iCode Duo Ultimate H1

Bring your classic Atari, ColecoVision, Intellivision, and Sega Genesis controllers to life on modern devices — from PCs and Macs to Nintendo Switch, MiSTer FPGA, and beyond. Supports 10 controller types across four console families with full button remapping, mouse and keyboard emulation, and a built-in color display.

No drivers needed. Just plug in and play.

Visit iCodeHub at **https://hub.icode.com** to unlock the full potential of your device — manage presets, fine-tune every setting, customize your buttons, and get the most out of your classic controllers!

For help and assistance: https://www.icode.com/support

Getting Started

Step 1. Plug the Duo Ultimate H1 into any USB port using the USB-C cable. The color display will light up and the RGB LEDs will start cycling. No drivers needed — your device is recognized as a standard USB gamepad.

Step 2. Connect your retro controller to either DB9 port. Port 1 is on the left, Port 2 on the right. Both ports work simultaneously.

Step 3. Start playing! The default preset (Preset 0) is configured for an Atari joystick with paddles. Your joystick directions map to the gamepad D-pad, and the fire button maps to Gamepad Button 0. The six colored buttons on the device are also active — Red is Button 0, Green is Button 1, Blue is Button 2, Yellow is Button 4, Black is Button 8, and White is Button 9.

Step 4. Visit **iCodeHub** in your browser to unlock the full potential of your adapter! Configure button mappings, fine-tune paddle sensitivity, adjust jitter control, enable mouse emulation, and much more — no software to install.

Know Your Device



Button & Port Layout

Your Duo Ultimate H1 features six colored face buttons (Red, Green, Blue, Yellow, Black, White), a 5-way hat switch that moves in four directions and clicks, and a gray Menu button near the hat. The color display shows your controller state and menus, with two RGB LEDs and a speaker alongside it.

You'll also find two DB9 controller ports for connecting your retro controllers and a USB-C port on the bottom. There is a tiny pinhole to the left of the Yellow button — this is the firmware update reset button, used only for emergency firmware recovery.

Using the Menu

Press the gray **Menu** button to open the on-screen menu. Press it again to close and return to normal operation.

Navigate using the **5-way hat**: push up and down to move through items, push right or click to select, and push left to go back. You can also use the colored buttons in menus — **Red** works like pushing right (select or increase a value) and **Green** works like pushing left (go back or decrease a value).

When you open the menu, you'll see four sections:

- **Settings** for your current preset configuration.

- **USB Settings** for how the adapter talks to the host.
- **General** for system-wide preferences.
- **System** for diagnostics, reset, and firmware updates.

Supported Controllers

The Duo Ultimate H1 supports controllers from four console families. Here's what's available:

Atari

Stick+Paddles — The most versatile mode — it auto-detects whether you're using a joystick or paddle controllers, so you don't need to switch manually.

Stick — For the standard digital joystick with 4 directions and a fire button. Use this mode if you don't want the system to detect paddles accidentally.

Paddles — Supports dual analog paddle controllers with up to 4 players. Use this mode if you are only going to use paddles and you want the system to force the unit into paddles mode, bypassing auto-detection.

Driving — For the steering wheel controller used in games like Indy 500. Make sure to review Mouse settings as some emulators will work with Driving controller only if mouse is turned on.

Trackball — Works with the CX-22 and CX-80 trackball controllers. Make sure your trackball is in trackball mode. Also review Mouse settings as some emulators will work with trackball only if mouse is turned on.

Keypad — For the 12-key numeric keypad — each key can be individually mapped.

ColecoVision

Hand Controller supports the standard controller with joystick, 2 fire buttons, and 12-key keypad. **Super Action** supports the enhanced controller with joystick, 4 fire buttons, keypad, and speed roller.

Intellivision

Hand Controller supports the Intellivision controller with directional disc, 3 fire buttons, and 12-key keypad.

