
- SEARCH LIGHT LEFT/RIGHT/RETRACT/EXTEND
  ROTATE SEARCH LIGHT LEFT/RIGHT/AFT/FWD
- START-UP ENGINE
  ENGINE STARTER
- TRIMMER RESET
  TRIM RESET
- ZOOM IN SLOW
  ALLOWS YOU TO ZOOM IN
- ZOOM OUT SLOW
  ALLOWS YOU TO ZOOM OUT
CONTROLS FOR GUNNERS, CREW & INTERFACE MANAGEMENT

• SET PILOT SEAT  
  SWITCHES TO PILOT SEAT (“1” BY DEFAULT)

• SET OPERATOR SEAT  
  SWITCHES TO COPILOT SEAT (“2” BY DEFAULT)

• SET LEFT GUNNER SEAT  
  SWITCHES TO LEFT GUNNER SEAT (“3” BY DEFAULT)

• SET RIGHT GUNNER SEAT  
  SWITCHES TO RIGHT GUNNER SEAT (“4” BY DEFAULT)

• AI OPERATOR/LEFT/RIGHT ROE ITERATE (L_CTRL+ 2/3/4)  
  ITERATES RULES OF ENGAGEMENT FOR COPILOT, LEFT & RIGHT GUNNERS
  HOLD FIRE / RETURN FIRE / FREE FIRE (AT WILL)

• AI OPERATOR/LEFT/RIGHT BURST SWITCH(L_SHIFT+ 2/3/4)  
  ITERATES FIRING BURST LENGTH FOR COPILOT, LEFT & RIGHT GUNNERS
  SHORT BURST / LONG BURST

• OPEN/CLOSE LEFT/RIGHT GUNNER SIDE DOOR (LALT+3/4)  
  OPENS UP SIDE DOORS FOR LEFT & RIGHT GUNNERS.

• AUTOPILOT  
  TURNS AI AUTOPILOT ON/OFF (LWIN+A)

• AUTOPILOT ATTITUDE HOLD/LEVEL FLIGHT/ORBIT  
  SELECTS AI AUTOPILOT MODE (LALT+LSHIFT+A/LCTRL+A/LALT+A)

• WEAPON HINTS ON/OFF  
  TOGGLE WEAPON INTERFACE (LCTRL+LSHIFT+H)

• SHOW CONTROLS INDICATOR  
  TOGGLE CONTROL INDICATOR INTERFACE (RCTRL+ENTER)

• TRACKIR AIMING ON/OFF  
  TOGGLE SIDE GUNNER AIMING WITH OR WITHOUT TRACKIR (RSHIFT+T)

NOTE: THESE LABELS ARE ONLY VISIBLE IF YOU HAVE THE “SHOW HINTS AT MISSION START” AND “AUTOPILOT AVAILABILITY” OPTIONS TICKED IN THE “SPECIAL – UH-1H” OPTIONS TAB.
CONTROLS FOR GUNNERS, CREW & INTERFACE MANAGEMENT

• In the “Special” tab, make sure **AUTOPilot AVAILABILITY**, and **RUddER TRIMMER** checkboxes are **ticked**! Note that rudder trimmer is optional and up to your personal taste. The real life Huey has it (pedals remain in place once trimmed) but most rudder pedals we have use springs, which makes rudder trim impractical.
TO ASSIGN AXIS, CLICK ON AXIS ASSIGN. YOU CAN ALSO SELECT “AXIS COMMANDS” IN THE UPPER SCROLLING MENU.

TO MODIFY CURVES AND SENSITIVITIES OF AXES, CLICK ON THE AXIS YOU WANT TO MODIFY AND THEN CLICK AXIS TUNE.
BIND THE FOLLOWING AXES:

- CYCLIC PITCH (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 85, CURVATURE AT 21)
- CYCLIC ROLL (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 85, CURVATURE AT 21)
- RUDDER (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 14)
- COLLECTIVE (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 11)
- THROTTLE – CONTROLS ENGINE RPM

NOTES ABOUT CONTROLS

If you are more familiar with airplanes than with helicopters, you might not be quite familiar with a “collective” and a “cyclic”. In a prop aircraft, you generally set your engine to a given RPM by changing the propeller’s pitch, and you throttle up and down to change your thrust. Rudder pedals are used to change the orientation of your vertical stab.

In a helicopter, it’s the opposite. You set your throttle to a given setting, and you change your thrust with your collective, which changes the pitch of your rotor/propeller’s blades. Rudder pedals are used to modify your tail rotor’s propeller pitch: the amount of lateral thrust generated by your rotor is in direct relationship with the horizontal/lateral orientation of your helicopter. The cyclic, on the other hand, is used just like a regular stick on a plane. The cyclic modifies the orientation of swashplates, to which are attached push rods that define the orientation of the rotor.

In very simple terms, you could say that the collective is used like a throttle on a plane, the throttle is used like a RPM setter on a plane, and the cyclic is used like a joystick on a plane.
PART 3 – COCKPIT & GAUGES

VHF ANTENNA

TAIL SKID

AFT POSITION LIGHT (NVG)

M-130 FLARE DISPENSER (30 FLARES)
NOTE: THERE ARE TWO DISPENSERS, SO 60 FLARES TOTAL.
NOTE: USE “RSHIFT+P” TO TURN PILOT BODY ON OR OFF.
PART 3 – COCKPIT & GAUGES

- Collective
- Search Light Switch (On/Stow)
- Governor RPM Switch
- Landing Light On/Off
- Search Light Control Hat Switch
- Throttle Stop Switch
- Idle Release Switch
- Twist-Grip Throttle

- Door Handle RCTRL+R

Open Doors
GUNSIGHT ELEVATION SETTINGS TABLE FOR N.O.E. (NAP OF THE EARTH, VERY LOW ALT), 1500 AND 2500 FT ALTITUDES.

<table>
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<tr>
<th>RANGE</th>
<th>500</th>
<th>1000</th>
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<th>2000</th>
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<td>-30</td>
</tr>
</tbody>
</table>

DEPLOY/STOW XM60 GUNSIGHT

GUNSIGHT BRIGHTNESS

GUNSIGHT POWER ON/OFF

COPILOT’S VIEW

PILOT’S VIEW

PART 3 – COCKPIT & GAUGES
ALTIMETER
SHORT THICK NEEDLE: 1000 ft
LONG THIN NEEDLE: 100 ft

VERTICAL VELOCITY INDICATOR (FT/MIN)

MAGNETIC COMPASS

CLOCK

CARGO RELEASE ARMED LIGHT

MARKER BEACON VOLUME CONTROL

MARKER BEACON SENSING SWITCH

TURN & SLIP INDICATOR

MARKER BEACON LIGHT

RADIO COMPASS INDICATOR

ATTITUDE INDICATOR

AIRSPEED INDICATOR (KTS)

PART 3 – COCKPIT & GAUGES

UH-1H HUEY
If you take a closer look at the Engine Oil Pressure Gauge, you will notice that it is rotated 90 deg. Bug? No, in this case it’s a real-life feature! This particular gauge was rotated to accommodate the pilot, believe it or not. If everything is fine during flight (all gauges in the green), all needles point in roughly the same direction. That way it’s quite easy for the pilot to check if everything is right. As long as all needles are pointing somewhere between 7 and 9 o’clock everything is OK. If one needle is different from the others, it will be easier to notice.
MAIN GENERATOR LOADMETER (%)

STANDBY GENERATOR LOADMETER (%)

DC VOLTMETER (VOLT)

AC VOLTMETER (VOLT)

Radar Altimeter

Gas Producer Tachometer (% RPM)

Exhaust Gas Temperature (EGT) (Deg C)

Compass Slaving Switch
DG (UP) = FREE GYRO MODE
MAG (DOWN) = SLAVED GYRO MODE
AN/APX-72
TRANSPONDER PANEL (NOT FUNCTIONAL)
USED FOR IFF/SIF
(Identify-Friend-or-Foe and Selected Identification Feature)
If you want to know more about this system, see this document from ARIES WING CONSULTING:
https://drive.google.com/open?id=0B-uSpZROuEd3cnVCM0RqOjwM0U&authuser=0

BRIGHT-DIM SWITCH
Selects dim of bright instrument and caution lights on the caution panel. Instrument lights must be ON to use this switch.
**PART 3 – COCKPIT & GAUGES**

- **Ambient Air Temperature (Deg C)**
- **NVG Position Lights** (Infrared lights only visible at night when wearing night vision goggles)
- **Main Generator Switch**
  - Reset/Off/On
- **Starter-Generator Switch**
  - Start = Function as starter
  - STBY GEN = Function as generator
- **Battery Switch (On/Off)**
- **Non-Essential Bus Switch**
  - Normal On = Receive power from main generator
  - Manual On = Receive power from standby generator (Main Gen is offline)
- **DC Voltmeter Selector Switch**
  - Selects what voltage your DC volt gauges monitor
  - Battery/Main Generator/Standy Generator/Essential Bus/Non-Essential Bus

---

**UH-1H HUEY**
AC INVERTER SWITCH
OFF = SPARE & MAIN INVERTERS OFF
MAIN ON = ENERGIZE MAIN INVERTER
SPARE ON = ENERGIZE SPARE INVERTER (IF MAIN INV. FAILURE)

AC VOLTMETER SELECTOR SWITCH
SELECTS WHAT VOLTAGE YOUR AC VOLT GAUGES MONITOR
AB/AC/BC (PHASES OF 115 VAC)
PITOT HEAT

DOME LIGHT CONTROL
WHITE/OFF/GREEN

EXTERNAL LIGHT CONTROL
STEADY/OFF/FLASH

WIPER CONTROL
PILOT/BOTH/COPILOT

POSITION LIGHTS CONTROL
DIM/OFF/BRIGHT

WIPERS SPEED
OFF/PARK/LOW/MED/HIGH

BLEED AIR CONTROL

CABIN HEATER (OUTLET)
NOT FUNCTIONAL

CARGO RELEASE
(OFF/ARMED)
NOT FUNCTIONAL

ANTICOLLISION LIGHTS CONTROL
ON/OFF

CARGO RELEASE
(ON/OFF)
NOT FUNCTIONAL

PITOT HEAT

POSITION LIGHTS CONTROL
DIM/OFF/BRIGHT

WIPER CONTROL
PILOT/BOTH/COPILOT

BLEED AIR CONTROL

CABIN HEATER (OUTLET)
NOT FUNCTIONAL
RADAR ALTIMETER POWER SWITCH
RADAR: RADAR ALTIMETER ON
ALT: ALTIMETER WITHOUT RADAR

CIRCUIT BREAKER PANEL
BUTTON PUSHED = OK
BUTTON POPPED = CIRCUIT FAILURE
COPILOT (OPERATOR) CONTROLS

- TAKE COPILOT POSITION: 2
- SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+2
- SET AI FIRING BURST LENGTH: L_SHIFT+2
- AUTOPILOT ON/OFF: LWIN+A
- AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
- AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
- AUTOPILOT ORBIT MODE: LALT+A
- SHOW WEAPON HINTS: LCTRL+LSHIFT+H
- FLEXIBLE SIGHT ON/OFF: M
- MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
- ZOOM: MOUSEWHEEL

