

# ARK HUD – User Manual

**Version: 1.0.0 | Tactical Display and Smart Assistant for GATE ETU Systems**

Welcome to the community of ARK HUD users! This device is an advanced, weapon-mountable smart device that provides real-time telemetry, motion tracking, voice assistance, and smart magazine management during airsoft games.

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## 1. Device Powering and Basic Operation

The ARK HUD features one physical button and a touchscreen. Navigation within the menu is done via touch, similar to smartphones.

- **Wake / Turn on screen:** Briefly press the lower physical button. The display wakes up immediately.
- **Put screen to sleep (Standby):** If you are on the Main Screen (HUD), briefly press the lower button. The display goes dark, but the system continues to work in the background.
- **Adjust brightness:** Enter any submenu, then briefly press the lower physical button. Brightness can be adjusted in 5 steps. A pop-up window will show the current brightness level (e.g., *Brightness: 80%*).
- **Record "Kill" (Hit):** While playing, press and hold the upper physical button for a moment. The number next to the skull icon on the screen increases, indicating that the hit has been recorded in the statistics.
- **Hardware shutdown:** Press and hold the lower physical button for at least 6 seconds.
- **Pop-up Notifications:** The system informs you about every important event (e.g., weapon connection, errors, targeting aborted) in an elegant window appearing in the center of the screen, which softly disappears after 3 seconds.

## 2. Detailed Layout of Screens and Icons (HUD)

You can choose from three different main screen styles (Themes) in the Command Center. These screens represent your "dashboard" during gameplay. Although the design varies, the information provided is identical.

## Meaning of icons and data on the Main Screen:

- **Weapon Battery:** A small battery icon and/or a progress bar. It shows the charge level of your weapon's own battery. It warns you of low battery with green, yellow, and then red colors.
- **Current Time:** Shows the real time (Hour:Minute).
- **Skull Icon (Middle left):** The kill counter. It can be increased by long-pressing the upper physical button.
- **SEMI / AUTO / SAFE text:** The current, real-time physical state of your weapon's fire selector lever.
- **Huge Number (Center):** The number of remaining ammunition (BBs) in the magazine. If it runs out, the value changes to "NUL" and flashes red.
- **Magazine Icon:** Shows two things. The number next to it indicates the remaining number of magazines in your vest. Below it, the physical status of the magazine inserted into the weapon is visible (if your weapon has a sensor): *IN* (inserted), *OUT* (removed), or *N/A* (no sensor).
- **Crosshair Icon (Bottom right):** The total amount of fired BBs since powering on (independent of magazine changes).
- **Footprint/Shoe Icon:** The built-in step counter, which continuously shows the number of steps you have taken.
- **Stopwatch Icon (00:00):** The countdown of the Mission Timer. When armed, it shows the *READY* text.
- **Microphone Icon:** The Stealth Meter. A sound wave showing the ambient noise level (and your chance of getting detected) in real time.

## 3. The Menu System and Button Functions

From the main screen (HUD), you can enter the menu system by briefly pressing the upper small button.

### *The Quick Menu (Menu) screen*

This is the first menu; this is where you go if you need something immediately during gameplay.

- **Top bar:** The Bluetooth icon shows whether you are *Connected* or *Disconnected*. Next to it, the HUD's own built-in battery percentage is displayed.
- **[Reset magazines] button:** Software magazine change. It resets the central ammo counter to the maximum value and subtracts one from the number of remaining magazines.
- **[Turret mode] button:** Starts the Turret mode (a 10-second countdown until automatic firing).
- **[Timer start/stop] button:** Manually starts, stops, or resets the Mission Timer.
- **[Settings] button:** Takes you to the Detailed Settings screen.

### *The Detailed Settings (Settings) screen*

The central hub from where you can access the deeper functions of the system.

- **[Magazines] button:** Takes you to the MagSetup (Magazine setup) screen.

- **[Set angle] button:** Gyroscope Calibration! This is how you teach the weapon the "horizontal" position. Aim forward and press the button. This is vital for accurate targeting time measurement and the smart-sleep function!
- **[Web UI] button:** Takes you to the Wi-Fi (Command Center) startup screen.
- **[Connect] button:** Takes you to the Bluetooth pairing screen.
- **[Timer] button:** Takes you to the mission timer (SetTimers) configuration screen.
- **[About] button:** Opens the about and version information screen.
- **Sound effect [Toggle]:** Instantly mutes or enables the entire sound system and speech of the HUD.
- **Night mode [Toggle]:** Switches to the dark, night design to prevent glaring.