Sega Genesis

3-Button supports the standard controller with D-pad, A/B/C, and Start.
6-Button supports the extended controller with D-pad, A/B/C/X/Y/Z, Start, and Mode.

How to Change Your Controller Type

Press the gray **Menu** button, then scroll down to **Settings** and push right to enter it. Scroll to **Console** and push right to choose your console (Atari, Coleco, Intellivision, or Sega). Then scroll to the port you want to configure (Port 1 or Port 2), push right, and select the specific controller type. Your choice takes effect immediately.

For a shortcut, hold **White + Menu** to jump straight to Port 1 settings, or **Black + Menu** for Port 2.

Fine-Tuning Your Controller

Once you've selected your console and controller type, you can fine-tune how it behaves. These settings are all inside the port configuration — press the gray **Menu** button, go to **Settings**, select the port, and you'll find them there. Everything is saved per-preset and per-port.

Function Mapping

This controls how your controller's directional input is reported to the host. Scroll to **Function** inside the port settings and push right to cycle through the options: **Left Analog** (left stick), **D-Pad** (digital hat switch), **Right Analog** (right stick), **Trigger Analog** (trigger axes), or **Buttons Only** (directions as button presses). Choose whichever your game or emulator expects.

Paddle Settings

If your paddles don't feel quite right, scroll to the **Paddles** section inside the port settings. From there you can adjust the **Axis** (Left, Right, or Trigger), **Range** (Full or Half), and **Sensitivity** (Full, 80%, 60%, or 40%). If your paddles are jittery, increase the **Jitter Control** (None to Very High) and **Jitter Averaging** (1–5 cycles) until the input smooths out.

You'll also find **Dual Paddles Mode** here: **Combined** keeps both paddles on one USB device, while **Split** gives each paddle its own USB device — Port 1 paddles use the X axis, Port 2 paddles use the Y axis.

Driving, Trackball, and Roller Settings

These controllers share similar tuning options inside their port settings. Scroll through to adjust **Axis Orientation** (Normal or Flip options), **Behavior** (Linear or Circular), **Resolution** (1–10 step size), **Acceleration** (Off to Very High), and **Range** (Full or Half, roller only) until the response feels right.

Fire Buttons

Each controller port has up to 2 fire buttons (A and B). Scroll to the **Fire Buttons** section inside the port settings to configure them. You can assign up to 3 actions to each fire button so a single press triggers multiple things at once. You can also turn on rapid fire for automatic repeat — set the value higher for faster firing.

Remapping Your Device Buttons

Want to change what the colored buttons and 5-way hat do? Press the gray **Menu** button, go to **Settings**, then scroll down to **Duo Buttons** and push right to enter it. You'll see a list of all 11 buttons. Select the one you want to change and you can set up to 3 action slots for it — this lets a single button press trigger multiple actions at the same time. You can also turn on **rapid fire** for automatic repeat on any button.

To control which USB gamepad receives your button presses, look for **Button Destination** at the top of the Duo Buttons section. Push right to cycle through Port 1, Port 2, or Both.

What You Can Map To

You have a wide range of actions to choose from: **Gamepad Buttons 0–31** (standard USB gamepad buttons), **Gamepad Directions** (Up/Down/Left/Right), **Mouse Clicks** (Left/Right/Middle/Back/Forward), and **Keyboard Keys** (A–Z, 0–9, F1–F12, arrows, Enter, Esc, Space, Tab, symbols, and modifiers like Shift/Ctrl/Alt/GUI).

Keypad keys (12 Atari / 14 Coleco) and Sega buttons (C, Start, X, Y, Z, Mode) are each individually mappable the same way.

USB Settings

These settings control how your adapter presents itself to the host device. Press the gray **Menu** button and scroll down to **USB Settings** to find them.