TIP: For copilot, you can only adjust gunsight brightness and lamp mode once the sight is stowed.
LEFT GUNNER CONTROLS

TAKE LEFT GUNNER POSITION: 3
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+3
SET AI FIRING BURST LENGTH: L_SHIFT+3
OPEN/CLOSE RIGHT GUNNER DOOR: L_ALT+3
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL
PART 3 – COCKPIT & GAUGES

RIGHT GUNNER CONTROLS
TAKE RIGHT GUNNER POSITION: 3
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+4
SET AI FIRING BURST LENGTH: L_SHIFT+4
OPEN/CLOSE RIGHT GUNNER DOOR: L_ALT+4
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL
M23 ARMAMENT SYSTEM
M-60D 7.62 MM MACHINEGUN

M21 ARMAMENT SYSTEM
M-134 7.62 MM MACHINEGUN

M21 ARMAMENT SYSTEM
M159: 19 x 2.75 INCH ROCKET LAUNCHER
M158: 7 x 2.75 INCH ROCKET LAUNCHER
PRE-FLIGHT: WHAT IS IT, AND WHY SHOULD YOU CARE?

Flying helicopters is a risky business: statistics collected by the National Transport Safety Board revealed that the rate of accidents during instructional flights in 2009 was twice as high for helicopters as for airplanes: 12.69 accidents per 100,000 hours. Crash rate for helicopters: 9.84 per 100,000 hours. Helicopters crash about 35 percent more often per hour in the air than your average aircraft. Scary, isn’t it?

You might wonder “why is that, Chuck?” One of the many reasons is that the standards of pilot training vary from flight school to flight school. Flying helicopters is an art form: learn it wrong and it will eventually bite you in the arse. For many years, the industry has failed many pilots in providing adequate training and knowledge of helicopter performance and Aeronautical Decision Making (ADM).

Decision-making should never be done by taking a wild guess: it’s a recipe for disaster. Pilots should ALWAYS know their max power producible by the engine and their reserve power (which both vary with altitude/air density and temperature conditions). These two power settings are compared to the value read on the torquemeter in order to know safe power settings.

Still awake? Hang on, it’s almost over. These power settings are directly affected by your environment. If you know your engine performance based on that, you will be able to operate safely. Helicopter performance is governed by three factors that influence your flight: density altitude (air density), helicopter weight and wind. Humidity (moisture) has an effect as well, but to a lesser extent (3-4 % performance reduction compared to dry air).

Now why on earth should you give a darn about that wall of text I just wrote? Because your (virtual) life is at stake, ye’ muppet! Before you even think about taking off and tuning the radio for Wagner’s Ride of the Valkyries, you need to do a PRE-FLIGHT check. Basically, you choose your loadout (fuel quantity & armament) for the type of mission you want to fly. Based on this loadout, you will obtain a gross weight. With this weight, you will be able to check very easily the power settings you need to know in order not to end up in a smoldering pile of ashes.

Know your mission, your loadout, your environment... and from that, you can find your power settings and operational ceiling.

And that’s it! Did it hurt?
**PRE-FLIGHT: WHAT IS IT, AND WHY SHOULD YOU CARE?** (KEEP READING, YOU KNOW YOU WANT TO)

Sorry, I lied: there’s a little more to talk about! I am fair but firmly cruel: deal with it! Don’t worry, we come to the fun part.

During the Vietnam War, the Huey operated in a hot and humid environment: definitely NOT a winning combination for engine performance. The problem was not with the airframe’s max structural weight load: the fuselage could handle the payload just fine. The real problem was with the engine. In these environmental conditions, the UH-1’s in Vietnam did not have sufficient power to come to a hover with what would be considered today a “light load”. This is why you will have to be selective about what you bring on board. You can’t carry 10 fully armed soldiers, 4 miniguns, 2 rocket pods, a full fuel load, a 500 lbs sling load, that weird guy who always says “Get some!” and your grandmother all at once.

Before takeoff, pilots and ground crews had to do a “Weight and Balance” calculation. The weight calculation will be shown in the following pages: it’s pretty straightforward and easy to do. You find your weight, and find your hover ceiling, max torque available and hover power required with fancy charts. The balance calculation, on the other hand, is a little more laborious since you need to find if the CG resulting from the weight of cargo, armament & passengers is within a safe range. I am merciful though: this calculation will not be shown (you can still consult the -10 manual available in Part 16: Other Resources to learn if you are curious).

**So here are the steps for a successful PRE-FLIGHT check.**

1. Find out what your mission will be
   - Hoist Sling Loads / MEDIVAC
   - Troop movement (slick)
   - CSAR (Combat Search and Rescue) / CASEVAC
   - Gunship / Recon
   - ARA (Aerial Rocket Artillery)
2. Select appropriate loadout (fuel & armament) based on your mission
3. Find your weight resulting from the loadout selected (DCS loadout interface already gives you this value, you lucky dog)
4. Find the environmental conditions (temperature and atmospheric pressure)
5. Find your hover ceiling, max torque available and hover power required from your gross weight and environmental conditions
6. Perform PRE-FLIGHT checklist
7. Proceed to engine start-up.

**WEIGHT AND BALANCE CALCULATION EXPLAINED:**
https://www.faasafety.gov/gslac/ALC/course_5b805f6687d34843e456862f3f6f03d85f6f03d8?cID=103&slID=438&preview=true
**1 - MISSION TYPE**
Find out what your mission will be
- Hoist Sling Loads / MEDIvAC
- Troop movement (slick)
- CSAR (Combat Search and Rescue) / CASEVAC
- Gunship / Recon
- ARA (Aerial Rocket Artillery)

**2 - LOADOUT**

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<tr>
<th></th>
<th>HOIST SLING LOADS / MEDIvAC</th>
<th>GUNSHIP (SIDE GUNS)</th>
<th>GUNSHIP (FWD GUNS)</th>
<th>TROOP MOVEMENT (SLICK)</th>
<th>CSAR CASEVAC</th>
<th>ARA</th>
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<td>SIDE-MOUNTED M-134 MINIGUNS</td>
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3 – RESULTING WEIGHT

WEIGHT TABLE
MINIMUM WEIGHT: 6312 LBS  
MAX GROSS WEIGHT: 9502 LBS

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<th>EQUIPMENT</th>
<th>WEIGHT (LBS)</th>
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<td>1 x M-134 SIDE MINIGUN + GUNNER</td>
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<td>10 X COMBAT TROOPS (240 LBS EACH)</td>
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</tr>
</tbody>
</table>

NOTE: Pressure Altitude (PA) = Height + 1000 x (QNH - 29.92)

4 – ENVIRONMENTAL CONDITIONS

- Consult your temperature gauge. In this case, we have a FAT (Free Air Temperature) of 21 deg C.
- For simplification purposes, we will assume that OAT (Outside Air Temperature) is equal to FAT.
- Your altimeter is already adjusted for atmospheric conditions.
- You can find your pressure altitude (airfield elevation) by turning the altimeter setting knob and set the QNH to 29.92 inches of Hg.
- Your altimeter reading will change: the altitude you see for 29.92 in Hg is your airfield elevation. If you set your altimeter back to a pressure altitude of 0, you will notice that the QNH setting will be different. Your altimeter is generally zeroed when you spawn.

To know more about altimeter settings, consult: [http://en.wikipedia.org/wiki/Atmospheric_pressure](http://en.wikipedia.org/wiki/Atmospheric_pressure)

NOTE: Pressure Altitude (PA) = Height + 1000 x (29.92 - altimeter setting)
5 – OPERATIONAL LIMITS AND POWER SETTINGS

We will now find three values:
1. **Required power (torque) to maintain a hover state**
2. Hover ceiling
3. Max torque available

REQUIRED TORQUE FOR HOVER can be found from the chart on the right.

The max torque value your prop blades can take is about 50 psi.

This technique allows you to find required power to maintain a hover at any altitude. Therefore, you can plan your mission and take mental notes of power settings to apply during mission.

**WHAT WE WANT TO KNOW**

**TORQUE REQUIRED TO HOVER**

**WHAT WE KNOW**

- PRESSURE ALTITUDE = 1500 FT
- FAT = 20 DEG C
- GROSS WEIGHT = 9000 LBS
- DESIRED SKID HEIGHT = 5 FT

**METHOD:**

1) ENTER PRESSURE ALTITUDE
2) MOVE RIGHT TO FAT
3) MOVE DOWN TO GROSS WEIGHT
4) MOVE LEFT TO SKID HEIGHT
5) MOVE DOWN, READ CALIBRATED TORQUE = 35 PSI
6) FIND TORQUE CORRECTION FROM TABLE BELOW FOR FAT AND CALIBRATED TORQUE SETTINGS (IF FAT IS AT 0 DEG OR BELOW). SINCE WE ARE AT 20 DEG C, NO CORRECTION IS NEEDED.
7) TORQUE REQUIRED TO HOVER IS CALIBRATED TORQUE + CORRECTION = 35 PSI
8) ADD +5 PSI SINCE THERE IS A SMALL DIFFERENCE BETWEEN DCS AND FLIGHT TEST DATA. THEREFORE, TORQUE REQUIRED = 40 PSI.

