FFB-Bridge
USB FFB JOYSTICK

USER MANUAL / RELEASE 1.4.0

Feel the aircraft.
Fly the difference.

Installation, hardware setup, Flight Check, tuning, profiles, simulator connection, and troubleshooting.

VERSION 1.4.0

Windows / Linux / macOS

START HERE

Read this before forces move

FFB-Bridge can command real mechanical force. A good setup begins with restraint, a clear desk, and a repeatable test - not with maximum strength.

Physical safety Bolt or clamp the base securely. Keep hands, cables, drinks, and loose objects clear. Begin with a conservative Hardware ceiling. Keep the emergency disarm control within reach. Never run guided tests during a live flight.

The safe setup sequence

1. Install FFB-Bridge and connect one supported force-feedback device.
2. Open Hardware. Confirm the selected device and its physical-strength ceiling.
3. Use Flight Check to verify pitch and roll direction at a low, controlled level.
4. Run the individual effects or the guided aeroplane/helicopter sequence.
5. Connect the simulator, load the closest starter profile, and arm only when the cockpit is clear.

What this manual covers

This manual matches FFB-Bridge 1.4.0 for Windows 10/11, modern Linux, and Apple-silicon macOS. MSFS 2024/2020 connects on Windows and Linux. X-Plane 11/12 connects on Windows and Linux; the macOS build is scoped to X-Plane 12.

Keep the online docs The downloadable PDF is the durable, offline guide. For the latest release notes and corrections, use https://ffb-bridge.com/docs/manual.

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NAVIGATION

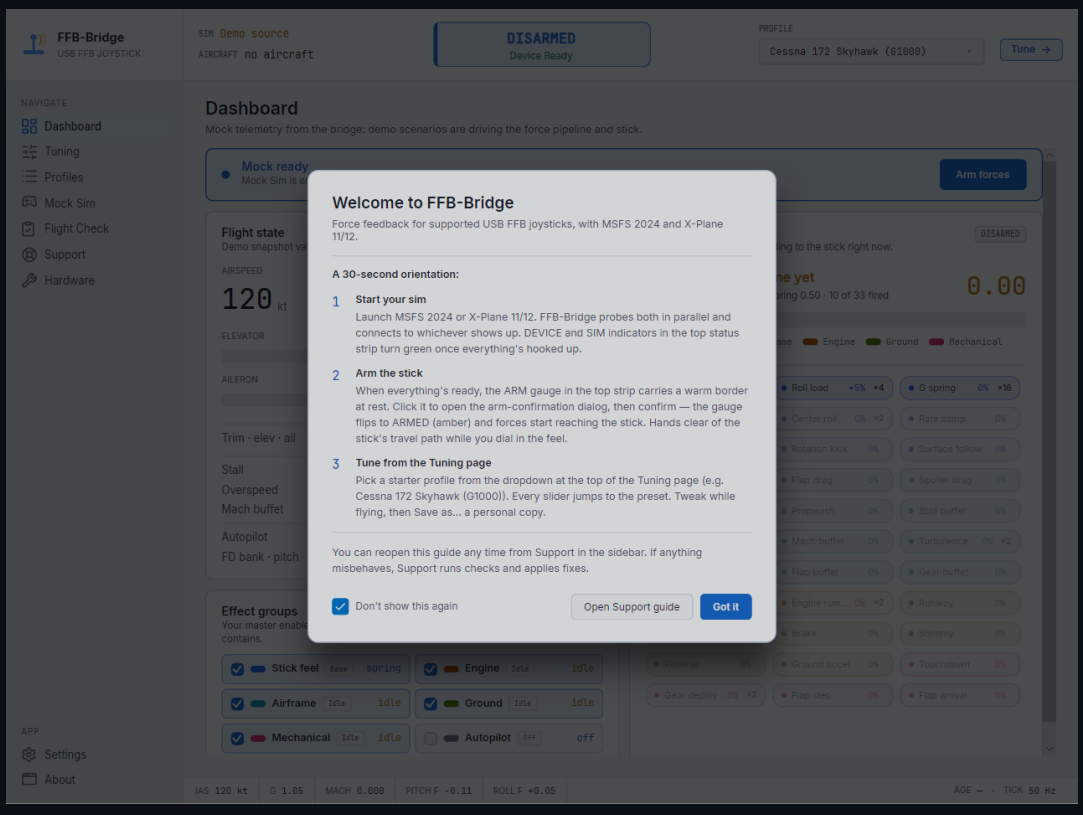
Contents

Use the PDF bookmarks or the linked contents below. Each major workflow starts on a new page so the guide remains comfortable on screen and in print.

SECTION 01

Install and first launch

Get the right build, verify the publisher, pass the startup health check, and prove the force path before opening a simulator.



1. Install FFB-Bridge

FFB-Bridge is a per-user desktop application. It does not require a simulator plugin and does not upload profiles, diagnostics, or telemetry unless you explicitly submit something.

Platform	Package	Install
Windows 10/11	Signed x64 installer	Open the emailed download, verify the publisher is Rohsam Inc. or RohsamInc, and use the per-user default location under `%LOCALAPPDATA%`.
Modern Linux	x86_64 AppImage	Make the file executable, then run it with `--install` to add the launcher and icons. Use Support to install or refresh the udev rule.
macOS	Signed, notarized DMG	Apple silicon only. Open the DMG, drag FFB-Bridge to Applications, and use it with X-Plane 12.

Before launch

- Clamp or bolt the force-feedback base to a stable surface.
- Connect only the device you intend to test. Multiple supported devices can be selected later under Hardware.
- For MOZA AB6, AB9, or AY210, update MOZA Cockpit and the base to firmware 1.1.4.6 or later, then recalibrate the base.
- Do not enable MOZA Cockpit Telemetry mode for normal FFB-Bridge use; it can keep the base idle during standalone tests.

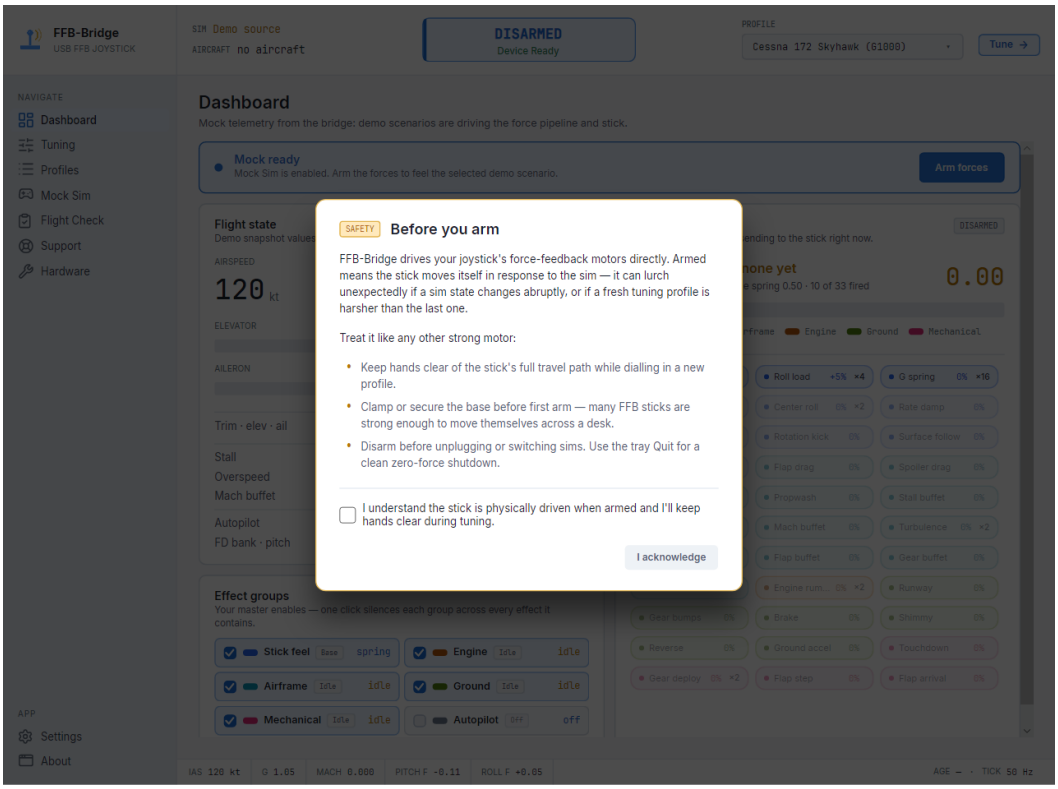
Linux command

```
chmod +x FfbBridge-1.4.0-x86_64.AppImage ./FfbBridge-1.4.0-x86_64.AppImage --install
```

Updates The app checks a signed release manifest. Windows installs the update through the normal installer. Linux downloads the replacement AppImage. macOS opens the current signed DMG flow.

2. First launch

The first launch opens a physical-hazard acknowledgement before any ordinary workflow. Read it, clear the area around the controls, and acknowledge it only when the base is secure.



The safety acknowledgement blocks normal use until you confirm the physical-force precautions.

Disarmed means zero force

FFB-Bridge opens every device at zero gain plus STOPALL. Every Disarm repeats that physical command, even when the UI already reports Disarmed, and no spring or other effect is replayed. Startup failure and clean shutdown also retain zero gain. Only an explicit Arm enables output.

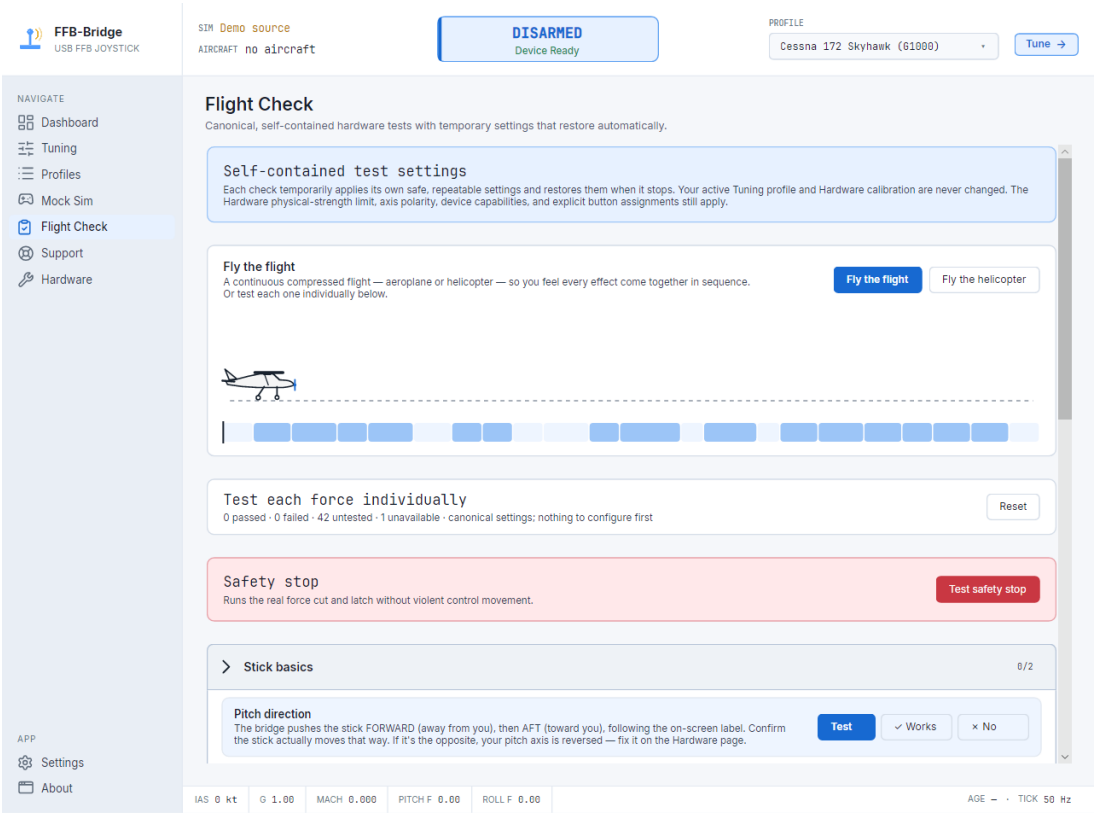
Startup health

At launch, FFB-Bridge quietly checks the device backend on every platform. Linux also checks read/write access to the selected event node and whether the installed udev rule covers current device permissions.