Port Mode

Scroll to **Ports Active** and push right to cycle through the options. **Both Same** mirrors Port 1's configuration to Port 2 — both ports behave identically. **Both Independent** gives each port its own separate settings. **Port 1 Only** and **Port 2 Only** disable the other port entirely — the device will need to reboot when you switch to these. A confirmation screen will appear where you can press **Red** or **Green** to confirm, or **Yellow** to cancel without rebooting.

USB Emulation Mode

If your platform isn't recognizing the adapter, scroll to **USB Emulation** inside USB Settings and push right to cycle through the modes. Keep cycling until you find the one that works for your platform:

Mode	Best For
Standard	Windows, Linux, emulators
Classic	Retro gaming platforms
Nintendo	Nintendo Switch
Legacy	Older basic HID systems
iOS	iPhone, iPad

Mouse & Keyboard Emulation

Want to use your trackball or paddles as a USB mouse? Or map controller buttons to keyboard keys? Your adapter can output mouse and keyboard signals alongside the gamepad data.

To turn on mouse mode, press the gray **Menu** button, scroll to **USB Settings**, push right to enter it, then scroll to **Mouse** and push right to cycle through the options: **Off**, **On** (actively reports mouse data), or **Standby** (the host sees the mouse device but no data is sent until you need it). You can also adjust the sensitivity from Very Low (1×) up to Very High (8×).

To turn on keyboard mode, go to **USB Settings**, scroll to **Keyboard**, and push right to cycle through **Off**, **On**, or **Standby**.

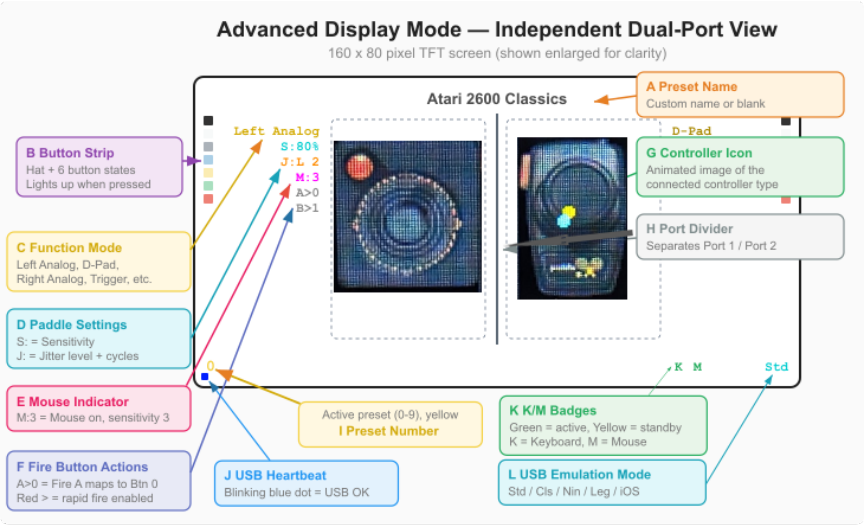
Note that changing mouse or keyboard modes may require the device to reboot since the USB descriptors need to change.

Display Modes

Your adapter has three display modes. The quickest way to change them is to hold **Green + Menu** while the menu is closed — each press cycles to the next mode. You can also press the gray **Menu** button, go to **General**, scroll to **Display**, and push right to cycle through them.

Off turns the display off completely. **Animated** (the default) shows a real-time animated visualization of your controller — you'll see it respond as you move the joystick and press buttons. **Advanced** shows a detailed HUD with your preset info, controller status, and diagnostic data at a glance.

Advanced Display Elements



Advanced Display Mode

The Advanced display packs a lot of information onto the screen. Here's what each element shows:

ID	Element	Description
A	Preset Name	Custom name from iCodeHub
B	Button Strip	Hat + face button states
C	Function Mode	Directional mapping type
D	Paddle Settings	Sensitivity & jitter values
E	Mouse Indicator	Active when mouse on + sensitivity
F	Fire Actions	Fire A/B mappings, red = rapid fire
G	Controller Icon	Animated controller with overlays
H	Port Divider	Separates Port 1 / Port 2
I	Preset Number	Active preset (0–9)
J	USB Heartbeat	Blinking blue = USB active
K	K/M Badges	Green = active, Yellow = standby

ID	Element	Description
L	USB Mode	S/C/N/L/i

General Settings

These settings apply across all your presets. Press the gray **Menu** button and scroll to **General** to find them.