#### *Functions of the Submenus*

- **MagSetup screen:** You can set your magazine's ammo capacity with the - and + buttons under *Capacity* (from 5 to 250 BBs). With the buttons under *Magazines*, you can set the number of magazines (1-5 pcs). The **[Send]** button saves the data and instantly updates the weapon.
- **SetTimers screen:** You can adjust the length of the mission in 5-minute steps using the **[UP]** and **[DOWN]** buttons. The **[Set]** button saves the setting.
- **Connect screen:** Tapping on the dashed line under **[PASSWORD]** opens the unique keyboard. Here you can enter the weapon's PIN code. You can change character types with the 123 and ABC buttons; DEL deletes. The **[Connect]** button starts the weapon search.
- **About screen:** Information window. It displays the HUD software version (*Device firmware*), the weapon electronics version (*Gearbox firmware*), and the creator (*Creator: Miskolczi Alex*).
- **Wifi screen:** Here you can start the web server with the **[Start]** / **[Stop]** button. You can see the connection data on the screen (*Wifi name: ARK HUD, Pass: ark12345, Browser address: <http://ark.local>*).

## **4. Connecting to the Weapon (Pairing)**

The HUD communicates wirelessly (via Bluetooth) with the GATE electronics inside your weapon.

### **First-time setup (Pairing):**

1. Enter the *Connect* screen from the HUD menu.
2. Touch the password field and enter your GATE electronics' 6-character PIN code on the keyboard (you can find this in the GATE Control Station application).
3. Press the **Connect** button.
4. The HUD will start searching for the weapon, and if found and the PIN code is correct, it will automatically save it. A "*Weapon Connected!*" pop-up window will appear on the screen.

*Note: After the first successful pairing, the HUD will automatically search for your weapon upon startup; you do not need to enter the PIN code again. If the connection drops and reconnects during a game, the system does this silently to avoid distracting your field of view with pop-up windows.*

## 5. Gameplay and Tactical Features

### *Ammo Management*

**Reloading:** When the magazine in the weapon runs out, the counter flashes red.

- **If your weapon has a physical magazine sensor:** Simply remove the magazine and insert a new one. The HUD detects this and automatically reloads the numbers.
- **Weapons without a sensor:** Use the **Menu** -> **[Reset magazines]** button.

### *Smart Use of the Mission Timer (Timer)*

After setting the time in the SetTimers menu:

- **Tactical start:** Put your weapon into *SAFE* mode and raise its barrel upward (at least at a 45-degree angle). The *READY* text appears on the timer. When the match starts, simply switch to *SEMI* or *AUTO* mode, and the clock will start automatically!
- **Emergency stop:** If you put the weapon back into *SAFE* mode, the timer stops immediately and resets to the original time.

### *Turret Mode (Automatic Machine Gun)*

With this function, your weapon starts firing automatically after 10 seconds when set down.

1. Go to the **Menu** and press the **Turret mode** button. (In *SAFE* mode, the system instantly blocks the operation).
2. The countdown begins on the main screen.
3. **Smart Abort:** The system is incredibly safe. The countdown or firing aborts **IMMEDIATELY** if you touch the trigger, move the fire selector lever, exit the main screen, or remove the magazine. In such cases, a clear Pop-up notification indicates the reason for the abortion (e.g., "*Targeting aborted: Trigger pulled*").

### *Movement and Sleep Mode (Smart Sleep & Wake)*

- **Tactical sleep:** If your weapon is armed (*NOT* in Safe), but you hold the barrel firmly towards the ground for at least 5 seconds (e.g., because you are crawling in the grass), the display turns off instantly so that its light does not give away your position.
- **Instant Combat Wake (Auto-Wake):** If the display is asleep but you suddenly get into action, the HUD wakes up instantly as soon as you pull the trigger, switch the fire selector lever, or replace the magazine.

## 6. The Sound System

An intelligent built-in speaker is located at the bottom of the HUD. (*For the sounds to work, the sound pack must be installed on the memory card! If a sound file is missing, a red "File missing" warning appears on the Web interface, and that specific function is automatically disabled*).

- **Ambient Noise Meter (Stealth Meter):** If you use the *Main* theme, the HUD's built-in microphone monitors ambient noises (footsteps, wind, speech). The bar on the screen continuously shows your chance of getting detected in real time.
- **Dynamic Volume:** The system adapts to ambient noises and sets the volume accordingly.
- **Personality:** The weapon has its own personality. It makes a sound for every single shot, comments on magazine changes, and what's more... if you fire too much in full-auto, it taunts you, and if you just wait for minutes in *SAFE* mode, it gets bored and starts humming. These functions can be enabled or disabled individually from the Command Center. The use of this feature depends on a preloaded sound pack.