- If all checks pass, no extra dialog opens.
- WARN or FAIL produces a non-blocking Review and fix banner naming each problem.
- Auto-arm waits while the health dialog is open. Dismiss it only if the device is intentionally disconnected.
- After a Linux udev repair, replug the device; a restart is recommended when the app says the old permission state may still be active.

3. Flight Check

Flight Check is the canonical bench-test surface. It temporarily applies known, safe settings, then restores your active profile automatically. The physical ceiling, axis polarity, device capabilities, and explicit button or hat assignments always remain in force.



Flight Check separates guided flights, individual force checks, direction checks, and the safety stop.

Run these checks in order

1. Test Pitch direction: the stick moves forward, then aft. Mark whether the real motion matches the on-screen instruction.
2. Test Roll direction: confirm left and right. Correct polarity or pitch/roll swap under Hardware if needed.
3. Use individual force checks to verify the renderer without borrowing aircraft tuning.
4. Run Fly the flight or Fly the helicopter for a compressed feel-through of the full pipeline.
5. Press Test safety stop and verify that force cuts immediately without violent movement.

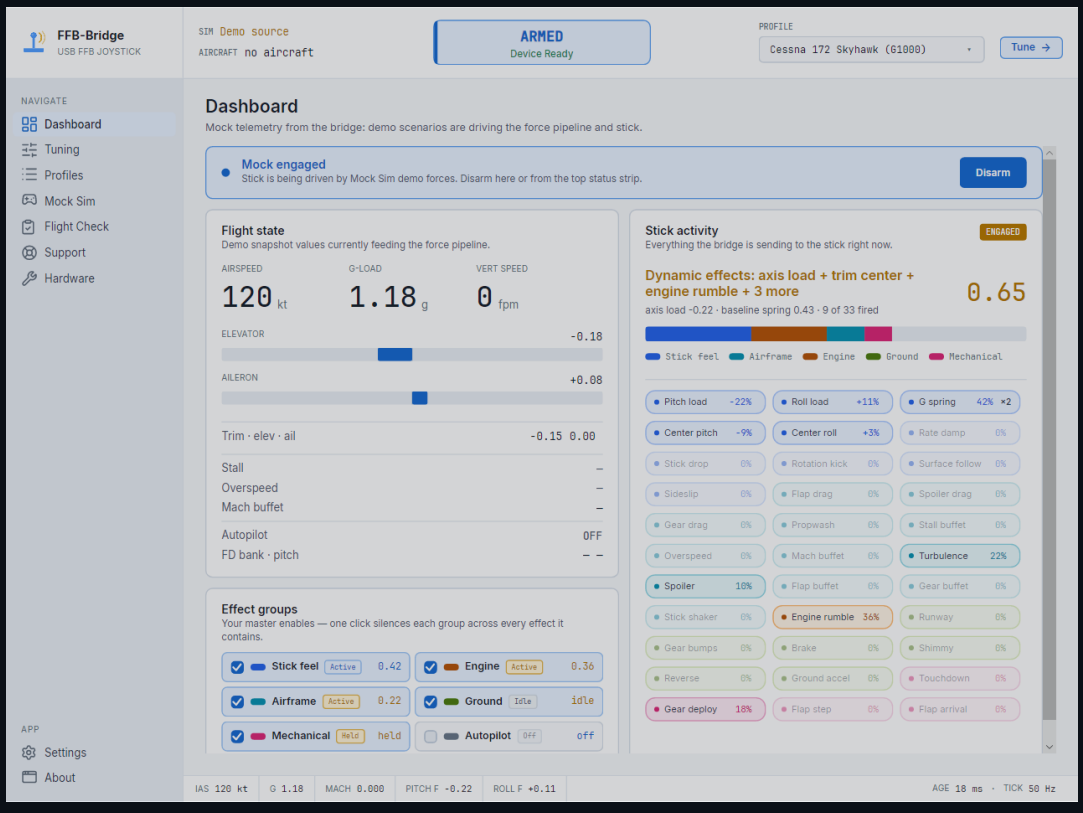
The isolated autopilot-follow check can move up to 50 percent of travel on the bench so direction is obvious. Live simulator AP-follow remains hard-capped at 8 percent. Safety Stop requires a device-accepted STOPALL rather than treating loop receipt as a completed physical stop.

Bench only Do not run Flight Check while controlling a live aircraft. Guided tests intentionally substitute canonical telemetry and effect settings.

SECTION 02

Connect and fly

Connect MSFS or X-Plane, understand the readiness strip, arm deliberately, and use the dashboard to see what the bridge is commanding.

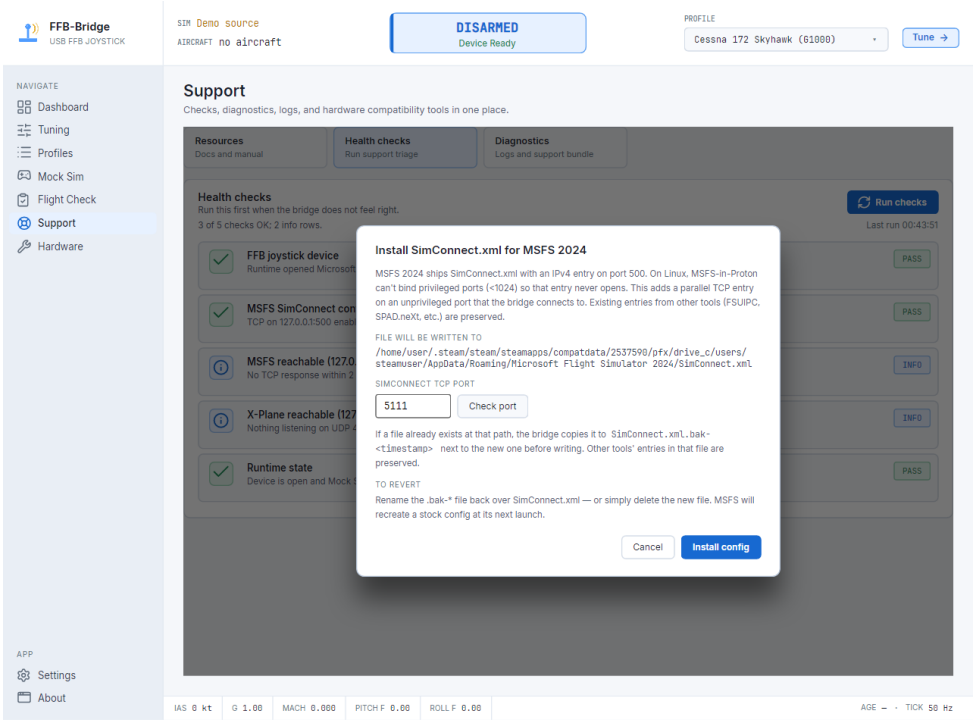


4. Connect Microsoft Flight Simulator

MSFS 2024 and 2020 use SimConnect TCP. Windows normally works without manual setup. Linux/Proton needs an unprivileged parallel port because the default port cannot be bound inside the Proton environment.

Use the Support health check

1. Start MSFS and load into a flight.
2. Open FFB-Bridge Support, then Health checks.
3. Find the SimConnect row. Green means the matching entry is ready. Amber can offer Use port :X. Red offers Fix....
4. Review the exact XML addition in the confirmation dialog, then apply it. Existing entries are preserved; an unparseable file is backed up first.
5. Restart MSFS if the new server entry was created, then rerun the check.



The fix dialog shows the exact additive SimConnect entry before writing it.

Common configuration locations

Install	Typical SimConnect.xml location
MSFS 2024 - Steam	`%APPDATA%\Microsoft Flight Simulator 2024\SimConnect.xml`
MSFS 2024 - Store/Xbox	`%LOCALAPPDATA%\Packages\Microsoft.Limitless_8wekyb3d8bbwe\LocalCache\SimConnect.xml`
Linux - Steam/Proton	Inside the MSFS compatdata prefix under `drive_c/users/steamuser/AppData/Roaming`.

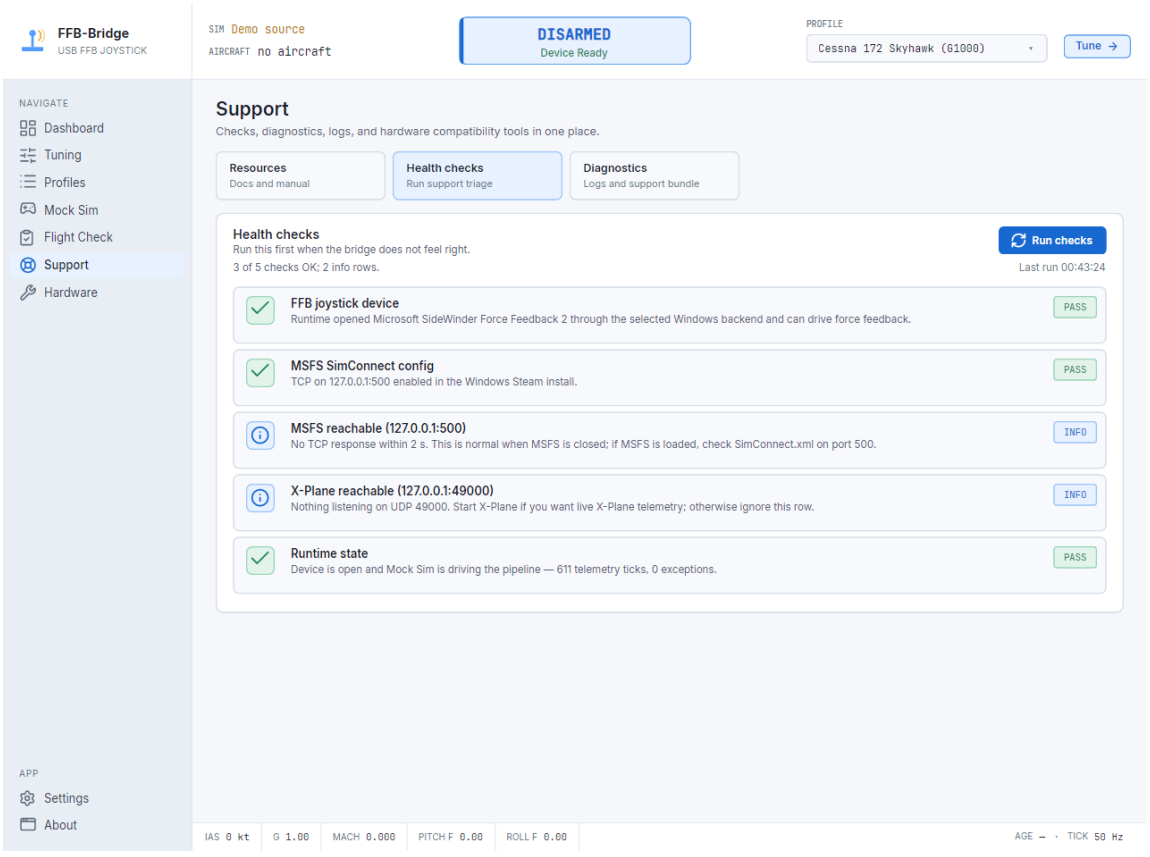
5. Connect X-Plane

X-Plane uses local UDP dataref subscriptions and normally needs no configuration. FFB-Bridge subscribes to X-Plane on loopback and automatically selects the active simulator.