To change the **RGB Lights**, scroll to RGB Lights and push right to cycle through Off, Rainbow (animated cycling, the default), Red, Green, or Blue.

To adjust the **Volume**, scroll to Volume and push right to increase or left to decrease. It goes from 0 (muted) to 10 (maximum), with 5 as the default.

To change the **Menu Theme**, scroll to Menu Theme and push right to cycle through Sunset Haze (warm, default), Midnight Ocean (cool blue), Ember (deep red/orange), or Neon Terminal (bright green retro look).

Presets

Your Duo Ultimate H1 stores **10 presets** (numbered 0–9). Each preset remembers your entire setup — console type, controller settings for both ports, all button mappings, rapid fire settings, USB emulation mode, port mode, and mouse/keyboard settings.

To switch presets, press the gray **Menu** button, scroll to **Settings**, push right to enter it, then scroll to **Preset** and push right to cycle through the numbers 0–9. The new preset takes effect right away.

Preset 0 is always available. To unlock presets 1–9, register your device with iCodeHub. You can also give each preset a custom name (up to 52 characters) through iCodeHub, making it easy to remember what each setup is for.

Mini-Games

Your adapter includes two built-in games you can play right on the TFT display! The quickest way to launch them is to hold **Yellow + Menu** while the menu is closed. You can also press the gray **Menu** button, go to **General**, scroll to **Mini-Games**, and push right to enter.

Iron Dome is a Missile Command-style defense game. Use the 5-way hat to move your targeting cursor and click or press fire to launch interceptors.

Protect your 6 cities from incoming missiles across 15 difficulty levels. Each of your 3 silos has limited ammo, and enemy bombers appear in later levels.

Brick Bash is an Arkanoid-style paddle game. Move your paddle left and right with the 5-way hat and bounce the ball to destroy all the bricks. There are 10 different brick types, and the ball speeds up as you progress through multiple levels.

High scores are saved on your device and can be synced to the iCodeHub leaderboard.

Button Shortcuts

You can quickly access common features without opening the menu by holding button combinations while the menu is closed:

Green+Menu — Cycle through the three display modes.

White+Menu — Jump straight to Port 1 settings.

Black+Menu — Jump straight to Port 2 settings.

Yellow+Menu — Launch the Mini-Games menu.

Red+White+Menu — Enter firmware update mode.

Diagnostics

If something isn't working right, the built-in diagnostics can help you see exactly what your controller is sending. Press the gray **Menu** button, scroll to **System**, push right, then scroll to **Diagnostics** and push right again. Each diagnostic can be toggled on or off:

Diagnostic	What It Shows
USB Heartbeat	USB communication indicator
FPS Indicator	Frames-per-second counter
Show Positions	Numeric axis values
Paddles Data	Raw paddle analog values
Trackball Raw	Raw encoder X/Y/delta
Driving Raw	Raw driving encoder data
Roller Raw	Raw speed roller data
Sega Raw	Raw button state (hex)

System Menu

Press the gray **Menu** button and scroll to **System** to find these options.

To **Reset Defaults**, scroll to Reset Defaults and push right. A confirmation screen will appear — this restores all settings across all presets to factory defaults.

To view **System Info**, scroll to System Info and push right. You'll see your product name, model, and firmware version.

To enter **Firmware Update** mode, scroll to Firmware Update and push right. This puts the device into update mode (same as holding Red + White + Menu).

