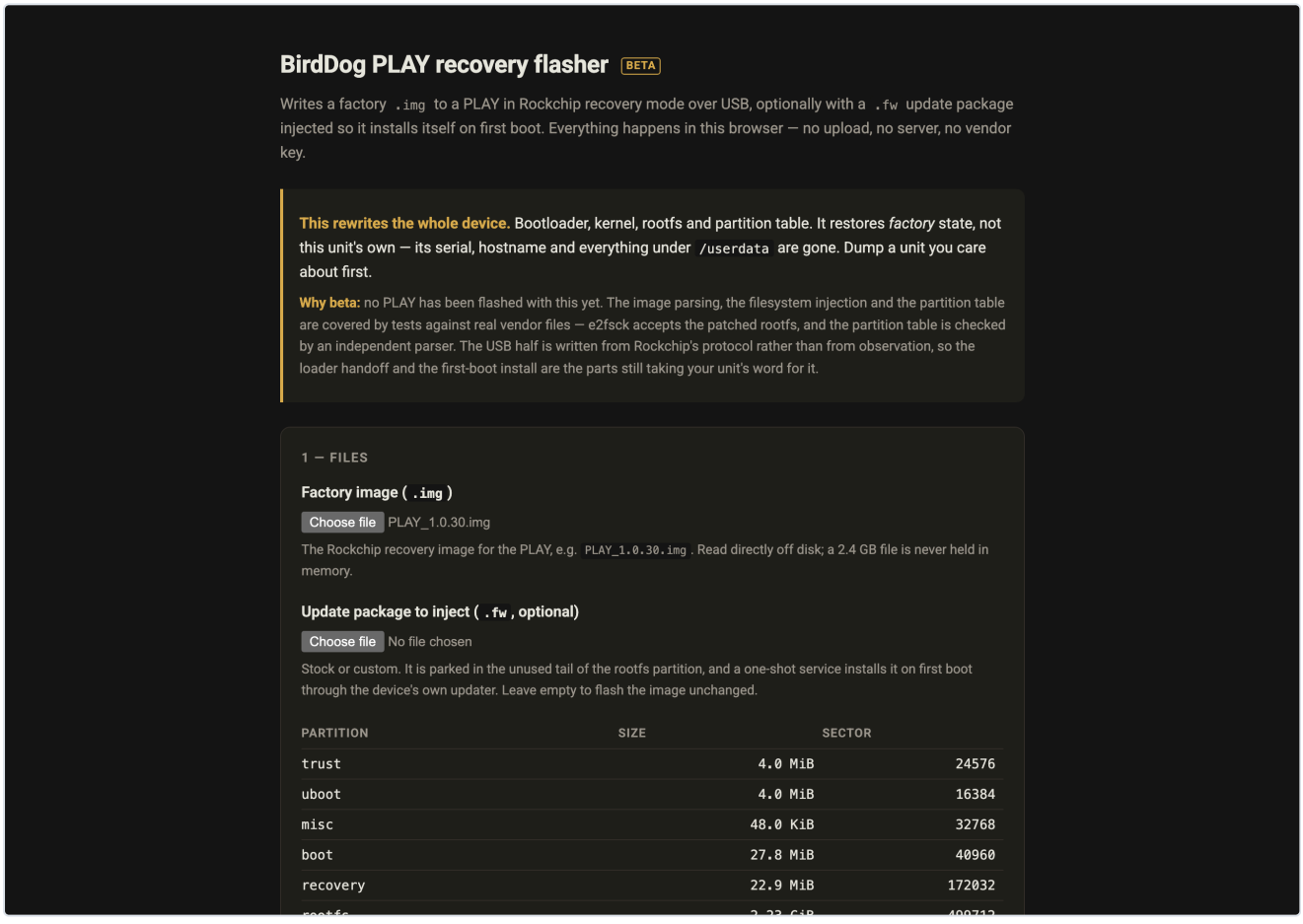
BirdDog PLAY recovery flasher user guide

A static web page that **flashes a BirdDog PLAY in Rockchip recovery mode over USB, straight from the browser** — and, optionally, **injects a `.fw` update package into the image** so the device installs it on first boot.

No upload, no server, no vendor key. **You supply your own factory `.img`**; the loader that gets pushed over USB is extracted from that file in the browser at run time.