Zero-config path	Start X-Plane, load an aircraft, then start FFB-Bridge. The SIM indicator should become ready as datarefs arrive.

If X-Plane does not become ready

- Open Support and run Health checks. The X-Plane row distinguishes not-running, unreachable, and stale-data states.
- Check that another tool has not changed X-Plane's UDP port away from the normal local endpoint.
- Temporarily test with the firewall disabled, then allow local UDP for FFB-Bridge rather than leaving the firewall off.
- A three-second staleness watchdog turns the SIM state unavailable if packets stop; loading a new flight should recover automatically.



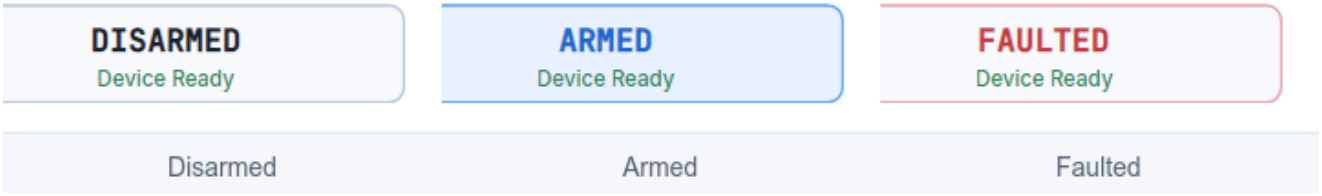
Support health checks report device, simulator, configuration, and runtime readiness independently.

Platform scope

Windows and Linux support MSFS 2024/2020 and X-Plane 11/12. The Apple-silicon macOS build is scoped to X-Plane 12 with supported USB force-feedback hardware.

6. Arm and fly

The top strip is the operational cockpit. It keeps simulator, device, arm state, and active profile visible on every page. Force never reaches the stick merely because the app is open.



The ARM control communicates disarmed, ready/armed, and faulted state without relying on colour alone.

Before every arm

- The base is secure and the controls have free travel.
- DEVICE and SIM are ready; the selected profile matches the aircraft as closely as practical.
- The Hardware physical ceiling is appropriate for this base and mounting.
- Hands and cables are clear for the initial centring movement.

While flying

Use the Dashboard to separate baseline spring from dynamic effects. The left side explains simulator state; the right side shows the force families and channels currently contributing. Effect-group toggles provide quick A/B muting without changing individual gains.

Force-family bars and channel chips show what is active instead of leaving the stick feel mysterious.

Disarm and Quit Disarm always means no force whatsoever. Quit commands the same zero-gain/STOPALL state and leaves no bridge-owned spring, damper, friction, inertia, constant, periodic, or soft-stop force playing.

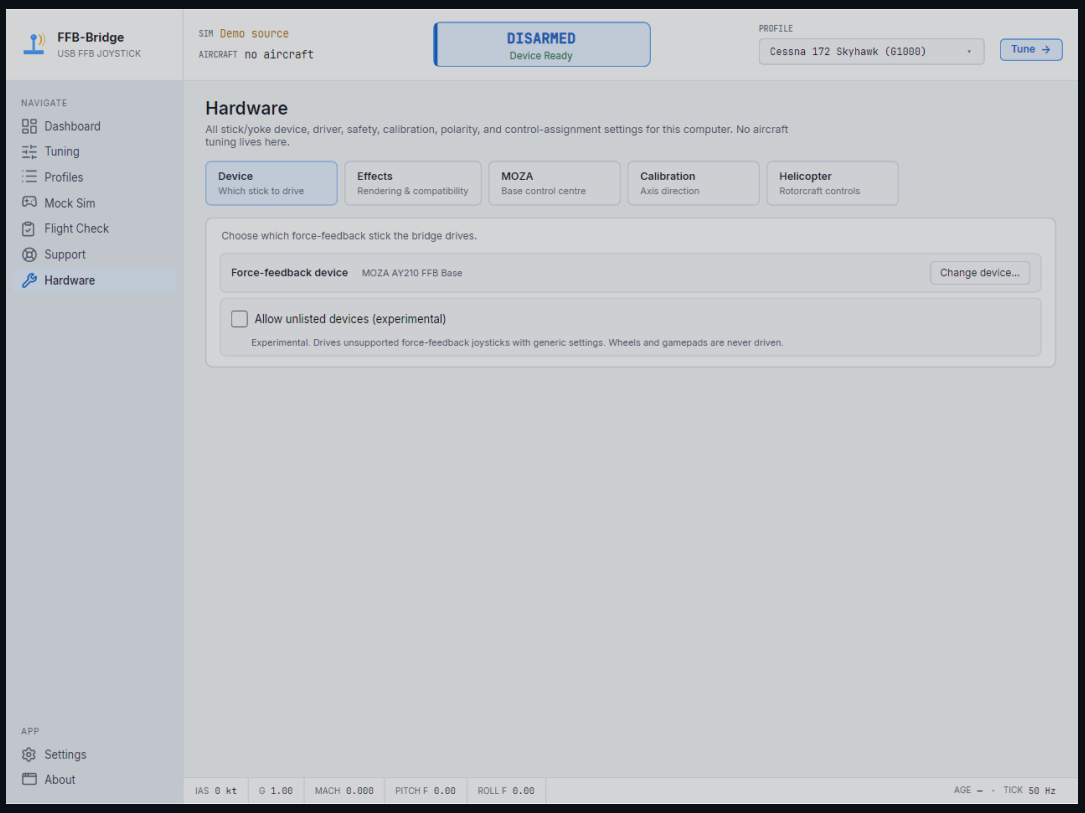
Fault recovery

If a device or simulator prerequisite disappears while armed, force stops and the ARM control becomes FAULTED. Restore the prerequisite, inspect Diagnostics if needed, then acknowledge the fault and re-arm deliberately.

SECTION 03

Hardware setup

Choose the physical device, apply evidence-based strength ceilings, calibrate axis direction, and assign helicopter controls without mixing hardware state into aircraft profiles.



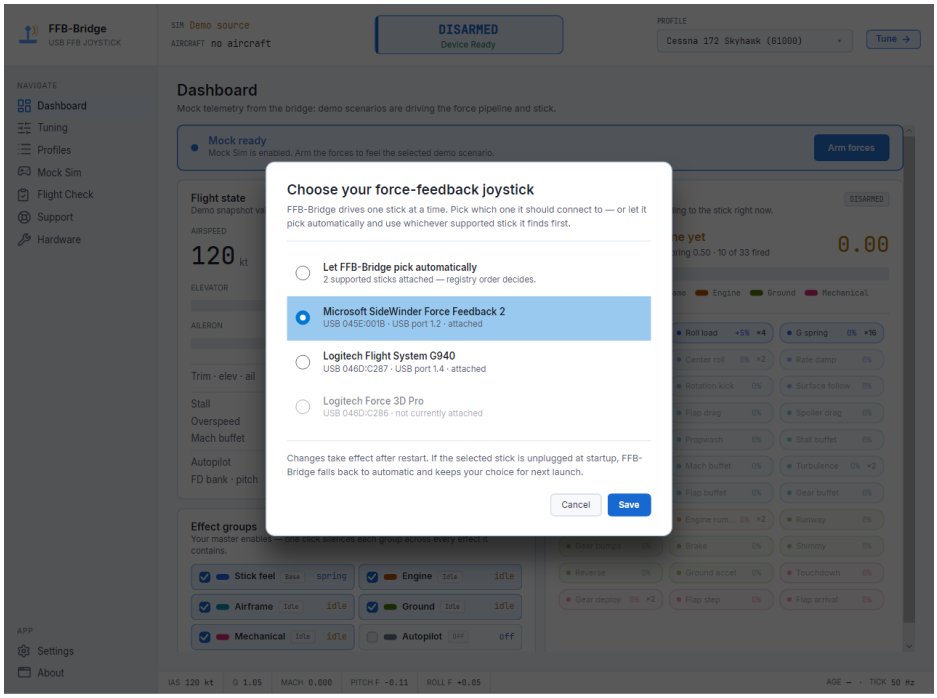
7. Supported hardware

FFB-Bridge 1.4.0 validates the families below. Detection evidence and safe defaults vary by base class; support does not imply that every device should be run at 100 percent.

Device family	Platforms / backend	Starting ceiling
Microsoft SideWinder Force Feedback 2	Windows raw HID/PID with DirectInput fallback; Linux evdev; macOS raw IOHID/PID	100% consumer-device default
PicoWinder SideWinder Force Feedback Pro adapter	Windows DirectInput and Linux evdev; no experimental opt-in required. Raw HID/PID stays gated and macOS actuation is unvalidated.	100% SideWinder-class default
Logitech G940 / Force 3D Pro / WingMan Force 3D	Validated consumer USB FFB devices	100% consumer-device default
MOZA AB6 / AB9	Windows, Linux, and macOS; firmware 1.1.4.6+	35% high-force default
MOZA AY210	Windows, Linux, and macOS; firmware 1.1.4.6+	35% pitch and 50% roll; the independent ceilings reflect the yoke's linear-pitch and rotary-roll mechanisms
Brunner FFB-G	Validated high-force base family	35% high-force default
Eligible unlisted joystick	Experimental opt-in; wheels, gamepads, and single-axis devices excluded	20% conservative default

Choose the device

Automatic selection chooses the first detected supported stick. If more than one is connected, use Hardware - Device - Change device.... Device selection is install-level and may require a restart.