## 7. The Command Center (Web Interface)

The HUD has its own secure website. While this is active, the weapon switches to silent mode and an offline state for safety reasons!

### Connection:

1. In the HUD menu, go to the **Wifi** screen and press the **Start** button. (The text changes to *ONLINE*).
2. On your phone, search for Wi-Fi networks and connect to the network named **ARK HUD** (Password: *ark12345*).
3. Open a browser and type: **192.168.4.1** or <http://ark.local>.

### Functions on the Web Interface:

- **Accurate Time Setup (Automatic RTC Sync):** After connecting, the accurate time is synchronized with your phone's time. This is indicated on the display by a  *RTC Time Synchronized!* pop-up window.
- **Stats (Statistics):** Here you can see global statistics as well as stats broken down by matches. You can see how many steps you took, how many calories you burned, what the weapon's maximum recoil (G-force) was, and the system analyzes your playstyle based on your movement (e.g., *Sniper*, *Ghost*, or *Assault*).
- **Files (File Manager):** You can view the contents of the SD card. This is where you can install new sound packs (.tar.gz format) with a single button press.
- **Config (Settings):**
  - You can select the HUD Theme (*Main / Gamer / NoSound*).
  - You can select the type of battery inside the weapon.
  - *Audio customization:* You can turn sounds on and off individually (e.g., you can turn off the shot sound but keep the timer alarm).
  - *Match End Logic:* Here you can set when the HUD should consider a match completed and when it should save it to the log (e.g., only if you put it in *SAFE* AND do not move for 3 minutes).
- **Update:** Here you can update the HUD's internal firmware wirelessly.

## 8. Battery and Power Management

The HUD monitors two different batteries:

- **HUD's Own Battery:** This powers the display and the sound system. You can see the percentage in the top row of the menus. If the level drops below 5%, the system enters a critical state and disables saving to the SD card to prevent data corruption. (Rechargeable via Type-C USB).
- **Weapon Battery (Gun Battery):** The small battery icon in the top left of the Main Screen. The system automatically detects from the voltage what kind of battery you put in the weapon (e.g., 2S or 3S LiPo). If you use a different battery (e.g., NiMH or LiFePO4), you can select the exact type in the Command Center for perfect display accuracy.

## 9. Safety Regulations and Maintenance

To maintain the long life and safe operation of the device, please observe the following regulations:

- **Display protection (In an airsoft environment):** The HUD screen is made of glass. Although durable, it does not withstand direct, high-energy BB (projectile) hits. To avoid damage, it is recommended to use an appropriate lens protector (killflash or plexiglass) during games.
- **Water and moisture resistance:** The device is designed to be protected against splashing water and light rain (splash-proof), but it is not waterproof. Do not submerge it in water, and protect it from prolonged, heavy rainfall!
- **Battery safety and charging:** The device contains a built-in Lithium-ion/Lithium-polymer battery. Use only standard, quality (5V / 1A or 5V / 2A) USB charging heads. Never charge the device at below-freezing temperatures or unattended!
- **Temperature limits:** Do not expose the device to extreme temperatures (e.g., do not leave it in a car parked in the hot sun in summer), as this can lead to overheating and damage to the built-in battery.
- **Cleaning:** Clean the device only with a soft, dry, or slightly damp microfiber cloth. Do not use aggressive chemicals or solvents.

## 10. Warranty Conditions

The manufacturer provides a 12-month (1 year) warranty from the date of purchase for material and manufacturing defects of the product.

**The warranty CANNOT be claimed in the following cases:**

- Damage resulting from physical impact (e.g., breaking of the display due to a BB hit, dropping, or strong impact).
- Short circuit caused by liquid entering the device (water damage).
- Unauthorized disassembly, home-brew style modification of the hardware, or modifying the software (firmware) in an unofficial way.
- Battery or circuit failures resulting from the use of an incorrect charging device.
- Deformation or battery swelling due to exposure to extreme heat.

## 11. Legal Disclaimer and Liability

- **Software:** The developer is solely liable for the code of the HUD software.

- **Compliance:** This product is a development platform ("Development kit"). The electronic components used in it comply with RoHS directives according to the manufacturer's (Waveshare) specifications. Safe use of the final product and compliance with local regulations are the responsibility of the user.
- **Waste management:** At the end of its lifespan, it is forbidden to dispose of the device (including the battery) with household waste. Please take it to an official electronic waste collection point.