**NOTE**

PRESSURE ALTITUDE = CURRENT ELEVATION + 1000 x (29.92 – ALTIMETER SETTING)

EXAMPLE FOR TAKEOFF AT 0 FT AGL WITH ALT. SETTING of 28.42 in Hg:

PA = 0 FT + 1000 x (29.92 in Hg – 28.42 in Hg) = 1500 ft

**HOVER POWER REQUIRED**

LEVEL SURFACE – CALM WIND

324 ROTOR / 6600 ENGINE RPM

**CORRECTION TABLE:**

<table>
<thead>
<tr>
<th>FAT (DEG)</th>
<th>-20°C</th>
<th>-10°C</th>
<th>0°C</th>
<th>10°C</th>
<th>20°C</th>
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<tr>
<td>PSI</td>
<td>.2</td>
<td>.4</td>
<td>.6</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>20</td>
<td>.4</td>
<td>.6</td>
<td>.8</td>
<td>1.0</td>
<td>2.0</td>
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<tr>
<td>30</td>
<td>.6</td>
<td>1.0</td>
<td>1.4</td>
<td>2.1</td>
<td>5.0</td>
</tr>
<tr>
<td>40</td>
<td>1.4</td>
<td>2.1</td>
<td>2.8</td>
<td>3.5</td>
<td>8.0</td>
</tr>
<tr>
<td>50</td>
<td>2.4</td>
<td>3.6</td>
<td>4.8</td>
<td>8.0</td>
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<td>60</td>
<td>4.0</td>
<td>6.0</td>
<td>8.0</td>
<td>10.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

PART 4 – PRE-FLIGHT & MISSION PLANNING
5 – OPERATIONAL LIMITS AND POWER SETTINGS

We will now find three values:
1. Required power (torque) to maintain a hover state
2. Hover ceiling
3. Max torque available

Finding your HOVER CEILING is very important since it allows you to figure out the maximal gross (loaded) weight of your helicopter for a given pressure altitude ceiling.

You can also use this chart the other way around: from a gross weight (determined by the requirements of your mission), you can determine a maximal pressure altitude you can reach for a given rotorcraft configuration.

IGE and OGE mean “In Ground Effect” and “Out of Ground Effect”. Ground effect is the increased lift force and decreased aerodynamic drag that an aircraft/rotorcraft’s wings or propeller blades generate when they are close to a fixed surface (like ground). The Huey is often operating very close to the ground, so ground effect is particularly noticeable.

A skilled pilot should remember that he will benefit from ground effect if he flies 50 ft from the ground or lower. If he flies higher, he will not benefit from this increased lift and decreased drag.

WHAT WE WANT TO KNOW
GROSS WEIGHT TO HOVER AT A GIVEN PRESSURE ALTITUDE

WHAT WE KNOW
HIGHEST (PREDICTED) PRESSURE ALTITUDE REACHED DURING MISSION= 10,000 FT
FAT = 20 DEG C
SKID HEIGHT = 50 FT (OGE, OUT OF GROUND EFFECT)

METHOD:
1) ENTER PRESSURE ALTITUDE
2) MOVE RIGHT TO FAT
3) MOVE DOWN TO SKID HEIGHT
4) MOVE LEFT, HEAD GROSS WEIGHT TO HOVER = 7550 LBS
5 – OPERATIONAL LIMITS AND POWER SETTINGS

We will now find three values:

1. Required power (torque) to maintain a hover state
2. Hover ceiling
3. Max torque available

The MAXIMUM TORQUE AVAILABLE for a given pressure altitude and temperature can be found from the chart on the right.

This is where the concepts of max producible power and reserve power come into play.

Max Power Available – Current Power = Reserve Power

Knowing your maximum available power is useful since it helps you have a good idea of much additional torque you can use when flying. You will tend to be more careful in situations where you have not a whole lot of reserve torque.

Monitoring your torquemeter gauge is critical since an excessive strain on your propeller blades will cause catastrophic structural damage. Unlike a plane, a helicopter cannot glide without his propeller blades.

IN CONCLUSION:
Performance planning charts are usually done by pilots for all phases of flight. Torque values should be known for hover (at different altitudes), takeoff, climb, cruise and landing.
6 – PRE-FLIGHT CHECK

If you were flying a helicopter in real life, you would be obligated to perform pre-flight checks: your own safety and your passengers’ is at stake and should be your number one priority. No effort should be spared to protect their life.

Life is imperfect, and mistakes from the ground crew or other pilots can cost you dearly if you do not take precautions to do these checks.

The table on the right is derived from the -10 UH-1H/V Operator’s Manual.

### BEFORE STARTING

<table>
<thead>
<tr>
<th>DC circuit breaker</th>
<th>IN</th>
<th>As required</th>
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<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>PITOT HTR</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>EXT LTS</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>ANTI COLL</td>
<td>OFF</td>
<td></td>
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<tr>
<td>POSITION lights</td>
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<tr>
<td>CARGO REL</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>WIPERS-OFF</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>CABIN HEATING</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>CABIN LTG</td>
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<td></td>
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<tr>
<td>AC POWER</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>PHASE</td>
<td>OFF</td>
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<td>INVRT</td>
<td>ON</td>
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<tr>
<td>DC POWER</td>
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</tr>
<tr>
<td>MAIN GEN</td>
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</tr>
<tr>
<td>VM</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>NON-ESS BUS</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>STARTER GEN</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>BATT</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>GPU</td>
<td>ON</td>
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</tr>
<tr>
<td>Smoke gauge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIRE wrng in light</td>
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<td></td>
</tr>
<tr>
<td>Caution/warning lights</td>
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<tr>
<td>System instruments</td>
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<tr>
<td>Avionics</td>
<td>Check</td>
<td></td>
</tr>
<tr>
<td>Ext Stores jet handle</td>
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<tr>
<td>DISP CONTROL panel</td>
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<tr>
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<tr>
<td>FORCE TRIM</td>
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<td>CHIP BIT</td>
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<tr>
<td>Flight controls</td>
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<tr>
<td>Altimeters</td>
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### STARTING ENGINE

<table>
<thead>
<tr>
<th>Fire guard post</th>
<th>Clear ans-un-tied</th>
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<tbody>
<tr>
<td>Rotor blades</td>
<td></td>
</tr>
<tr>
<td>Ignition key</td>
<td>ON</td>
</tr>
<tr>
<td>Throttle</td>
<td>Start position</td>
</tr>
<tr>
<td>Engine start</td>
<td></td>
</tr>
<tr>
<td>Start switch</td>
<td>Press and hold, DC&gt;14V</td>
</tr>
<tr>
<td>N1 15%</td>
<td>Up to idle, rotor turning</td>
</tr>
<tr>
<td>N1 40%</td>
<td>Release start switch, 1min</td>
</tr>
<tr>
<td>N1 68-72%</td>
<td>Throttle slowly to full</td>
</tr>
<tr>
<td>INVTR</td>
<td>MAIN ON</td>
</tr>
<tr>
<td>Pressures</td>
<td></td>
</tr>
<tr>
<td>Eng Press</td>
<td>80-100PSI</td>
</tr>
<tr>
<td>Eng Temp</td>
<td>93°&lt;30°</td>
</tr>
<tr>
<td>Trans Press</td>
<td>40-60PSI</td>
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<tr>
<td>Trans Temp</td>
<td>110°&lt;max</td>
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<tr>
<td>EGT</td>
<td>400°&lt;610°</td>
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<tr>
<td>GPU</td>
<td>Disconnect</td>
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### ENGINE SHUTDOWN

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>UHF</td>
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</tr>
<tr>
<td>VHF</td>
<td>Default</td>
</tr>
<tr>
<td>FM</td>
<td>Default</td>
</tr>
<tr>
<td>STARTER GEN</td>
<td>STBY GEN</td>
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<td>Systems</td>
<td>Check</td>
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<td>FUEL</td>
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<tr>
<td>Transmission</td>
<td>In green</td>
</tr>
<tr>
<td>AC</td>
<td>112-118V</td>
</tr>
<tr>
<td>DC</td>
<td>27V&gt;26°C, 26V&lt;26°C</td>
</tr>
<tr>
<td>RPM</td>
<td>6600</td>
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<tr>
<td>Compass</td>
<td>Set RMI</td>
</tr>
<tr>
<td>Hi tcheck</td>
<td>Perform</td>
</tr>
<tr>
<td>PITOT HTR</td>
<td>As required</td>
</tr>
</tbody>
</table>

### BEFORE TAKEOFF

| RPM              | 6600        |
| Systems          | Check       |
| Avionics         | As required |
| Passenger equipment | Check   |

### BEFORE LANDING

| RPM              | 6600        |
| Passenger equipment | Check |

### HOVER/TAXI

| Engine and trans inst | Check green |
| Flight instruments   | Check       |
| Hover Power          | 2PSI>power check |

### BEFORE LEAVING

| Walk around          | Complete    |
| Mission equipment    | Secure      |
| Complete DA forms    | 2400-12, 2408-13 |
| Secure helicopter    |             |

### UH-1-H check list, by Flyer and Stand-Fish

- Pre-flight checks are critical for safety.
- Thorough inspection of the helicopter's systems is necessary.
- Regular maintenance ensures the helicopter is in optimal condition.
- Always prioritize safety during pre-flight checks.

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**PART 4 – PRE-FLIGHT & MISSION PLANNING**
COMMON MISTAKES

There are good and bad ways to start the Huey. Both will get you up in the air, but only adequate start-up procedures will ensure that you remain so. There are a million ways to die in the Huey: please don’t pick the easy or stupid ones. Common mistakes include using the engine starter with your throttle maxed out, raising collective too quickly and too violently, or using your cyclic in angles that generate too much strain/torque on your propeller blades. Most of these acts are usually bad habits developed from playing Arma or Battlefield.
**REARMING**

To contact the ground crew to rearm the UH-1 in DCS, you have to switch the Intercom Selector to INT (Intercom) on Audio Panel.
START-UP PROCEDURE

1. PERFORM PRE-FLIGHT CHECK (DEFINE MISSION, LOADOUT, POWER SETTINGS)
2. FOR NIGHT OPERATIONS, PUT NVGS (NIGHT VISION GOGGLES) ON (RSHIFT + H)
3. ALL DC CIRCUIT BREAKERS – IN (OVERHEAD CONSOLE AND BREAKER PANEL NEXT TO YOUR LEFT FOOT)
4. DOME LIGHTS – AS REQUIRED (RECOMMENDED: GREEN)
5. PITOT HEAT – OFF
6. EXTERNAL LIGHTS & ANTI-COLLISION LIGHTS – ON
7. POSITION LIGHTS – AS REQUIRED (RECOMMENDED: FLASH)
8. CARGO RELEASE – OFF (NOT FUNCTIONAL)
9. WIPERS – OFF
10. CABIN HEATING – OFF
11. CABIN LIGHTING – AS REQUIRED
START-UP PROCEDURE