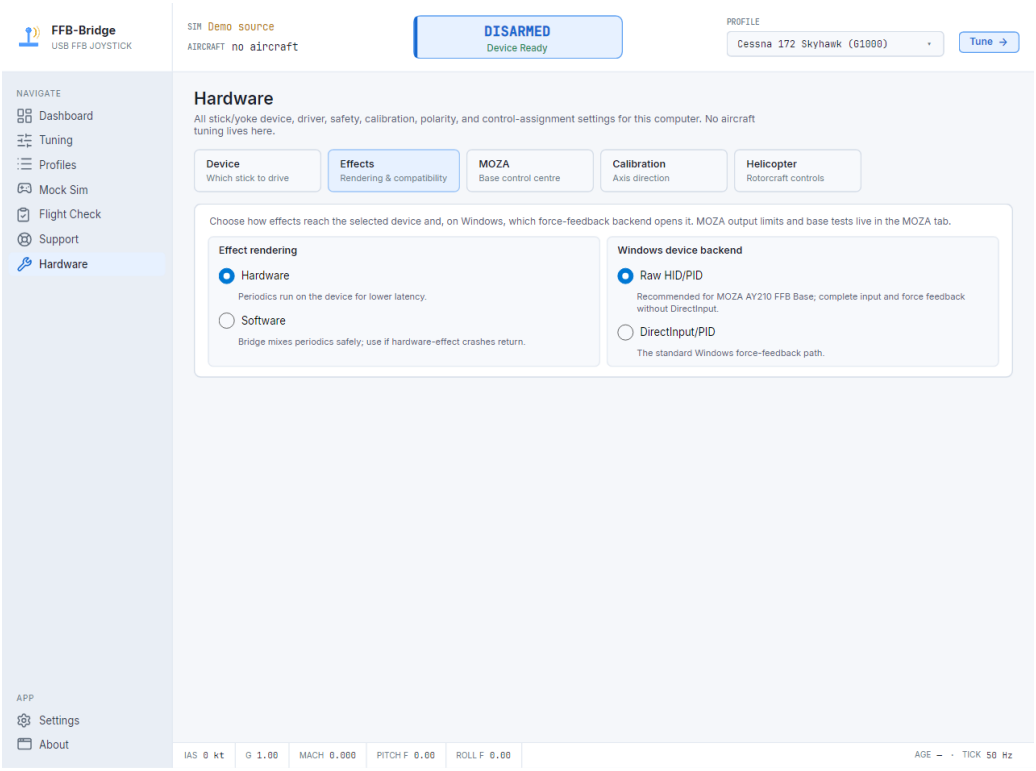


The picker exposes supported devices and keeps experimental hardware behind an explicit opt-in.

Unlisted hardware Use the 20 percent default, verify direction and the safety stop, and characterize unsupported hardware with ffb-probe.com. Never opt a wheel or gamepad into flight-stick output.

8. Effects, limits, and calibration

Hardware settings belong to this computer and physical base. Tuning settings belong to the aircraft profile. Keeping that boundary clear prevents a shared profile from overriding a safe device limit or axis correction.



Hardware Effects holds the physical-strength ceiling and renderer/compatibility choices.

Physical ceiling

The ceiling clamps every effect at the final device-output edge. Begin at the class default and lower it whenever the mounted device or pilot requires less force. Raise it only after direction, mounting, and emergency stop behavior are proven.

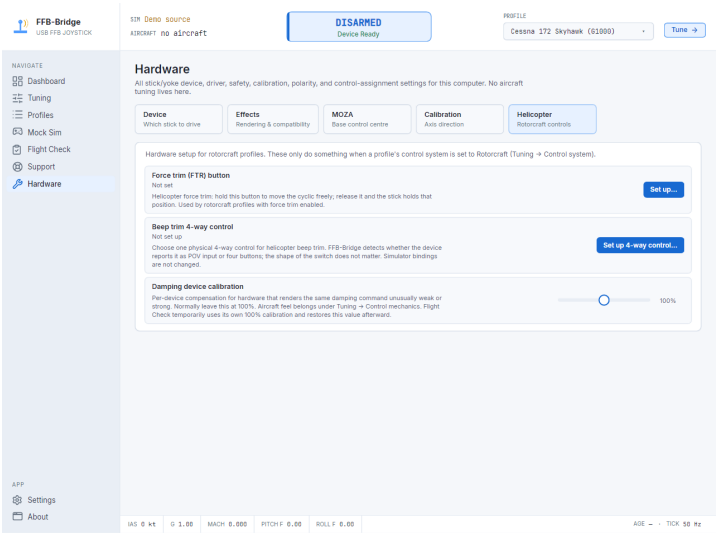
Calibration

- Use the guided pitch/roll direction checks instead of guessing from simulator feel.
- Invert polarity or swap pitch/roll only under Hardware. The correction applies to every profile.
- The Flight Check direction procedures preserve the physical ceiling while using canonical test settings.
- Renderer compatibility choices are restart-required when the app says so.

Software-blended periodics	Use the compatibility renderer only when a hardware-effects probe fails, a classified native-effect crash is detected, or support directs you to it. Native hardware waveforms usually preserve sharper high-frequency cues.

9. Helicopter controls

Helicopter control assignments are physical-device settings. Aircraft-specific rotor feel remains in the profile. FFB-Bridge supports two complementary operations: force-trim release and beep trim.



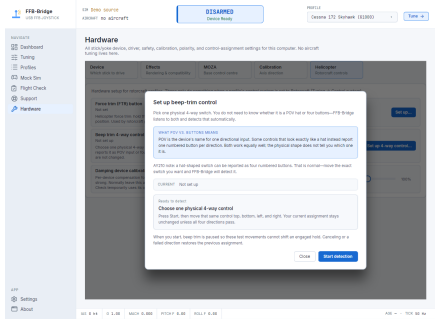
Hardware - Helicopter owns the physical button and hat assignments.

Force-trim release

- Assign a dedicated button or the guided force-trim toggle behavior supported by your controls.
- While held or toggled, the bridge releases the trim reference as configured; on release it captures the new cyclic position.
- Run the guided assignment flow so the app learns the physical control instead of relying on button-number guesswork.

Beep trim

Assign a four-direction POV hat or four buttons through the single guided flow. Some devices, including the AY210, report a physical hat as four individual buttons; the preparation step handles either form. The test remains quiet until the assignment is ready.



One guided beep-trim flow accepts a POV hat or four separate directions.

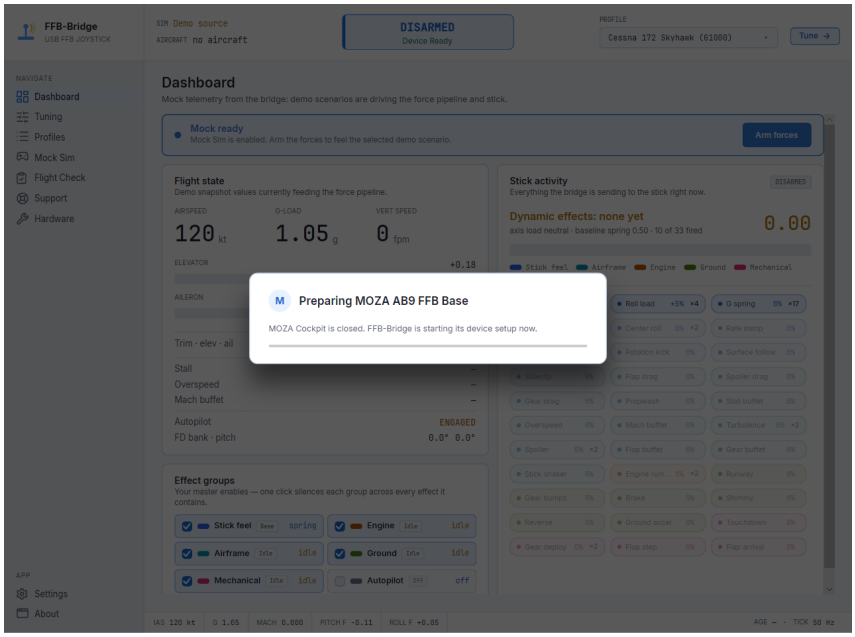
10. MOZA setup

FFB-Bridge takes ownership of the force path while it is active. MOZA Cockpit remains the firmware, calibration, and base-management tool.

Firmware requirement	Update MOZA Cockpit and every connected AB6, AB9, or AY210 base to firmware 1.1.4.6 or later. Recalibrate after updating.

Normal startup

1. Close any MOZA Cockpit mode that is actively commanding telemetry effects.
2. Start FFB-Bridge and let the prepared startup snapshot establish the base state.
3. Verify the device and ceiling under Hardware, then run Flight Check.
4. When FFB-Bridge closes, allow its restore dialog/path to return the captured base settings while force output remains inhibited.

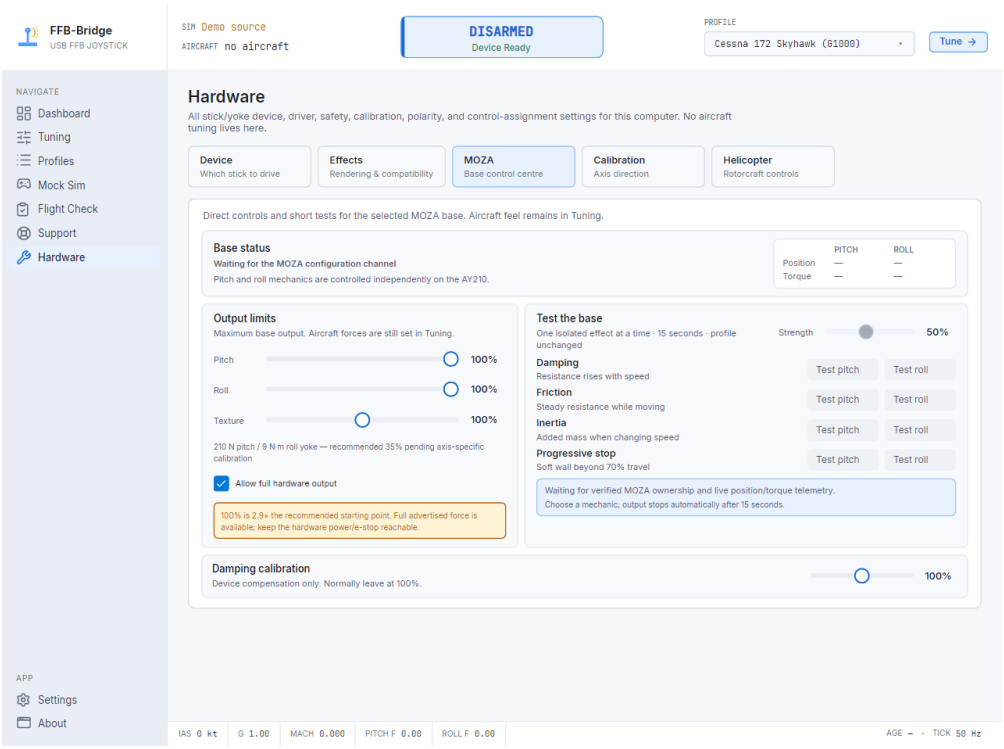


The MOZA preparation flow explains what FFB-Bridge will change before taking control.

Hardware - MOZA control centre

The MOZA tab owns the selected base's pitch, roll, and texture output limits, health/ownership state, live position and torque evidence, damping calibration, and isolated damping, friction, inertia, and progressive-stop tests. Aircraft feel remains under Tuning.