Unlock the Full Potential — iCodeHub Web App

Your Duo Ultimate H1 has powerful features right out of the box, but the real magic happens when you connect it to the **iCodeHub** web app. This is where you can manage all 10 presets with custom names, fine-tune paddle jitter and sensitivity, dial in driving and trackball response, remap every button with multi-action slots and rapid fire, enable mouse and keyboard emulation, back up your configurations to the Cloud Vault, and so much more. If you want to get the absolute best experience from your adapter, iCodeHub is the place to do it.

The best part? There's nothing to install. iCodeHub runs right in your browser. Just open it in **Chrome** or **Edge**, click Connect, select your device, and sign in.

Visit: **https://hub.icode.com**

Firmware Updates

Via iCodeHub (Recommended)

Plug your adapter into USB, open your browser, and go to **https://hub.icode.com**. The app will let you know if an update is available — just follow the on-screen instructions.

Important: Your settings and presets are not preserved during updates. Save them to your iCodeHub Vault before updating, and reload them afterward.

Backup Reset (Pinhole)

If your device becomes unresponsive and normal updates don't work, use the small pinhole near the Yellow button:

1. Press & hold button inside pinhole with a paperclip 2. While holding, plug in the USB cable 3. Release — the device appears as a USB drive 4. Use iCodeHub device recovery to install the firmware

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Troubleshooting

Your controller isn't detected. Make sure it's firmly plugged into the DB9 port. Press the gray Menu button, go to Settings, and check that you've selected the correct console and device type. Try the other port. You can also turn on diagnostics to see raw input data — press Menu, go to System, then Diagnostics.

Your host device doesn't recognize the adapter. Try a different USB cable or port. Press Menu, go to USB Settings, scroll to USB Emulation, and push right to try a different mode. Standard works for most platforms, but some require Classic, Nintendo, Legacy, or iOS.

Your paddles are jittery. Press Menu, go to Settings, select the port, scroll to the Paddles section, and increase Jitter Control and Jitter Averaging until the input smooths out. You can also reduce Sensitivity. If it persists, try cleaning the paddle potentiometer contacts.

Buttons aren't responding. Make sure you're not in the menu — press Menu to exit. Press Menu again, go to Settings, then Duo Buttons, and check that your buttons are mapped to the actions you expect. Also check the Button Destination setting. If something seems wrong, go to System and select Reset Defaults to start fresh.

The display is blank. Hold Green + Menu to cycle through display modes — it may be set to Off. If it's still blank, press Menu, go to System, and select Reset Defaults.

Mouse or keyboard not working on your host. Press Menu, go to USB Settings, scroll to Mouse or Keyboard, and make sure it's set to On (not Off or Standby). Your host may need a reboot after the USB descriptors change. Try disconnecting and reconnecting the adapter.

You see two gamepad devices on your host. That's normal — the Duo H1 presents two USB gamepads (one per port). If you only want one, press Menu, go to USB Settings, scroll to Ports Active, and set it to Port 1 Only or Port 2 Only.

Platform Compatibility

Your adapter works with any device that supports USB HID gamepads:

PC — Windows, macOS, Linux **Mobile** — iOS, Android **FPGA** — MiSTer FPGA **Consoles** — Nintendo Switch, Steam Deck **SBC Retro** — RetroPie, Batocera, RetroArch, EmuElec, Recalbox

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Specifications

Spec	Detail
Processor	RP2350 dual-core, 200 MHz
Controller Ports	2× DB9
USB	USB-C, USB 2.0 Full Speed
USB HID Devices	Up to 4 (2 pads+mouse+kbd)
Display	160×80 color TFT (ST7735)
LEDs	2× addressable RGB
Audio	10-channel polyphonic
Storage	On-board flash (LittleFS)
Power	USB bus-powered
Consoles	Atari, ColecoVision, Intellivision, Sega
Presets	10 device / 100 cloud

Duo Ultimate H1

For web configuration and updates, visit https://hub.icode.com For help and assistance, visit https://www.icode.com/support