12. AC POWER - AC PHASE
13. INVERTER – OFF
14. DC POWER – MAIN GEN ON (FLIP COVER)
15. VM – ESS-BUS
16. NON-ESS BUS – NORMAL ON
17. STARTER GENERATOR – ON
18. BATTERY – ON
19. LOW RPM SWITCH – OFF (AFT - YOUR EARS WILL THANK ME LATER)
20. OPTIONAL - GPU (GROUND POWER UNIT) ON
21. FIRE WARNING INDICATOR LIGHT – TEST
22. CAUTION/WARNING LIGHTS – TEST & RESET
23. SYSTEM INSTRUMENTS – CHECK
24. ARMAMENT & COUNTERMEASURE (DISP) PANEL – CHECK (EVERYTHING OFF/SAFE + JETTISON SWITCH IS DOWN & COVERED BY RED COVER SWITCH)
25. GOV SWITCH – AUTO (FWD)
26. DE-ICE SWITCH – OFF (AFT)
27. MAIN FUEL SWITCH – ON (FWD)
28. FORCE TRIM & HYD CONT – ON (FWD)
29. CHIP DET – BOTH (FWD)
AND RIGHT CLICK ON
IFF TRANSPONDER
MASTER SWITCH (STBY).
PART 5 – START-UP PROCEDURE

30. CHECK FLIGHT CONTROL RESPONSE TO CYCLIC/COLLECTIVE/RUDDER INPUT

31. SET ALTIMETER TO AIRFIELD ELEVATION (QNH SETTING) (SEE PART 4: PRE-FLIGHT FOR MORE DETAILS)

32. SET THROTTLE TO IDLE-START POSITION
   a) “IDLE RELEASE” SWITCH PRESSED DOWN. SAFETY GATE IS OFF AND YOU ARE NOT PREVENTED FROM SHUTTING DOWN YOUR ENGINE.
   b) USE “PAGE UP” TO THROTTLE ALL THE WAY TO FULLY OPEN (LEFT)
   c) USE "PAGE DOWN" TO THROTTLE BACK TO THE “START” POSITION. YOU WILL KNOW YOU HAVE REACHED THIS POSITION WHEN THE “IDLE RELEASE” SWITCH POPS UP.
   d) “IDLE RELEASE” SWITCH SHOULD BE RELEASED (UP). THROTTLE SAFETY GATE NOW PREVENTS YOU FROM SHUTTING DOWN YOUR ENGINE.

33. LOWER COLLECTIVE, THEN PRESS & HOLD STARTER SWITCH (HOME KEY BY DEFAULT)

34. WAIT UNTIL N1 RPM REACHES 15 %. AT 15 % N1 RPM, THROTTLE UP TO IDLE-STOP (START) POSITION.

35. WAIT UNTIL N1 RPM REACHES 40 %. AT 40 % N1 RPM, RELEASE START SWITCH (DO NOT HOLD IT FOR MORE THAN 1 MINUTE).

36. WAIT UNTIL N1 RPM REACHES 68-72 %. AT 70 % N1 RPM, SLOWLY THROTTLE TO FULLY OPEN.

37. SET INVERTER – MAIN ON & STARTER GEN – STBY GEN

FULLY CLOSED: position of the throttle when you spawn (fully rotated to the right). If you try to move it using your throttle axis, nothing will happen: it is locked and fuel cannot physically be sent to the engine. You can see it like an OFF, or 0 % position. Red throttle range can only be accessed if IDLE RELEASE SWITCH is UP.

IDLE-STOP: position of the throttle that allows just enough fuel to start the engine in an IDLE setting. You can see it like an IDLE position (5-10 %).

START POSITION: position of the throttle when you start holding your starter switch in order not to flood the engine with fuel.

IDLE RELEASE SWITCH: this switch is a safety barrier that prevents you from shutting down your engine while you’re flying. If the IDLE RELEASE is pressed (DOWN), the safety barrier is lifted and you are allowed to turn your throttle all the way down to the FULLY CLOSED position. If the IDLE RELEASE is “released” (UP), the safety barrier is locked and you will be prevented from turning your throttle to the FULLY CLOSED position.
38. VERIFY CORRECT ENGINE OPERATION (IN THE GREEN)
   - EGT (EXHAUST GAS TEMPERATURE
   - ENGINE TEMPERATURE < 100 deg C
   - ENGINE PRESSURE
   - TRANSMISSION TEMPERATURE < 110 deg C
   - TRANSMISSION PRESSURE

39. GROUND POWER UNIT (GPU) DISCONNECT IF USING GROUND POWER

40. CHECK FOR CORRECT AC (112-118 V) AND DC (27-28.5 V) SETTINGS

41. TURN ON RADAR ALTIMETER (OVERHEAD PANEL)
   a) Turn on radar altimeter power switch
   b) Rotate left knob to activate radar altimeter
   c) Click right knob test switch
   d) Rotate left and right knobs to set the LOW and HIGH radar altimeter warnings with the flags.

42. TURN ON ARMAMENT AND COUNTERMEASURE PANELS AND SET FLARE/ROCKET INDICATORS MANUALLY ON PANEL.

43. PITOT HEAT – AS REQUIRED.

44. SET UP RADIO COMPASS AND RADIOS

45. MAKE SURE YOUR DOORS ARE CLOSED (RCTRL+R)
   NOTE: DOORS NEED TO BE OPEN IF YOU WANT TO BE ABLE TO COMMUNICATE WITH GROUND CREW (i.e. change fuel/armament loadout)

46. ADJUST COMPASS SYNCHRONIZATION KNOB TO MATCH THE RADIO COMPASS HEADING WITH THE HEADING INDICATED BY THE MAGNETIC COMPASS.

47. YOU ARE NOW READY TO TAXI AND TAKEOFF.
HOVER POWER CHECK – WHY IT ACTUALLY MATTERS

- The standard procedure for takeoff requires you to do a “5-ft hover power check”.
- As we have seen before, engine performance will vary based on temperature, humidity and air density/pressure altitude (QNH).
- In this example, we have the exact same loadout, same weight. In a hot & humid setting, the helicopter cannot generate enough power to hover over the ground (LOW RPM warning). In normal temperature & humidity conditions though, we can hover without any problem.
- This is why you need to do a hover power check to confirm the torque settings you predicted.
- A hover power check is simple: maintain a 5 ft high hover and note the torque value required to maintain this attitude. If this value is greater than the torque value you predicted to maintain a hover state, this means that you are too heavy. If the torque value is within the predicted safe range, you’re good to go!
- A pilot’s ability to predict his engine performance will allow him to know if he can safely hover or not, what climb rates he takes and how he MUST operate his machine to its full potential.

FAT: 45 DEG C
QNH: 29.25 mm HG
High Temp, QNH & Humidity Levels
Max Torque: 35 PSI

FAT: 20 DEG C
QNH: 28.30 mm HG
Normal Temp, QNH & Humidity Levels
Max Torque: 40 PSI
HOW TO HOVER

1. Apply left rudder to stay centered and avoid drifting.
2. Use cyclic to remain straight and level (left & aft input).
3. Raise collective very gently to initiate a hover.
4. Hovering is hard at first. Failure to predict the helicopter’s reaction after cyclic input will often result in you dancing the French Cancan for a looong long time. Think of it like doing plate-spinning: you need to put yourself in a position of equilibrium, so you always need to think one step ahead.
5. Hold the “FORCE TRIM” button (on your cyclic) and your stick will remember that “hover” position. Keep in mind that trim works a bit differently from a plane’s trimming.
6. Anticipate the rotorcraft’s reaction when you trim.
TAKING OFF

NOTE: There are many ways to takeoff in a Huey. The best way is generally a function of your loadout, weight and mission.

1. Check that all your engine and transmission gauges (pressure & temperature) are in the green.
2. Check to see if all your flight instruments all set up properly.
3. Open gunner doors (LALT + 3, LALT+4) and set gunners to RETURN FIRE (LCTRL+3, LCTRL+4) or FIRE AT WILL (PRESS 2 TIMES LCTRL+3, LCTRL+4). I generally recommend setting them to FIRE AT WILL (2 key presses) since you can assume that you will be sent into enemy territory anyway.
4. Once you have performed a hover check and are maintaining a 5 ft hover, you can taxi to the runway. Just push your nose down slightly to move forward.
5. When lined up, set RPM to 6600.
6. Push nose slightly forward to start gaining horizontal speed. No collective input should be required since you are already in a hover state. This is the normal takeoff and the safest procedure. You can also attempt a maximum performance takeoff, which will be more taxing on the rotor blades and can end in tragedy if you are too heavily loaded or the environmental conditions don’t allow for it. I recommend using the normal takeoff since you are very unlikely to fly at empty weight. You’re better off being safe than sorry.
7. NORMAL TAKEOFF: Keep accelerating and you will start generating more and more translational lift, naturally climbing. Try to maintain an airspeed of 60 kts when climbing.
VISUAL LANDING

NOTE: When you think about it, a helicopter is usually landed like an aircraft: you maintain a descent rate, reach a touchdown point and pull back on your cyclic to bleed speed and come to a full stop. There are many different types of approaches. Your approach and landing type will depend on the type of LZ (landing zone) and the type of mission you are doing.

2) From 500 to 300 ft, use collective and cyclic input to maintain 80 kts for a descent rate between 300-500 ft/min
3) From 450 to 50 ft, use collective and cyclic input to maintain 60 kts for a descent rate between 300-500 ft/min
4) Reduce speed to 30 kts when you are 50 ft: you will start feeling excess lift being generated by ground effect. Adjust collective to keep a straight trajectory towards your reference point while reducing airspeed.
5) You should reach your reference point in a 5 ft hover. Use your cyclic to come to a full stop, and raise your collective to “cushion” the sudden drop caused by the loss of translational lift (which is caused by the loss of airspeed).
6) Once you have come to a full stop in a 5 ft hover, you can slowly reduce collective to safely land on the ground.

NOTE: It takes a lot of practice to be able to counter the different flight states you will go through when coming for an approach and landing. This is why performing hover power checks before takeoff is very useful: it helps you master the hover state.
Figure 9-20. Plan the turn to final so the helicopter rolls out on an imaginary extension of the centerline for the final approach path. This path should neither angle to the landing area, as shown by the helicopter on the left, nor require an S-turn, as shown by the helicopter on the right.

Figure 10-3. Rapid deceleration or quick stop.

Figure 10-4. Steep approach to a hover.

Figure 10-5. Shallow approach and running landing.
SHUTDOWN

1) Set throttle to IDLE-STOP with PAGE-DOWN key, let engine spool down for 2 minutes
2) Force Trim – ON
3) Pitot Heater – OFF
4) INVERTER – OFF, then SPARE
5) AC – CHECK
6) Main GEN – OFF, Check DC voltmeter
7) Main GEN – ON
8) Starter GEN – START
9) Set throttle to OFF with PAGE-DOWN key (make sure IDLE RELEASE switch on collective is pressed ENGAGED/PUSHED)
10) Central Pedestal switches – OFF (Fuel switch, Hydro, Force Trim, Armament & Countermeasure Panel)
11) Overhead panel switches – OFF (Battery, Lights)
1. Make sure EGT (Exhaust Gas Temperature) is always in the green.