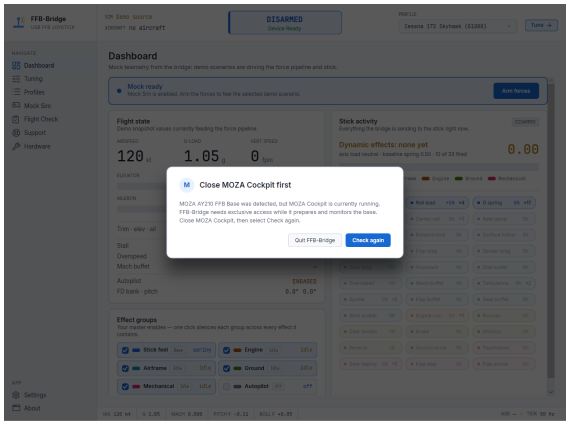
AY210 roll ceiling	The automatic AY210 recommendation is 35 percent pitch and 50 percent roll, because the yoke's linear pitch and rotary roll mechanisms are not equivalent. A limit you saved explicitly is never overwritten, so an existing installation can keep showing 35 percent Roll. Choose Reset to automatic, or set Roll to 50 percent yourself, to take the current recommendation.



The MOZA control centre keeps base limits and isolated hardware tests separate from aircraft tuning.

If the base is detected but idle

- Return MOZA Cockpit from Telemetry mode to its normal/default mode.
- Close other applications that may own the force-feedback endpoint.
- Rerun Flight Check before testing inside a simulator.

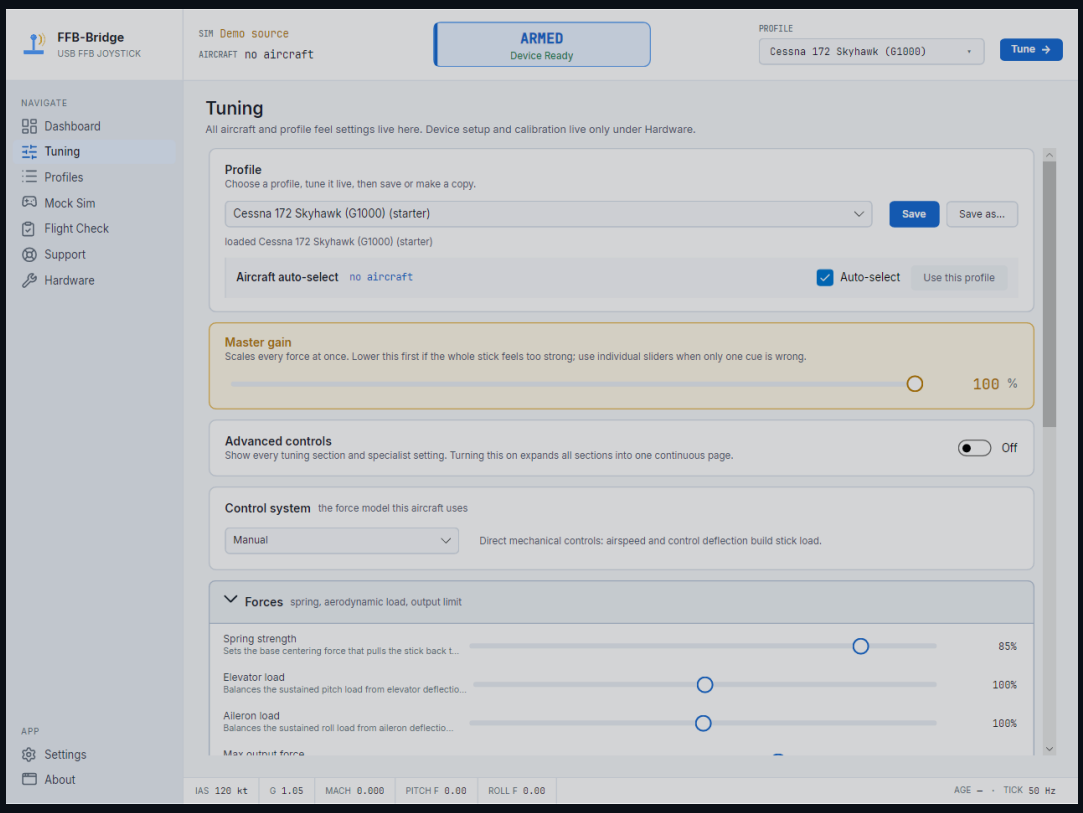


A conflict warning points to MOZA Cockpit state when it blocks the expected force path.

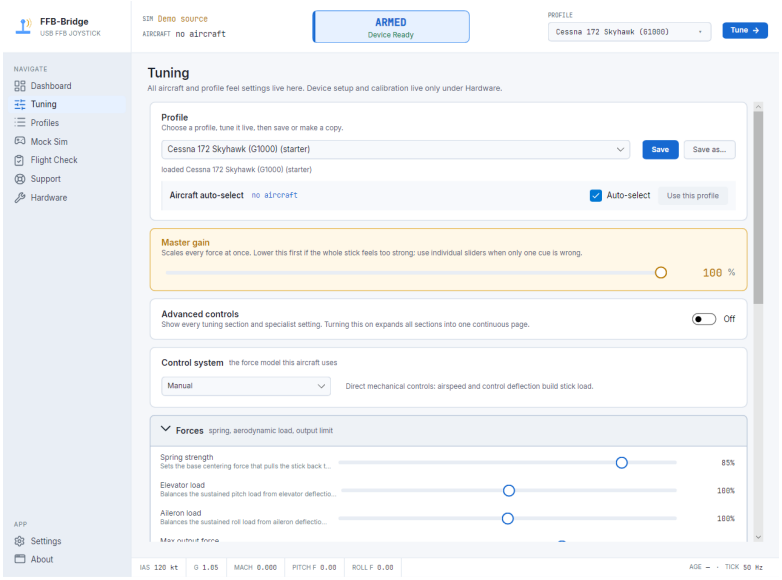
SECTION 04

Tune and save profiles

Start from the closest built-in aircraft, set one safe global level, choose the right control system, then adjust only the effects you can identify.



11. A repeatable tuning workflow



Tuning opens with profile, master gain, Advanced controls, control system, and the essential force groups.

Before touching a slider

Secure the base, verify pitch and roll direction in Flight Check, set a conservative Hardware ceiling, and duplicate the closest built-in starter. Tune the editable copy and keep the built-in starter unchanged as a reference.

Use the same eight steps every time

1. Load the built-in starter closest to the aircraft and use Save as... to make an editable copy.
2. Choose Manual, Hydraulic-boosted, Fly-by-wire, or Rotorcraft before judging any force group.
3. Set Master gain for the complete profile. If everything is too strong, lower this before chasing individual sliders.
4. Stabilize baseline centring and air-load forces in straight-and-level cruise.
5. Check G-load and trim in one repeatable manoeuvre, then return to the same speed and attitude.
6. Add ground, aerodynamic, powerplant, and one-shot cues one family at a time.
7. Add passive mechanical feel and specialist Advanced controls only after the primary forces are stable.
8. Save after a clear A/B improvement, then validate taxi, cruise, manoeuvring, approach, and landing.

Zero means off

A gain at zero disables that contribution. Reset arrows return a row or section to the loaded profile; they do not write the profile until you save.

A good test loop

Use the same aircraft, loading, weather, speed band, and manoeuvre. Change one control, repeat the same condition, and watch the matching Dashboard channel while you feel the result. If the channel you expect never becomes active, confirm simulator telemetry before increasing its gain.

- Use small changes - normally 2 to 5 percentage points - so the result can be identified.
- Describe the result before changing anything else: clearer, weaker, harsher, delayed, or unchanged.
- Revert an unchanged or worse adjustment before moving to the next group.
- Do not tune through clipping, oscillation, loose mounting, reversed polarity, or an unproven safety stop.

12. Fixed-wing tuning, stage by stage

Control	What it changes	Start here when...
Master gain	Scales all force output together	The entire stick feels too strong or too weak
Spring strength	Baseline centring authority	The neutral feel is wrong even in steady flight
Force gain / axis load	Sustained airspeed and control-deflection loading	Pitch or roll effort does not build naturally
Max output force	Per-profile cap before the hardware ceiling	A profile needs less authority on the same physical base
Control system	Changes how aerodynamic and G-load cues are modelled	A fly-by-wire or boosted aircraft feels like a cable-controlled aircraft
Trim	Relieves held force and shifts the centring target	The aircraft is stable only while you hold unnecessary pressure

Stage A - global level and centring

1. Fly straight and level at normal cruise. Release the stick and judge only the return to centre.
2. If the whole force stack is too strong or too weak, change Master gain. Do not compensate with every individual effect.
3. Adjust Spring strength until the return is positive but not snappy. A self-sustaining or growing wobble is never an acceptable tune.
4. Check low-speed flight and taxi. Use low-speed spring floor and deadband widening only if the centre becomes implausibly loose or twitchy.

Stage B - air load, G-load, and trim

1. At cruise, hold a modest pitch or roll deflection. Force gain should make effort rise with airspeed without immediately reaching the cap.
2. Repeat at approach speed and at a faster safe condition. Set Cruise reference and the airspeed curve so the whole envelope changes progressively.
3. Fly a repeatable 2 G level turn. Increase G-load gain only if the control effort is indistinguishable from 1 G; reduce it if the stick becomes leaden.
4. Trim a stable condition. The required held pressure should unload and the centring target should move without a sudden jump.
5. Use Max output force for an aircraft-specific cap. The Hardware physical ceiling still remains the final device boundary.

Symptom-to-control map

Symptom	First control to inspect
Everything is too strong or too weak	Master gain; repeat the complete circuit afterward.
Only steady pitch or roll loading is wrong	Elevator load or Aileron load; use Max output force for high-deflection clipping.
Centre chatter, snapping, or oscillation	Disarm first. Verify mounting, polarity, Hardware ceiling, spring, deadband, and passive mechanics.
Loading arrives at the wrong speed	Cruise reference, then Airspeed curve and Centre firmness versus speed.
An effect is missing	Its Dashboard channel, simulator evidence, aircraft applicability, group gain, and device capability.
Movement feels sticky, slow, or heavy	Isolated Hardware test, then profile friction, damping, or inertia one value at a time.
Trim leaves held pressure	Control system, trim telemetry, and elevator or aileron authority.
Autopilot Follow hunts	Set Authority to zero, verify the simulator input path, then reintroduce only a tiny cue.

If oscillation appears Disarm immediately. Lower the Hardware ceiling and Master gain, then verify mounting, polarity, passive mechanical settings, and the one effect just changed. Do not mask an unidentified oscillation with unrelated gains.

Stage C - effect families

Family	Repeatable test	What good tuning feels like
Ground	Taxi at 10-20 kt, brake once, then make one normal and one firm landing.	Runway, braking, gear, and touchdown remain individually recognizable throughout the sequence.
Aero buffet	Approach stall, deploy spoiler, then extend flap and gear in separate stable conditions.	Each cue starts from its own real aircraft state and remains proportional rather than constantly present.
Powerplant	Idle, run-up, cruise, and shutdown; test reverse or beta only where applicable.	RPM and vibration provide background texture without hiding primary centring and air load.
Mechanical	Cycle gear and each flap detent once.	Brief, discrete confirmations stay proportional to the event.
Vertical wind	Use a controlled lift/sink or turbulence condition.	A bounded environmental-wind texture; no output on the ground, paused, slewing, or without valid data.