> **Before you use this on a unit you care about: nothing here has been run against a PLAY yet.** The image parsing, the filesystem injection and the partition table are covered by tests against genuine vendor files. **The USB half is written from the protocol documentation, not from observation.**
>
> This codebase was created with AI assistance, directed and reviewed by a human author.

You probably do not need this

To update a working PLAY, use the device's own web interface. Browse to the unit's IP address, log in, go to the **System** tab, and upload the `.fw` there. The device installs it and reboots.

This tool is for the case where that is not an option: **a unit that will not boot**, or one you are deliberately putting a different OS on.

Getting a PLAY into recovery mode

The recovery button is not on the outside of the case — it sits inside the 3.5 mm headphone socket. Straighten a paperclip or use a SIM-eject tool, push it gently all the way in, and you will feel the button click.

1. Power the unit off.
2. Push the pin into the headphone socket and **hold the button down**.
3. Still holding it, apply power, and **keep holding for a few seconds after**.
4. Connect USB, then release.

The unit enumerates in either **maskrom** or **loader** mode — the page reports which and handles both.

If it boots normally instead, the button was not held down far enough or long enough. The socket is deep and the button is right at the bottom.

Windows needs Zadig to rebind the device to WinUSB, because Rockchip's own driver claims it and the browser cannot then reach it. **macOS needs nothing.** Linux needs a udev rule.

The four things it can do

Flash a factory `.img`	Whole device: bootloader, u-boot, trust, kernel, DTB, rootfs, partition table. **The brick-recovery path.**
Inject a `.fw`	Parks the package in the unused tail of the rootfs partition and adds a one-shot service that installs it on first boot via the device's own updater.
Write individual partitions	The opposite job: put a **replacement OS** on a unit, writing only the partitions you name and leaving the rest — including the vendor's recovery partition — untouched.
Verify	Optional read-back and compare of everything written.

The image is read off disk in slices and **never held in memory**, so choosing a 2.3 GB file costs nothing.

Writing individual partitions

Restoring a factory image and installing a replacement OS are different operations, and this does the second. Give it one file per partition and it writes those and nothing else.

Two things make it safer than the `dd`-at-an-offset it replaces:

- **It aims using the partition table read off the device**, not a sector number copied out of a parameter file. A number in a script is right until it meets a unit that has already been reflashed, or is not a PLAY at all — **which is precisely the case where a 3.5 GiB write at a plausible offset does real damage.** The table is read, the header checksum verified, partitions matched by name, and **a file too large for its target is refused rather than truncated.**
- `uboot`, `trust` **and** `recovery` **are refused by default.** They are what loader mode and the vendor's restore depend on. Writing them is possible, but **it takes a deliberate tick of an override**, because getting them wrong is the difference between "flash it again" and "this unit is gone".

It needs the device in **loader mode**: a maskrom device cannot serve the reads used to fetch the partition table until a loader has been pushed into it, and **the loader comes out of a factory image.**

Everything not listed is left exactly as it was — which is what keeps the factory recovery path available after you have replaced the OS.

Why injection works

A `.fw` is not a partition image — it is an archive whose installer script **runs as root on a booted device.** In maskrom mode there is no OS to run it, so it cannot simply be flashed.

Two facts from the factory image make the injection clean:

- **The rootfs partition has a 1.26 GiB hole.** The partition is 3.5 GiB and the filesystem image is 2.235 GiB, and **nothing ever grows into it** — only the userdata partition grows. The package lives there as raw bytes, costing no filesystem space.
- **The rootfs is plain ext2** — no journal, no extents, no metadata checksums. So three small files can be added to it correctly from JavaScript, and `e2fsck` agrees.

On first boot the injected service reads the package back off the partition, hands it to the device's own updater exactly as the vendor's network path does, waits, and reboots.

It marks itself done *before* installing, so a package that kills the box cannot reinstall itself on every boot.

If something is wrong

Symptom	Cause
The unit boots normally instead of entering recovery	The button was not held long or far enough. The socket is deep.
The browser cannot see the device (Windows)	Rockchip's driver has claimed it. Rebind with Zadig.
A partition write is refused	Either the file is too large for its target — refused rather than truncated — or it is `uboot`, `trust` or `recovery`, which need the override.
The partition table cannot be read	The device is in maskrom mode. A loader has to be pushed first, and it comes out of a factory image.
An injected package did not install	It marks itself done before installing, deliberately. Read the device's own updater log.