2. Make sure N2 RPM needle for the engine free power turbine is in the green, preferably at 6600 RPM.

3. Make sure N2 RPM for the tail rotor is in the green and lined up on the power turbine RPM needle, preferably at 324 RPM.

4. Throttle should be fully open during engine operation.

5. Torquemeter should never exceed 50 PSI.
EGT (Exhaust Gas Temperature) Limits

If you are over EGT safe limits for a considerable amount of time, there will be a cumulative degradation effect which will depend on the time and EGT temperature in which you will be flying since that cumulative degradation effect started. Cumulative degradation effect will cause permanent engine performance degradation and percentage of that degradation will depend again on temperature and time. There are the three main points:

1. If you drop to safe numbers before cumulative degradation effects start, you will regain normal engine performance.
2. If you drop to safe numbers after cumulative degradation effect started, damage accumulation will stop and you will return to degraded engine performance. However, the accumulated cumulative degradation effect will not go anywhere. Next time you exceed EGT limits, damage accumulation will grow again and it will bring even more performance degradation.
3. After cumulative degradation effect reaches its limit and if you still operate engine above limits, it will cause even more engine performance degradation and can cause engine fire.

<table>
<thead>
<tr>
<th>Power Setting</th>
<th>EGT Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Continuous (green arc)</td>
<td>400 to 610 deg C</td>
</tr>
<tr>
<td>Takeoff Power (max 30 min)</td>
<td>610 to 625 deg C Risk of engine fire after 30 min</td>
</tr>
<tr>
<td>10-second power limit (max 10 sec) (Engine Hot Start)</td>
<td>625 to 675 deg C Only for engine start and acceleration</td>
</tr>
<tr>
<td>5-second power limit (max 5 sec) (Engine Hot Start)</td>
<td>675 to 760 deg C Only for engine start and acceleration</td>
</tr>
<tr>
<td>EGT Redline (Maximum Allowable EGT)</td>
<td>760 deg C If exceeded in flight, high risk of engine fire</td>
</tr>
</tbody>
</table>

**Condition**  
| EGT is 645 deg C | 166 seconds (from start of over limits operation) before performance degradation (RPM will drop by ~200 in 5-10 sec)  
|                  | 209 seconds (from start of over limits operation) before your engine can catch fire |
| EGT is 680 deg C | 83-88 seconds (from start of over limits operation) before performance degradation (RPM will drop by ~200 in 3-6 sec)  
|                  | 90-95 seconds (from start of over limits operation) before your engine can catch fire |

**Bottom Line**: Use 625 deg C as your maximum EGT during flight. Any exceedance of this parameter may lead to engine fire, engine damage or engine seizure.
The Huey has one of the most interesting aerodynamic models in DCS. We will look at some aerodynamic concepts to help you understand why the helicopter behaves the way it does. Don’t worry, I’ll keep it short and simple. The following principles are simply what you MUST understand as a Huey pilot if you want to fly worth a darn.
FORCES: TORQUE, TRANSLATIONAL & VERTICAL LIFT

In a hover, you will most likely generate vertical lift only since the lift vector is pointing upwards. However, if you push your nose down and gain horizontal speed, you will notice that you will generate much more lift as you gain speed. This is called "Translational Lift": your blades gain much more lift efficiency as you accelerate.

You might also wonder why you need to apply left rudder when you are hovering. This is simply because of the torque created by the propeller blades’ rotation: we call this "Translating Tendency", or simply “drift”. In a prop airplane, the torque will force you to use rudder on takeoff to stay straight. The same principle applies for a helicopter, but in a different axis.

Figure 2-25. A tail rotor is designed to produce thrust in a direction opposite to the torque. The thrust produced by the tail rotor is sufficient to move the helicopter laterally.

Figure 2-26. The airflow pattern for 1-2 knots of forward airspeed. Note how the downwash vortex is beginning to dissipate and induced flow down through the rear of the rotor system is more horizontal.

Figure 2-27. An airflow pattern at a speed of 10-15 knots. As this increased airspeed, the airflow continues to become more horizontal. The leading edge of the downwash pattern is being overrun and is well back under the nose of the helicopter.

Figure 3-1. Forces Acting on a Helicopter
GYROSCOPIC PRECESSION

The spinning main rotor of a helicopter acts like a gyroscope. What we call “gyroscopic precession” is the resultant action or deflection of a spinning object when a force is applied to this object. This action occurs 90 degrees in the direction of rotation from the point where the force is applied, like on a rotating blade.

Now, what does this mean and why should you care about such mumbo jumbo? This means that if you want to push your nose down, you push your cyclic forward. What happens in reality is that pilot control input is mechanically offset 90 degrees “later”, as shown on the pictures below.

**Figure 2-28. Gyroscopic precession.**

**Figure 2-29.** As each blade passes the 90° position on the left in a counterclockwise main rotor blade rotation, the maximum increase in angle of incidence occurs. As each blade passes the 90° position to the right, the maximum decrease in angle of incidence occurs. Maximum deflection takes place 90° later—maximum upward deflection at the rear and maximum downward deflection at the front—and the tip-path plane tips forward.
RETREATING BLADE STALL & DISSYMMETRY OF LIFT

In forward flight, the relative airflow through the main rotor disk is different on the advancing and retreating side. The relative airflow over the advancing side is higher due to the forward speed of the helicopter, while the relative airflow on the retreating side is lower. This dissymmetry of lift increases as forward speed increases. To generate the same amount of lift across the rotor disk, the advancing blade flaps up while the retreating blade flaps down. This causes the AOA to decrease on the advancing blade, which reduces lift, and increase on the retreating blade, which increases lift.

At some point as the forward speed increases, the low blade speed on the retreating blade, and its high AOA cause a stall and loss of lift. Retreating blade stall is a major factor in limiting a helicopter’s never-exceed speed (VNE) and its development can be felt by a low frequency vibration, pitching up of the nose, and a roll in the direction of the retreating blade. High weight, low rotor rpm, high density altitude, turbulence and/or steep, abrupt turns are all conducive to retreating blade stall at high forward airspeeds. As altitude is increased, higher blade angles are required to maintain lift at a given airspeed.

Thus, retreating blade stall is encountered at a lower forward airspeed at altitude. Most manufacturers publish charts and graphs showing a VNE decrease with altitude.

IN A NUTSHELL...

Did you ever wonder why your helicopter can never stay straight when you center your cyclic stick? The reason why you always need to hold your stick to your left and towards you is because the lift generated by your rotor blade is not equal everywhere on your blades. Therefore, the lift profile is not symmetric. “Lift dissymmetry” is just other fancy ways to refer to this phenomenon.

“Retreating Blade Stall” is a major factor in limiting a helicopter’s maximum forward airspeed. Just as the stall of a fixed wing aircraft wing limits the low-airspeed flight envelope, the stall of a rotor blade limits the high-speed potential of a helicopter.
OGE VS IGE: UNDERSTANDING GROUND EFFECT

Ground effect is the increased efficiency of the rotor system caused by interference of the airflow when near the ground. The air pressure or density is increased, which acts to decrease the downward velocity of air. Ground effect permits relative wind to be more horizontal, lift vector to be more vertical, and induced drag to be reduced.

These conditions allow the rotor system to be more efficient. Maximum ground effect is achieved when hovering over smooth hard surfaces. When hovering over surfaces as tall grass, trees, bushes, rough terrain, and water, maximum ground effect is reduced. Rotor efficiency is increased by ground effect to a height of about one rotor diameter (measured from the ground to the rotor disk) for most helicopters. Since the induced flow velocities are decreased, the AOA is increased, which requires a reduced blade pitch angle and a reduction in induced drag. This reduces the power required to hover IGE.

The benefit of placing the helicopter near the ground is lost above IGE altitude, which is what we call OGE: Out of Ground Effect.

IN A NUTSHELL...

Ground Effect is what gives you additional lift when you are flying close to the ground. A hover, for instance, is much easier to maintain close to the ground torque-wise since ground effect is nullified at higher altitudes.

Ground effect is specially important on missions where you need to fly NOE (Nap-Of-Earth, where even lawnmowers dare not set foot).
VORTEX RING STATE (VRS)

Vortex ring state describes an aerodynamic condition in which a helicopter may be in a vertical descent with 20 percent up to maximum power applied, and little or no climb performance. The term “settling with power” comes from the fact that the helicopter keeps settling even though full engine power is applied.

In a normal out-of-ground-effect (OGE) hover, the helicopter is able to remain stationary by propelling a large mass of air down through the main rotor. Some of the air is recirculated near the tips of the blades, curling up from the bottom of the rotor system and joining the air entering the rotor from the top. This phenomenon is common to all airfoils and is known as tip vortices. Tip vortices generate drag and degrade airfoil efficiency. As long as the tip vortices are small, their only effect is a small loss in rotor efficiency. However, when the helicopter begins to descend vertically, it settles into its own downwash, which greatly enlarges the tip vortices. In this vortex ring state, most of the power developed by the engine is wasted in circulating the air in a doughnut pattern around the rotor.

A fully developed vortex ring state is characterized by an unstable condition in which the helicopter experiences uncommanded pitch and roll oscillations, has little or no collective authority, and achieves a descent rate that may approach 6,000 feet per minute (fpm) if allowed to develop.

WHY SHOULD YOU CARE?

One of the biggest issues new pilots have is that they do not understand what VRS is, what it does, why it happens and how to counter it. In simple terms, if your airspeed is around 10-15 kts (which is the speed at which VRS usually occurs), you will experience a sudden loss of lift that will cause you to drop like a rock. VRS also occurs in situations where you have a descent rate of 500 ft/min or greater. More often than not, VRS happens when you are trapped in a column of disrupted air created by your own rotor blades, and this (unfortunately) often occurs at the most critical part of flight: on LANDING.

Oh, now I’ve got your attention? Good. One of the biggest problems Peter Pilots experience is to land their chopper. Even in real life, there are many pilots who do what we call a “hard landing” because they did not anticipate correctly the sudden loss of lift caused by VRS. A hard landing is when you impact the ground at a vertical speed that is too great, which causes structural damage to the skids, and possibly other structural components. The helicopter is not a total loss, but it will require extensive inspection and repairs, which costs time, money, and temporarily deprives the operator from one of its main sources of income.