Tune the cue you can name. If muting its Dashboard group does not remove the sensation, the source is elsewhere. Restore the row before testing another family.

Stage D - passive mechanical feel

Damping, friction, inertia, and progressive stops describe the aircraft and therefore live in Tuning. The MOZA page under Hardware provides isolated proof tests and the base-level pitch, roll, and texture envelope.

Mechanic	Expected feel	Warning sign
Damping	Opposes faster motion more strongly without pulling to centre.	Constant drag at every speed or a self-driven centre force.
Friction	Steady breakout and sliding resistance, largely independent of movement speed.	Resistance rises sharply with speed or disappears on reversal.
Inertia	Opposes changes in motion, strongest when starting, stopping, or reversing.	A continuous spring-like pull toward a position.
Progressive stop	Rises only near the configured end of travel.	Force appears in the central range or drives the control by itself.

MOZA model boundary

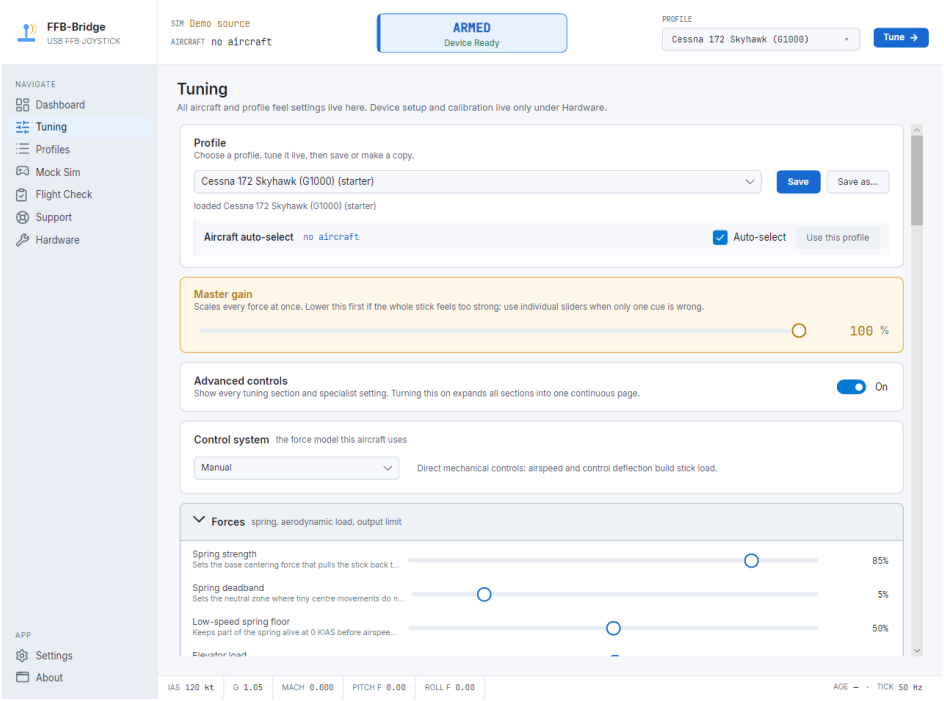
AY210 supports passive coefficients by axis. AB6 and AB9 expose one firmware-local coefficient per passive condition, so FFB-Bridge uses the stronger requested axis. Unsupported native conditions stay inactive rather than being silently approximated.

Run the isolated MOZA tests safely

1. Secure the base and keep live simulator output disarmed.
2. Open Hardware - MOZA, select one mechanic, and begin at low strength.
3. Move slowly, then faster, and reverse direction so the mechanic can be identified.
4. Press Stop as soon as the feel is clear. Each test has a 15-second maximum and leaves the aircraft profile unchanged.
5. Return to Tuning and adjust the matching per-aircraft pitch and roll values in small steps.

Advanced controls

Enable Advanced controls to expand all specialist sections into one page. The groups cover forces, trim, stick feel, ground effects, aerodynamic buffets, powerplant, one-shots, passive mechanics, and autopilot cues.



Advanced controls expose the full effect set while keeping the essential path at the top.

- Rate damping reacts to aircraft pitch and roll rotation rate. Add it sparingly after spring and air load are stable; too much can make control response feel delayed.
- Stick drop models gravity on an unloaded elevator for appropriate cable-controlled aircraft. Keep it off for fly-by-wire types.
- Autopilot Follow moves the control toward the autopilot reference. Authority is profile-owned and selectable from 0 to 50 percent; hardware output limits stay authoritative above it. Motor-driven movement is visible to the simulator as pilot input, so higher values can oppose or disconnect the autopilot. Seven mechanically back-driven starters ship enabled at 10 percent movement authority with a 20 percent follow spring; the A320 and other aircraft whose pilot controls are not mechanically back-driven ship disabled.
- Watchdog timing lives under Settings - Advanced. Defaults normally give the right balance between brief packet gaps and a real simulator disconnect.

Simulator-driven refinements

- An aircraft impact raises the touchdown one-shot to a stronger profile-scaled thump. It fires once per crash edge and stays bounded by Master gain, the arm ramp, texture limits, capability resolution, the motion Safety Stop, and Disarm.
- Standard stall warning and native shaker telemetry remain primary for the 737 shaker. When both are silent, a shaker-capable airborne 737 profile may fall back to valid angle of attack at 88 percent of reported stall AoA; the fallback stays silent on the ground and below 40 KIAS.
- Actual flap-surface travel drives motion texture, sustained drag/buffet, and a separate arrival bump; actual gear and left/right spoiler deployment replace handle commands where available.
- RPM, combustion, vibration, and reverse evidence aggregate every installed engine - MSFS engines 1-4 and X-Plane engines 0-7.
- Valid AoA/stall reference and dynamic redline data make stall and overspeed onset progressive; existing simulator warnings remain the fallback.

- Measured wheel skid, native shaker intensity, surface condition, and X-Plane rotor blade slap refine only their matching effects. Missing or implausible optional data keeps the established fallback.
- MSFS Slew is a hard force-neutral state. Aircraft changes clear cached optional telemetry before force can resume.

Vertical wind vibration	The default-off Vertical wind vibration channel uses aircraft-point environmental wind in MSFS and X-Plane 12. Aircraft climb and descent rate have no effect on it. The channel is bounded and silent on the ground, while paused or slewing, and whenever the optional telemetry is unavailable.

Changes and resets

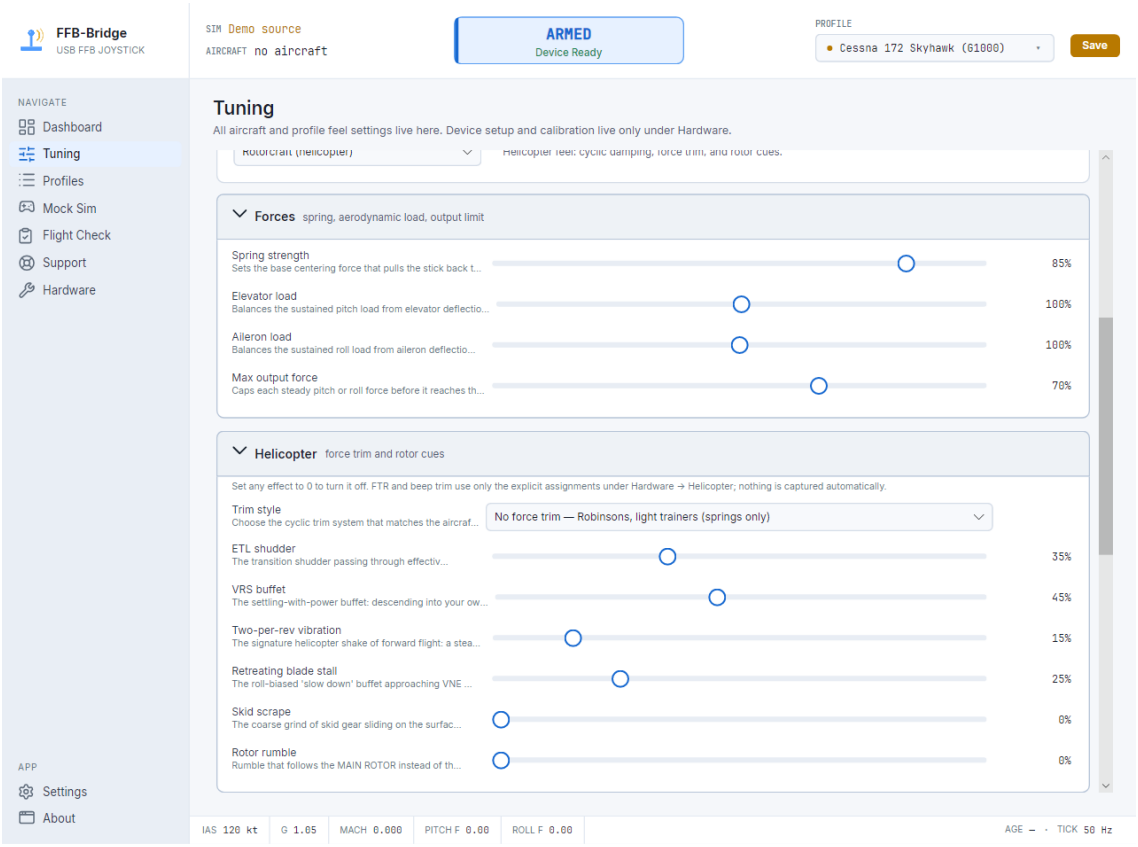
- A dirty indicator shows that the working copy differs from the loaded profile.
- Reset a single row, an entire section, or discard all unsaved changes.
- Switching profiles can discard an unsaved working copy; save before moving to another aircraft.
- Keep the previous working version until the new profile has survived taxi, cruise, manoeuvring, approach, and landing.

The five-condition save gate

Condition	Keep the profile only when...
Taxi	The control remains stable near centre and ground cues are identifiable rather than continuous.
Cruise	Centring, air load, trim, and background texture remain distinct at the normal reference speed.
Manoeuvring	G-load and rate cues build progressively without clipping, lag, or oscillation.
Approach	Low-speed feel, flap, gear, buffet, and trim remain controllable as configuration changes.
Landing	Touchdown and braking are brief, proportional cues and the stick returns to a stable baseline.

13. Rotorcraft tuning

Rotorcraft profiles use a cyclic model instead of pretending that a helicopter is a low-speed aeroplane. Begin with the rotorcraft starter and configure the physical force-trim/beep-trim controls under Hardware.



Rotorcraft context exposes cyclic force-trim, damper, and rotor-specific feel controls.