Countering VRS is easy if you pay attention to your airspeed and descent rate. Once you enter VRS, raising the collective (which is instinctively what someone would do) will do nothing at best, or aggravate the situation at worst. To reduce the descent rate, you need to get out of that column of disrupted air. You counter VRS by pointing the nose down (or in any direction) to pick up some speed and get away from these nasty vortices.

Note: Many pilots confuse VRS with the inertia of your machine. If you come in too fast and raise your collective too slowly, it is to be expected that you will crash.
MAST BUMPING

Mast bumping is generally a result of pilot induced over controlling of the cyclic leading to a negative G situation, however the negative G can also be caused by other factors without input by the pilot such as severe turbulence or a rapid lowering of the collective. It is a condition applicable to two bladed helicopters with a teetering rotor. Mast bumping is a result of the helicopters main rotor hub (head) making contact with the main rotor mast. The head literally ‘bumps’ the mast and can damage or snap it off. For this to happen excessive flapping of the disc must occur and this is impossible if the helicopter is flown within its designed tolerances.

Causes:
Excessive flapping may be the result of
• Flight resulting in a negative or low G situation, this may be due to manoeuvring, turbulence or similar
• Sudden, abrupt and large changes made to the cyclic, especially in the fore/aft direction
• Sudden and unanticipated lowering (or dropping) of the collective
• Strong gusty winds (especially updraughts associated with hovering or landing on a cliff edge)
• Excessive sideways flight beyond the maximum allowable limits
• Landings on an excessive slope beyond the design limits of the helicopter

Corrective actions:
Prevention is the best rule. Never get into a negative G situation in a two bladed helicopter system by intentionally using abrupt control inputs. If you do experience a negative G for any reason then the obvious solution is to reload the rotor disc so that you are experiencing positive G. This can be done by
• Using aft cyclic to increase the G force and use right cyclic to follow the roll
• Raise collective to increase the total rotor thrust and help increase the G force
• Once the G force has been restored then you can recover to straight and level flight.

A great video on mast bumping with cheesy music: https://www.youtube.com/watch?v=nm8iV_uiBsI
AUTOROTATION

Autorotation is a flight state where your engine is disengaged from the rotor system and rotor blades are driven solely by the upward flow of air through the rotor. It can be caused by engine malfunction or engine failure, tail rotor failure or a sudden loss of tail rotor effectiveness.

Figure 3.16. Approach to Landing, Power Off

Figure 11-1. During an autorotation, the upward flow of relative wind permits the main rotor blades to rotate at their normal speed. In effect, the blades are “gliding” in their rotational plane.
AUTOROTATION – CORRECTIVE ACTIONS

WHY SHOULD YOU WANT TO SIMULATE AUTOROTATION?

Real life does not come with a “re-spawn” button. Life is imperfect: there is always a chance that you could lose engine power for a million reasons. In the world of DCS, odds are that you will be sent on dangerous (read: SUICIDAL) missions. Forget about milk runs: combat landings, close gunship support, CSAR... there are very high chances that you will be fired upon. With so much crap flying in the air, you are bound to get zinged by something. This is why if you enter in an autorotation state, you MUST know what you do.

HOW TO SIMULATE AUTOROTATION

Autorotation can be simulated if you reduce your throttle to IDLE (hold PAGE DOWN until you get to IDLE position). Train yourself to deal with autorotation and you will be surprised to see how much better your flying will become.

AUTOROTATION RECOVERY EXAMPLE:

1) Find a good place to land first and make sure you are at 1,500 ft or more.
2) Simulate engine loss of power by reducing throttle to IDLE-STOP (PAGE DOWN).
3) Push TRIM RESET switch
4) Immediately set the GOV (governor) switch to EMERGENCY, which will allow pilot to manually control engine RPM with the throttle (AUTO automatically controls engine RPM while in the FULL OPEN position).
5) Apply right rudder to center the slip ball, lower collective and pull up cyclic to compensate for sudden RPM loss: make sure the power turbine reaches 6600 RPM (green).
6) Adjust cyclic for a constant descent at 80 kts
7) Maintain 6600 RPM and 80 kts airspeed. You now have the choice between the three following recovery modes.

8.1) RECOVERY MODE #1: POWER RECOVERY (throttle up, climb back up and resume flight)
   a) Once condition at step 7) is respected and you are high enough (400 ft or higher), throttle up to FULLY OPEN and raise collective to start climbing again.
   b) Set the GOV EMERGENCY switch to Auto.

8.2) RECOVERY MODE #2: TERMINATE WITH POWER (throttle up, continue descent and land)
   a) Once condition at step 7) is respected, continue descent and throttle up to FULLY OPEN. Adjust collective to maintain 6600 RPM.
   b) At 100 ft AGL, apply aft cyclic to level out and decelerate. Descent rate should be around 500 ft/min.
   c) At 15 ft AGL, start flaring and raise collective with decision to cushion the landing: not too fast, not too slow.

8.3) RECOVERY MODE #3: TOUCHDOWN (no power, continue descent and land)
   a) Once condition at step 7) is respected, continue descent and do not touch throttle.
   b) At 100 ft AGL, apply aft cyclic to level out and decelerate. Descent rate should be around 500 ft/min.
   c) At 15 ft AGL, start flaring and raise collective with decision to cushion the landing: not too fast, not too slow.

Here is a video demonstration of a touchdown autorotation recovery by Furia, a real life helicopter pilot. The engine loss of power is simulated differently, but the recovery concepts are the same.

LINK: https://www.youtube.com/watch?v=u6UufhO2A9k
THROTTLE IDLE
 Collective Down
 Cyclic Aft

LEVEL OFF @
200 FT

RPM DROP DUE TO
ENGINE LOSS OF POWER

MAINTAIN 80 KTS &
6600 RPM
FOR NIGHT OPERATIONS:
NIGHT VISION GOGGLES CONTROLS
ON/OFF: RSHIFT + H
BRIGHTNESS + : RCTRL + RSHIFT + H
BRIGHTNESS - : RALT + RSHIFT + H
FLIGHT ENVELOPE: HEIGHT VS SPEED & “DEAD MAN’S CURVE”
All helicopters carry an operator’s manual that has an airspeed versus altitude chart similar to this one. The shaded area on this chart must be avoided. It is often referred to as the “dead man’s curve” and “avoid curve”. Proper manoeuvres for a safe landing during engine failure cannot be accomplished in these areas.

RECOMMENDED SPEEDS: 90 kts for cruise, 70 kts for climbing

NOTE
Avoid continuous operation in indicated areas. However, if the aircraft is operated in the indicated areas, emergency procedures relating to engine failures – low altitude, low airspeed should be observed.
<table>
<thead>
<tr>
<th>CAUTION PANEL</th>
<th>WHAT DOES IT MEAN?</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGINE OIL PRESS</td>
<td>Engine oil pressure below 25 psi</td>
</tr>
<tr>
<td>ENGINE ICING</td>
<td>Engine icing detected</td>
</tr>
<tr>
<td>ENGINE ICE DET</td>
<td>Not connected</td>
</tr>
<tr>
<td>ENGINE CHIP DET</td>
<td>Metal particle in engine oil</td>
</tr>
<tr>
<td>LEFT FUEL BOOST</td>
<td>Left fuel boost pump inoperative</td>
</tr>
<tr>
<td>RIGHT FUEL BOOST</td>
<td>Right fuel boost pump inoperative</td>
</tr>
<tr>
<td>ENG FUEL PUMP</td>
<td>Engine fuel pump inoperative</td>
</tr>
<tr>
<td>20 MINUTE</td>
<td>Fuel quantity about 170 lbs (20 min remaining)</td>
</tr>
<tr>
<td>FUEL FILTER</td>
<td>Fuel filter impending bypass</td>
</tr>
<tr>
<td>GOV EMER</td>
<td>Governor switch in emergency position</td>
</tr>
<tr>
<td>AUX FUEL LOW</td>
<td>Auxiliary fuel tank empty</td>
</tr>
<tr>
<td>XMSN OIL PRESS</td>
<td>Transmission oil pressure below 30 psi</td>
</tr>
<tr>
<td>XMSN OIL HOT</td>
<td>Transmission oil temperature above 110 deg C</td>
</tr>
<tr>
<td>HYD PRESSURE</td>
<td>Hydraulic pressure LOW</td>
</tr>
<tr>
<td>ENGINE INLET AIR</td>
<td>Engine air filter clogged</td>
</tr>
<tr>
<td>INST INVERTER</td>
<td>Failure of inverter</td>
</tr>
<tr>
<td>DC GENERATOR</td>
<td>DC generator failure</td>
</tr>
<tr>
<td>EXTERNAL POWER</td>
<td>External power access door open</td>
</tr>
<tr>
<td>CHIP DETECTOR</td>
<td>Metal particles present in 42 deg or 90 deg gearbox or main transmission</td>
</tr>
<tr>
<td>IFF</td>
<td>IFF system inoperative</td>
</tr>
</tbody>
</table>
FLIGHT MODES

Mission planning is a crucial part of flying helicopters. Airmobile operations will often require you to drop troops at a designated LZ (landing zone). The flight path to reach this LZ should be as safe as possible. The Huey can neither fly fast nor high, therefore his safest routes will often be as close to the ground as possible in order to avoid detection and use terrain to mask his approach. “NOE” is what pilots call “Nap-of-the-Earth”, a very low altitude flight mode done in a high-threat environment. NOE flying minimizes detection and vulnerability to enemy radar.
FORMATIONS

PART 11 – MISSION TYPES & OPERATION

HEAVY LEFT

HEAVY RIGHT

VEE

TRAIL

ECHelon LEFT

ECHelon RIGHT

DIAMOND

Distance between aircraft in flight:
- Day - 2 to 3 rotor disks.
- Night - 3 to 5 rotor disks.

Distance between aircraft in landing points:
- Day - Determined by TDP size.
- Night - Determined by TDP size.

In heavy left and right formations, double the distance between the first and third aircraft.

STAGGERED TRAIL RIGHT

STAGGERED TRAIL LEFT

UH-1H HUEY
Transport helicopters are called “slicks”. Since slicks carry troops and are not heavily armed, they are often escorted by gunships.
HOW TO LOAD AND DROP TROOPS

1) Land next to ground troops
2) Press “\” to open the main menu
3) Press “F10” to select Other
4) Press “F1” to Load (or unload) troops
SLING LOADS

a) Land next to cargo crates
b) Press “\” to open the main menu
c) Press “F6” to select Other
d) Press the key specified to choose the cargo you will pick. Its location will be identified by a red smoke.