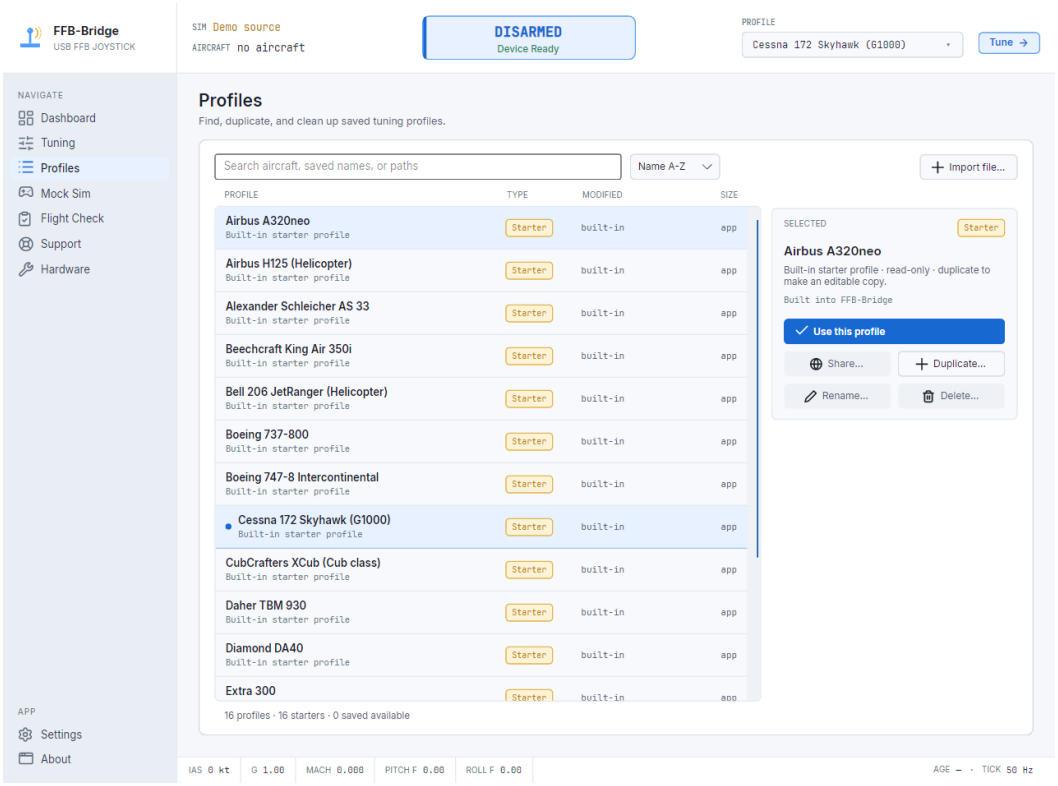
Practical order

1. Set a conservative Master gain and physical ceiling.
2. Verify pitch and roll direction in Flight Check.
3. Tune cyclic centring/damping in a stable hover or the guided helicopter sequence.
4. Assign and test force-trim release, then beep trim.
5. Only then add stronger rotor, vortex-ring-state, and ground/landing cues.

Hardware owns control assignments	Button and hat mappings belong to Hardware and stay on this computer. Rotorcraft force values belong to the aircraft profile and can be shared safely.

14. Profiles

Profiles collect aircraft feel, effect gains, and Dashboard effect-group state. They do not carry the physical hardware ceiling, device selection, polarity, or button assignments.



Built-in starters and saved aircraft profiles share a searchable list.

Profile actions

- Use selected profile applies it immediately without requiring disarm.
- Duplicate makes an editable copy of a starter or saved profile.
- Save as... keeps the current tuning under a new name.
- The free Profile Library lets anyone browse and download. Publishing requires an explicit member sign-in and submission; nothing uploads silently.

Where the built-in starters come from

Every built-in starter was rebuilt for 1.4.0 from cited control-feel research rather than from taste. Each magnitude traces to a published source: pilot flight tests, certification data, and primary-source measurements, including wartime NACA flight-test data for the P-51D and the official Airbus sidestick force tables for the A320.

- Aircraft with direct cable or rod controls use a physical V-squared airspeed-load law, so control effort grows with dynamic pressure the way it does in the aircraft.
- Centring keeps firming as speed builds instead of going flat once the controls come alive at rotation.
- Each starter carries its documented pitch-to-roll harmony rather than a single house ratio.

The research behind each aircraft - the sources, the force mix, and the canonical starter baseline, with a citation on individual values - is published in the aircraft library at ffb-bridge.com/aircraft. Use it when a starter feels wrong to you: it shows what the value was meant to reproduce before you change it.

Notable feel corrections in 1.4.0

- The Extra 300 is now light and nearly speed-invariant. Its aerodynamic balancing is the documented character; the previous strong airspeed ramp was wrong.
- The P-51D is light per g, with forces that build strongly with speed.
- The C172 carries the firmest per-g yoke of the trainers, as the real aircraft does.
- The DA40 has a pronounced stall buffet and lighter overall forces.
- The King Air 350i stall warning is the horn. The production aircraft has no stick shaker.
- The TBM 930 shaker is stronger, matching its documented vigorous cue.

Adopting the new feel — The retune changes the built-in starters. A profile you already saved keeps the feel you saved, which is the point of saving it. To move an aircraft onto the new baseline, load the retuned starter and re-apply your own changes on top of it.

Starter lineage

A profile you save records which starter it was forked from. A profile shared to the library can therefore show exactly what you changed against that baseline, which makes a shared profile reviewable instead of opaque. The lineage is a starter reference and your own changes; it is not a record of how you fly.

Local files

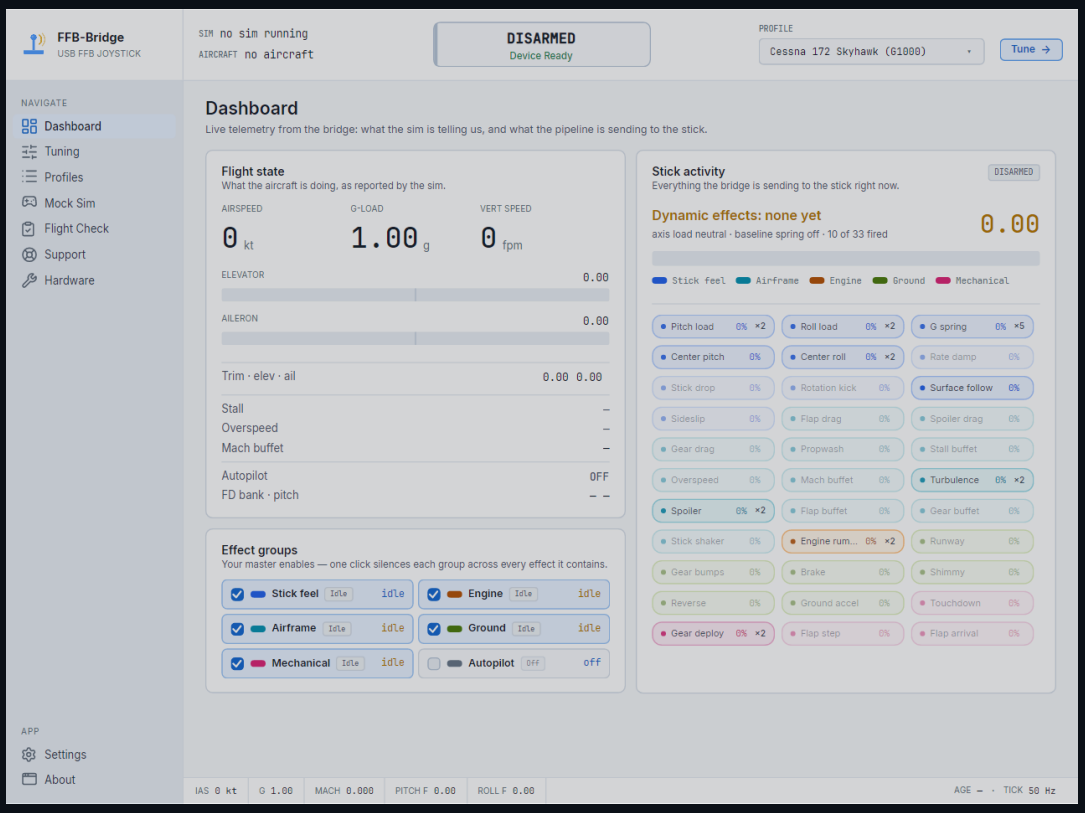
Windows stores profiles under `%APPDATA%\ffb-bridge\profiles`. Linux and macOS use `~/.config/ffb-bridge/profiles` (respecting `$XDG_CONFIG_HOME`). Copying the JSON file is enough for a manual backup.

Share responsibly — Describe the aircraft, simulator, and hardware context. Recipients still keep their own physical ceiling and calibration, which is exactly why hardware settings are excluded from the profile.

SECTION 05

Know the app

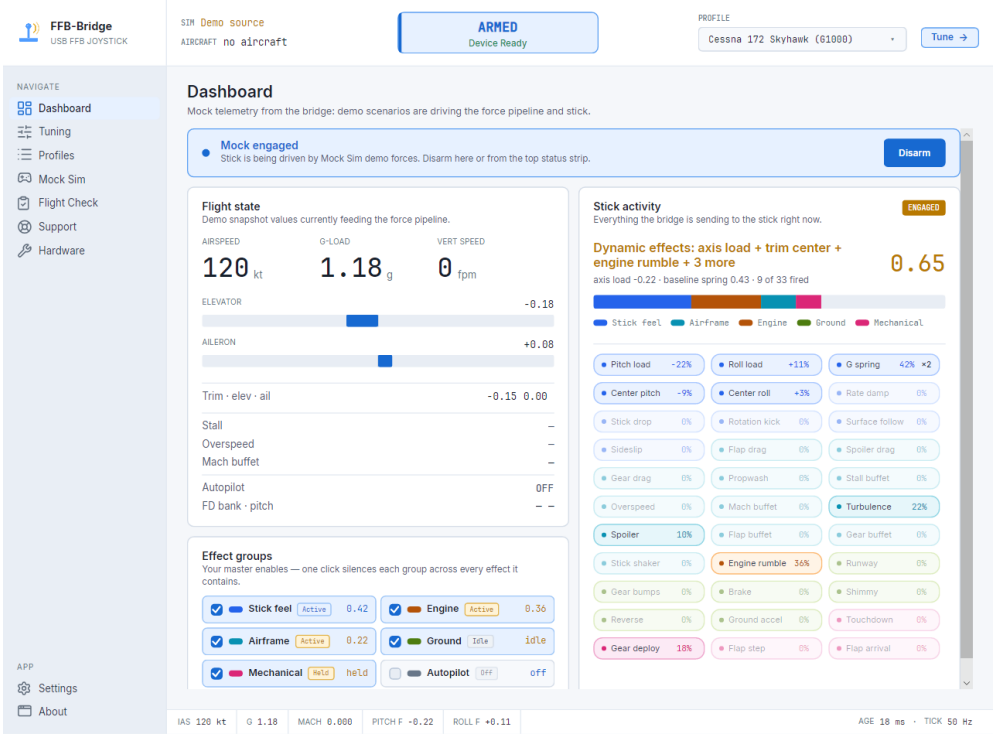
The cockpit strip stays constant; each page then answers one operational question: what is happening, what should feel different, or what needs fixing.