Figure 11.3. Cargo selection menu appearance dependant on distance to cargo.
SLING LOADS

e) Land next to identified cargo. See picture to see how close you need to be.
f) Press Hook/Unhook key binding to attach cargo to hoist. A cable will appear. You can now transport the sling load.
g) When you fly, be mindful of the pendulum effect the cargo will have. Climb at 60 kts, cruise at 60-100 kts. Do not make hard turns or the hoist cable will snap.
HOW TO FIRE FORWARD GUNS

1) Click on Gunsight Power switch
2) Click on Gunsight handle
3) Select and arm 7.62 mm guns. Make sure both of them are selected.
4) Fire guns when ready.
HOW TO FIRE ROCKETS

1) Click on Gunsight Power switch
2) Click on Gunsight handle
3) Select and arm 2.75 in rockets.
4) Select quantity of rockets to fire per salvo. I suggest you choose “1”, as it gives you more flexibility.
5) Fire rockets when ready using the gun trigger. Take note that you will send two rockets at a time (one per pod).
HOW TO AIM WITH THE FLEXIBLE SIGHT

1) (For DCS versions older than 2.5) Don’t forget to have your “TRACKIR Aiming” option ticked in the SPECIAL option panels.
2) Select and arm 7.62 mm guns.
3) Select desired AI autopilot mode.
4) Select co-pilot (operator) by pressing “2”.
5) While the sight is stowed, turn your flexible switch UP and adjust brightness.
6) Press “M” to deploy flexible sight.
7) By default, the miniguns will aim where you look in trackIR. If you prefer to aim with the mouse (recommended), you just have to pause your trackIR and the mouse will take over. Fire using the FIRE GUNS button (on joystick) or your left mouse button. Scroll mousewheel to zoom.

COPilot (OperAtor) Controls

Take Copilot Position: 2
Set AI ROE (Rule of Engagement): L_CTRL+2
Set AI Firing Burst Length: L_SHIFT+2
Autopilot On/Off: LWIN+A
Autopilot Attitude Hold Mode: LALT+LSHIFT+A
Autopilot Level Flight Mode: LCTRL+A
Autopilot Orbit Mode: LALT+A
Show Weapon Hints: LCTRL+LSHIFT+H
Flexible Sight On/Off: M
Mouse Cursor Click Mode On/Off: LALT+C
Zoom: Mousewheel
HOW TO AIM WITH A GUNNER

1) (For DCS versions older than 2.5) Don’t forget to have your “TRACKIR AIMING” option ticked in the SPECIAL option panels.
2) Select and arm 7.62 mm guns.
3) Select desired AI autopilot mode.
4) You can toggle the CREW STATUS window (AI Panel) by pressing “LWIN+H”.
5) Select desired gunner (press “3” or “4”).
6) By default, the gun will follow where you look in trackIR. If you prefer to aim with the mouse (recommended), press “RSHIFT+T” (TrackIR Aiming ON/OFF binding). The mouse will then take over.
7) Fire using the FIRE GUNS button (on joystick) or your left mouse button. Scroll mousewheel to zoom.

LEFT GUNNER CONTROLS
TAKE LEFT GUNNER POSITION: 3
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+3
SET AI FIRING BURST LENGTH: L_SHIFT+3
OPEN/CLOSE RIGHT GUNNER DOOR: L_ALT+3
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL

RIGHT GUNNER CONTROLS
TAKE RIGHT GUNNER POSITION: 3
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+4
SET AI FIRING BURST LENGTH: L_SHIFT+4
OPEN/CLOSE RIGHT GUNNER DOOR: L_ALT+4
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL
HOW TO DEPLOY FLARES

1) Arm flare dispensers ("armed" light is blue)
2) Turn the FLARE counter knob manually to set it to 30 flares (for one dispenser). You have 60 flares in total since your tailboom is equipped with 2 dispensers that deploy one flare each simultaneously each time you pop flares)
3) Press the “flare dispense” button to pop a pair of flares.

NOTE: As of version 2.5, there is no chaff available in the game.
You have three radios on your central console. 

- The UHF AN/ARC-51BX radio set is used for Air-to-Air primary communications.
- The VHF AN/ARC-134 radio set is used for Air-to-Air alternate communications (and tower).
- The FM AN/ARC-131 radio set is used for internal flight communications between crew members.
- The C-1611/ARC Signal Distribution Panel allows you to choose which radio set you communicate on.

Most of the time, you will only be using the ARC-51BX UHF radio since in DCS you don’t really need to communicate with crew members.
**HOW TO TURN ON RADIOS (COMMS)**

1. Turn VHF-COMM ON (Right Click) and set desired frequency (scroll mousewheel)
2. Set UHF-COMM to TR (Transmit-Receive) (Right Click), MANUAL (default) and set desired frequency (scroll mousewheel)
3. Set FM-COMM to TR (Transmit-Receive) (Right Click) and set desired frequency (scroll mousewheel)
4. Turn ON Signal Distribution Panel receiver switches 1 (VHF FM), 2 (UHF), 3 (VHF AM), 4 (#2 FM/HF navigation radio), INT (interphone) and NAV (navigation receiver).
5. Set Signal Distribution Panel to “2” to select UHF channel and adjust volume.
6. Press radio switch (on cyclic) to open up comms menu on the radio selected by the Signal Distribution Panel

---

**Transmit-Interphone Selector Switch**
- PVT: Hot Line
- INT: Interphone
- 1: VHF FM Transmitter
- 2: UHF Transmitter
- 3: VHF AM Transmitter
- 4: Not Used

---

**AN/ARC-134**
VHF RADIO PANEL
Air-to-Air Alternate (& tower)
116.000 – 149.975 MHz Band

**AN/ARC-51BX**
UHF RADIO PANEL
Air-to-Air Primary
225.0 – 399.9 MHz Band

**C-1611/ARC SIGNAL DISTRIBUTION PANEL**
Selects which radio microphone transmits on

---

**AN/ARC-131**
FM RADIO PANEL
Crew Members Comms
30.00 – 75.95 MHz Band
## RADIO FREQUENCIES – AIRFIELDS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anapa</td>
<td>121.0</td>
</tr>
<tr>
<td>Batumi</td>
<td>131.0</td>
</tr>
<tr>
<td>Beslan</td>
<td>141.0</td>
</tr>
<tr>
<td>Gelendzhik</td>
<td>126.0</td>
</tr>
<tr>
<td>Gudauta</td>
<td>130.0</td>
</tr>
<tr>
<td>Kobuleti</td>
<td>133.0</td>
</tr>
<tr>
<td>Kutaisi</td>
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<tr>
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<tr>
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<td>Maykop</td>
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<td>Mineral’nye Vody</td>
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<td>Tbilisi</td>
<td>138.0</td>
</tr>
<tr>
<td>Vaziani</td>
<td>140.0</td>
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</table>
UNDERSTANDING ADF, NDB, VOR, ILS

Navigation is an extensive subject. You can check chapter 15 of FAA manual for more details on navigation.


- “NDB” is what we call a non-directional beacon. It transmits radio waves on a certain frequency on long distances. These waves are read by an ADF (automatic direction finder). NDBs are typically used for radio navigation.
- “VOR” is what we call a VHF Omnidirectional Range system. It transmits radio waves on a certain frequency. These waves are read by a VOR receiver. VOR systems, just like NDBs, can be used for radio navigation.
- NDB and VOR are used just like lighthouses were used to guide ships. This way, air corridors and airways are created to help control an increasingly crowded sky.
- ILS (Instrument Landing System) allows an aircraft find their way to an airstrip (provided it is equipped with a VOR or NDB) despite bad visibility conditions.

The UH-1H Huey can navigate using the following equipment:

- **AN/ARC-131 FM radio set (FM-COMM panel):** you can communicate with your on-board crew OR you can track FM signals being broadcast by units on the ground using its HOMING mode, which works just like an ADF (automatic direction finder) and is very useful for CSAR (Combat Search & Rescue) missions.
- **AN/ARN-83 ADF radio set (ADF panel):** you can track NDB (non-directional beacons), which are scattered throughout the map. The ADF will give you a direction to follow, but not a range.
- **AN/ARN-82 VHF navigation set (NAV-COMM panel):** you can track VOR signals, which are used by airfields for ILS (Instrument Landing System) approaches.

### FREQUENCY RANGES

<table>
<thead>
<tr>
<th>Mode</th>
<th>Lower Frequency</th>
<th>Upper Frequency</th>
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<tbody>
<tr>
<td>FM-COMM</td>
<td>30.00 MHz</td>
<td>75.95 MHz</td>
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<tr>
<td>ADF</td>
<td>190 kHz</td>
<td>1750 kHz</td>
</tr>
<tr>
<td>VHF NAV-COMM</td>
<td>108.0 MHz</td>
<td>126.95 MHz</td>
</tr>
</tbody>
</table>
NDB, VOR & ILS STATIONS – HOW TO FIND THEM?

Lino _Germany created a **wonderful** HD map containing all NDB stations and VOR/ILS stations scattered throughout the map. Use this to know the NDB and VOR channel frequencies you need to set.

LINK: [https://drive.google.com/open?id=0B-uSpZROuEd3YWJBUmZTa3BGajQ&authuser=0](https://drive.google.com/open?id=0B-uSpZROuEd3YWJBUmZTa3BGajQ&authuser=0)

ADF & FM demo: [https://www.youtube.com/watch?v=SNT0A2Pgxh8](https://www.youtube.com/watch?v=SNT0A2Pgxh8)

VOR/ILS demo: [https://www.youtube.com/watch?v=SkpvrbqeFDk](https://www.youtube.com/watch?v=SkpvrbqeFDk)
FM RADIO NAVIGATION – EXAMPLE
As an example, we will take a rescue mission to Mount Elbrus. Try it, it’s a lot of fun and flying a rescue mission really feels great! A Mi-8 crew crashed in the mountains and its ELT (Emergency Locator Transmitter) started broadcasting an emergency signal on a 40.50 MHz FM frequency.

1) Set FM radio channel to 40.05
2) Set radio to HOME (for homing)
3) Switch sensitivity switch to HIGH.
4) Consult the Course Deviation Indicator and find where the signal is coming from.
5) Fly towards the signal: you will be on course when the vertical line is aligned with the center of the CDI.

Vertical bar not aligned, fly to the right towards it.

Vertical bar aligned, you are now on course.
ADF (AUTOMATIC DIRECTION FINDER) – EXAMPLE

By consulting Lino_Germany’s map, we can find NDB locations and frequencies. In this example, we will use NDB 662 (ADF frequency = 662 kHz).

1) Right click on ADF mode knob to set it to “ADF” and set ADF/VOR Control switch to ADF
2) Right click on Frequency tuner to pick adequate band range (in our case 400-850).
3) Scroll mousewheel on the frequency tuner and set frequency to 662 kHz. Check signal strength to know when you are receiving a signal. Be careful: it is very sensitive. You can check if you are on the good frequency by cross-checking the signal you are hearing and the morse code associated with the NDB.
4) Switch sensitivity switch to HIGH.
5) Consult the Radio Compass Indicator and find where the signal is coming from by following the pointy end of the needle.
6) Fly towards the signal: you will be on course when the needle is aligned with the upper triangle of the Radio Compass.
VOR/ILS APPROACH – EXAMPLE

ILS approaches function with VOR beacons. As an example, we will use the ILS beacon at Sochi-Adler. By consulting Lino_Germany’s map, we can find the ILS/VOR beacon location, runway heading, morse signal and frequency. In this example, we will use a VOR/ILS frequency of 111.10 MHz for a runway heading of 062 deg.

1) Set NAV-COM radio to PWR (right click).
2) Scroll mousewheel on both frequency tuners and set frequency to 111.10 MHz. You can check if you are on the good frequency by cross-checking the signal you are hearing and the morse code associated with the ILS VOR.
3) Switch sensing switch to HIGH.
4) Set Course Deviation Adjustment knob to the runway heading of 062.
5) Consult the Course Deviation Indicator and find where the signal is coming from.
6) Fly towards the signal: you will be on course when the vertical line is aligned with the center of the CDI.
VOR/ILS APPROACH – EXAMPLE

Vertical bar not aligned, you are off course.

Vertical bar aligned, you are now on course.
CONTROLS FOR AI AUTOPILOT

The autopilot is not a real autopilot in the case of the Huey. Belsimtek simply allowed an AI pilot to take over controls when you switch to the copilot, left gunner or right gunner.

- **AI OPERATOR/LEFT/RIGHT ROE ITERATE (L_CTRL+ 2/3/4)**
  - Iterates Rules of Engagement for Copilot, Left & Right Gunners
  - Hold Fire / Return Fire / Free Fire (At Will)

- **AI OPERATOR/LEFT/RIGHT BURST SWITCH (L_SHIFT+ 2/3/4)**
  - Iterates Firing Burst Length for Copilot, Left & Right Gunners
  - Short Burst / Long Burst

- **AUTOPILOT**
  - Turns AI Autopilot On/Off (LWIN+A)

- **AUTOPILOT ATTITUDE HOLD/LEVEL FLIGHT/ORBIT**
  - Selects AI Autopilot Mode (LALT+LSHIFT+A/LCTRL+A/LALT+A)

- **WEAPON HINTS ON/OFF**
  - Toggle Weapon Interface (LCTRL+LSHIFT+H)
Abort—terminate a preplanned aircraft maneuver.
Affirmative—yes.
Bandit—an identified enemy aircraft.
Braking—announcement made by the crew member who intends to apply brake pressure.
Break—immediate action command to perform an emergency maneuver to deviate from the present ground track: will be followed by the word “right,” “left,” “up,” or “down.”
Call out—command by the pilot on the controls for a specified procedure to be read from the checklist by the other crew member.
Cease fire—command to stop firing but continue to track.
Clear—no obstacle present to impede aircraft movement along the intended ground track. Will be preceded by the word “none,” “all,” or “aircraft” and followed by the direction: for example, “left,” “right,” “slide left,” or “slide right.” Also indicates that ground personnel are authorized to approach the aircraft.
Come up/down—command to change altitude up or down; normally used to control masking and unmasking operations.
Contact—establish communication with... (followed by the name of the element).
Controls—refers to aircraft flight controls.
Drifting—an alert of the unintentional or uncontrolled movement of the aircraft; will be followed by the word “right,” “left,” “backward,” or “forward.”
Egress—command to make an emergency exit from the aircraft; will be repeated three times in a row.
Execute—initiate an action.
Expect—anticipate further instructions or guidance.
Filing—announcement that a specific weapon is to be fired.
Fly heading—command to fly an assigned compass heading. (This term is generally used in low-level or contour flight operations.)
Go ahead—proceed with your message.
Go az—directive to activate altimeter communications.
Go plane—directive to discontinue secure operations.
Go secure—directive to activate secure communications.
Go red—directive to discontinue secure operations.
Hold—command to maintain present position.
Hove—horizontal movement of an aircraft perpendicular to its heading; will be followed by the word “right” or “left.”
Inside—primary focus of attention is inside the cockpit for longer than two to three seconds.
Jettison—command for the emergency or unexpected release of an external load or stores; when followed by the word “door,” will indicate the requirement to perform emergency door removal.
Maintain—command to continue or keep the same.
Max/maximum—conceal aircraft by using available terrain features and to position the aircraft above terrain features.
Mickey—3 have Quick time-synchronized signal.
Monitor—command to maintain constant watch or observation.
Move aft—command to move aft, followed by distance in feet.
Move forward—command to move forward, followed by distance in feet.
Negative—incorrect or permission not granted.
Negative contact—unable to establish communication with... (followed by name of element).
No joy—target, traffic, or obstruction not positively seen or identified.
Now—indicates that an immediate action is required.
Outside—primary focus of attention is outside the aircraft.
Put me up—command to place the 2nd radio transmit selector switch to a designated position: will be followed by radio position numbers on the intercommunication panel or “Up on 1, up on 3.”
Put on—command to place the P2 radio transmit selector switch to a designated position: will be followed by radio position numbers on the intercommunication panel or “Up on 1, up on 3.”
Release—command for the planned or expected release of an external load.
Report—command to notify.
Roger—message received and understood.
Say again—repeat your transmission.
Sildes—intentional horizontal movement of an aircraft perpendicular to its heading; will be followed by the word “right” or “left.”
Slow down—command to reduce ground speed.
Speed up—command to increase ground speed.
Stand by—duties of a higher priority are being performed and request cannot be complied with at this time.
Stop—command to stop no further; halt present action.
Strobe—indicates that the aircraft AN/AAR-39 has detected a radar threat; will be followed by a clock direction.
Tally—target, traffic, or obstruction positively seen or identified; will be followed by a repeat of the word “target,” “traffic,” or “observation” and the clock position.
Target—an alert that a ground threat has been spotted.
Traffic—refers to friendly aircraft that present a potential hazard to the current route of flight; will be followed by an approximate clock position and the distance from your aircraft with a reference to altitude (high or low).
Transfer of control—positive three-way transfer of the flight controls between the rated crew members; for example, “I have the controls,” “You have the controls,” and “I have the controls.”
Troops on/off—command to have troops enter or exit the aircraft.
Turn—command to deviate from present ground track: will be followed by words “right” or “left,” specific heading in degrees, a bearing (“turn right 30 degrees”), or the draw at 2 o’clock.
Unable—indicates the inability to comply with a specific instruction or request.
Up—indicates primary radio selected; will be followed by radio position numbers on the intercommunication panel or “Up on 1, up on 3.”
Weapons hot/cold/off—weapon switches are in the ARMED, (L, 0, APF), or OFF position.
Wire—have received your message, I understand, and I will comply.

Figure 6-4. Examples of standard words and phrases (continued)
OTHER INTERESTING RESOURCES AND USEFUL STUFF

DCS HUEY MANUAL
https://drive.google.com/open?id=0B-uSpZROuEd3VkREci05UnVnd1U&authuser=0

FM 1-110 ARMED HELICOPTER EMPLOYMENT

FM3-04_203 FUNDAMENTALS OF FLIGHT

TM 55-1520-210-10 UH-1H OPERATOR MANUAL

UH-1H ATM AIRCREW TRAINING MANUAL 2007

LINO_GERMANY’S NAVIGATION MAP

FAA HELICOPTER FLYING HANDBOOK
http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook/

FAA MANUAL CHAPTER 15: NAVIGATION
OTHER INTERESTING RESOURCES AND USEFUL STUFF

CHICKENHAWK – ROBERT MASON
In my opinion, this is one of the best (if not THE best) book on chopper pilots. Robert Mason’s writing is thrilling and is a must-read for any reader interested in the Vietnam War, helicopters, and the dangers of being a Huey pilot.

TO THE LIMIT: AN AIR CAV HUEY PILOT IN VIETNAM – TOM A. JOHNSON
This is also one of my favourite books on the experiences of Huey pilots during the Vietnam War. Highly recommended.

AUTOROTATION TUTORIAL
https://www.youtube.com/watch?v=u6UufhO2A9k

AIR FORCE HELICOPTER - UH-1 TACTICAL OPERATIONS (1970)
https://www.youtube.com/watch?v=gNJ1-RUIVvQ

BUNYAP’S YOUTUBE CHANNEL – HUEY TEST FLIGHT SERIES
https://www.youtube.com/watch?v=S2KQQSxVK9w&list=PLoiMNu5jyFzQyf1DMZ4y4lkGGbD0buiOV

DSLYECXI’S FLYING & LANDING THE HUEY IN DCS
https://www.youtube.com/watch?v=hZYMkG63cJU

MAST BUMPING (CHEESY MUSIC INCLUDED!)
https://www.youtube.com/watch?v=nm8iV_uiBsl
MAXIMUM TORQUE AVAILABLE (30 MIN OPERATION)

324 ROTOR / 6600 ENGINE RPM

EXAMPLE

WANTED

INDICATED TORQUE

CALIBRATED TORQUE

KNOWN

PRESSURE ALTITUDE = 10,000 FEET

FAT = 18°F

CALIBRATION FACTOR = 88

METHOD

ENTER FAT

MOVE RIGHT TO PRESSURE ALTITUDE

MOVE DOWN TO CALIBRATION FACTOR

MOVE LEFT, READ INDICATED TORQUE = 41.2 PSI

FOR CALIBRATED TORQUE CONTINUE DOWN THRU CALIBRATION FACTOR

READ CALIBRATED TORQUE = 38.3 PSI
Special Thanks to

Virtual 229th Battalion, 1st Cavalry Division
http://1stcavdiv.conceptbb.com/

Flyer
GunfighterSIX
Samri
Skullz

And all Huey pilots and air crews who risked their lives to fly these wonderful machines.
Creating these guides is no easy task, and I would like to take the time to properly thank every single one of my Patreon supporters. The following people have donated a very generous amount to help me keep supporting existing guides and work on new projects as well:

- ChazFlyz