15. Dashboard and Mock Sim

Dashboard

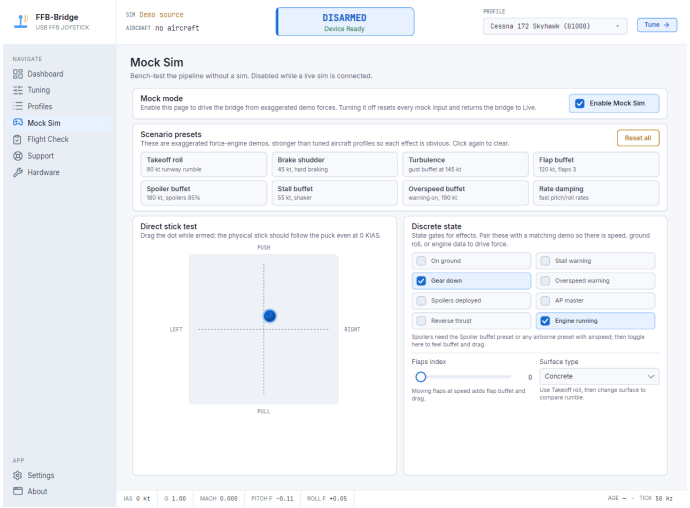
The Dashboard explains the live force state. Tuning remains on the Tuning page. The Dashboard combines flight state, effect-group toggles, dynamic force-family totals, and individual channel chips so you can confirm that the app and your physical impression agree.



Dashboard: simulator state at left, current force output at right, operational readiness in the persistent top strip.

Mock Sim

Mock Sim is a bench telemetry source for the normal force pipeline. It offers takeoff roll, braking, turbulence, flap/spoiler, stall, overspeed, and rate-damping scenarios plus a direct stick test. It cannot run while a live simulator owns the source.



Mock Sim drives repeatable scenarios without requiring MSFS or X-Plane.

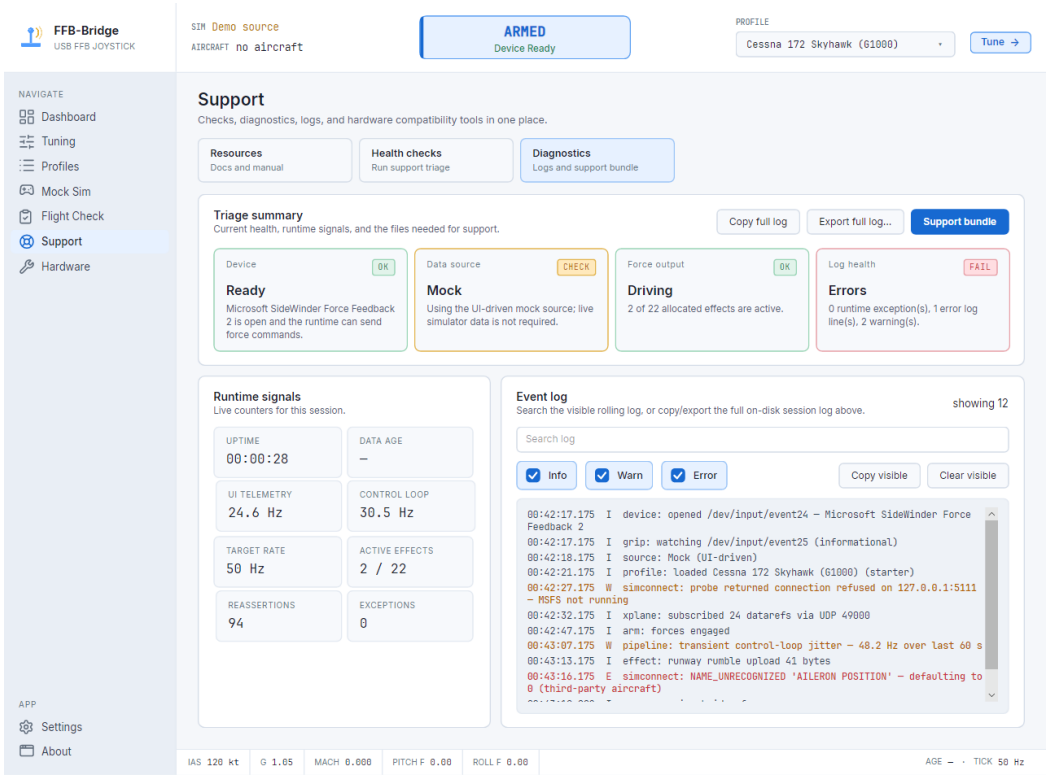
16. Support and Diagnostics

Support opens on Health checks for setup and connectivity. Diagnostics is the deeper runtime view for evidence after the app is already running.

Health checks

- Device detection, permissions, and hardware compatibility.
- SimConnect configuration/reachability and X-Plane reachability.
- Inline repairs that preview the exact change before applying it.
- Startup warnings that distinguish an intentional disconnect from a real setup problem.

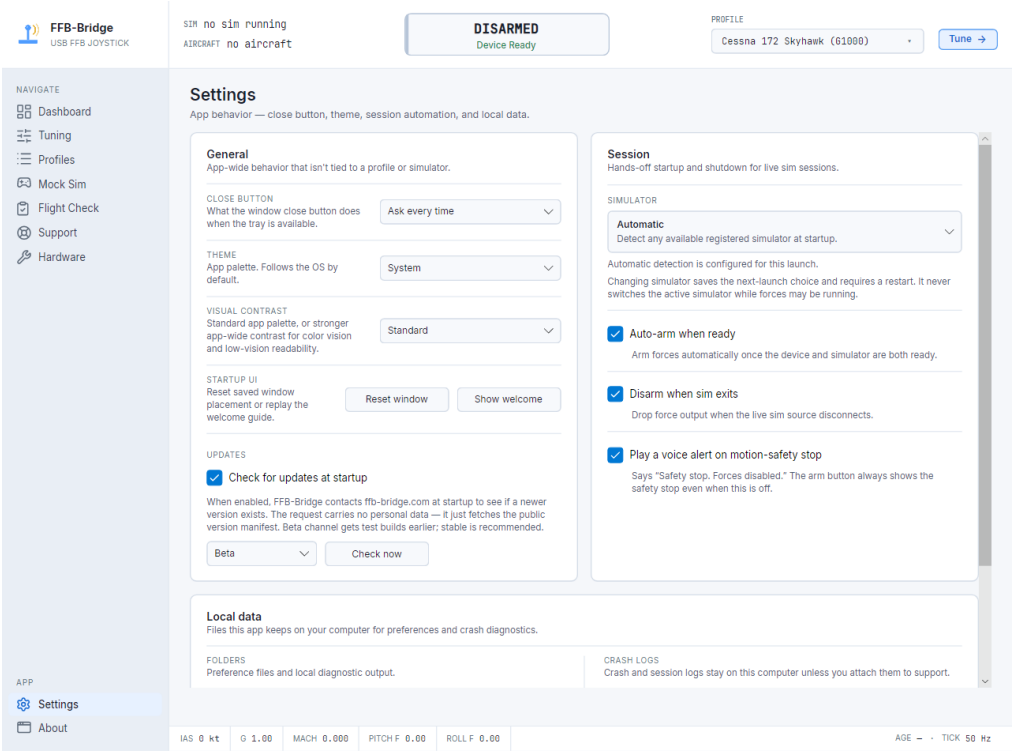
Diagnostics



Diagnostics summarizes device, data source, force output, log health, runtime signals, and the searchable event log.

- Filter Info, Warn, and Error; search for a symptom; copy visible rows or export the full log.
- Watch data age, UI update rate, control-loop rate, effects, reassertions, and exception count.
- Export a support bundle when filing feedback so the report includes the exact runtime evidence.

17. Settings and updates



Settings holds app-wide behavior and local-data controls. Physical device settings live on Hardware.

Behavior

- Choose close-button behavior: ask, minimize to tray, or quit.
- Choose System, Light, or Dark theme and Standard or High visual contrast.
- Auto-arm and disarm-on-simulator-exit are opt-in and default off.
- Reset window placement or replay first-launch UI without changing tuning.

Local data

- Open the config or diagnostics folder in the file manager.
- Clear local crash reports or logs deliberately.
- Profiles, logs, and diagnostics stay on this computer unless you explicitly share or submit them.

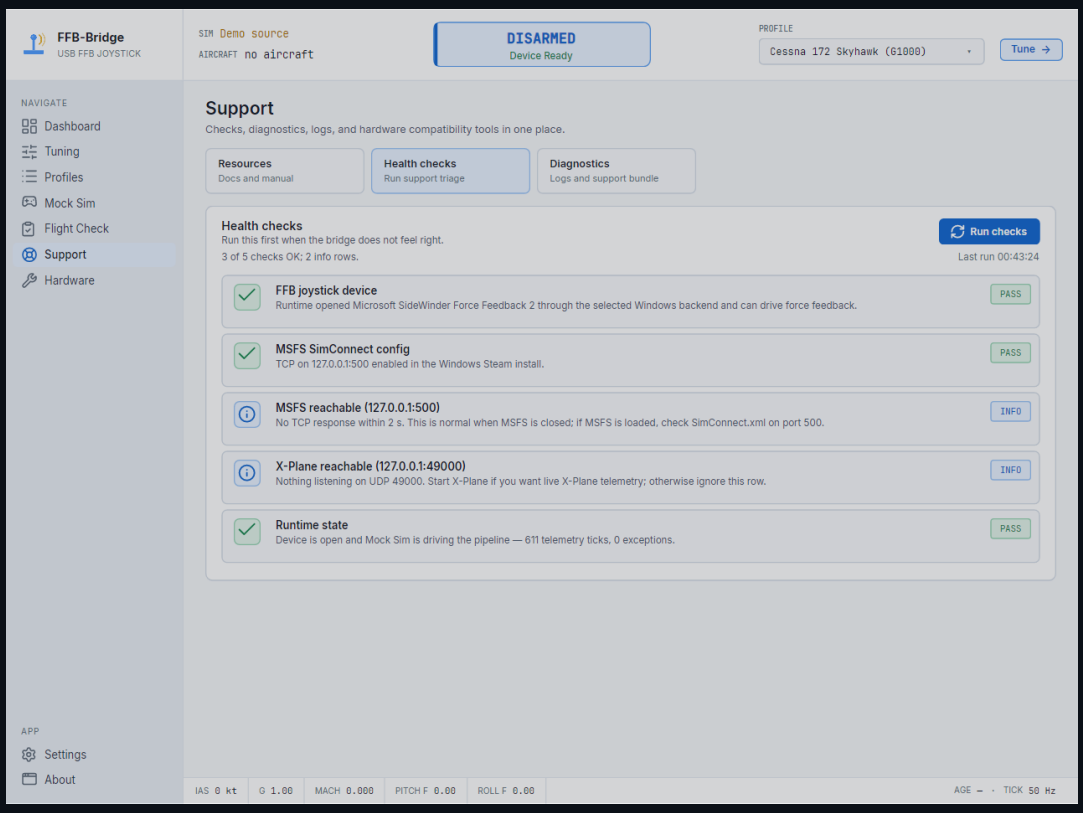
Updating

Use the in-app update notification or the current download link. Save custom profiles before a major upgrade. The profile format is forward-compatible, but keeping a manual copy is still sensible.

SECTION 06

Solve problems

Start with the state lamps, then Health checks, then Diagnostics. Change one thing at a time and export evidence before clearing local logs.



18. Symptom-first troubleshooting

Symptom	Check first	Next action
Stick does not move	ARM state, DEVICE state, SIM state	Run Flight Check. Confirm the physical ceiling is not zero and no other app owns the device.
Direction is wrong	Flight Check pitch/roll direction	Correct polarity or pitch/roll swap under Hardware, never in every aircraft profile.
MSFS reachable but no data	Support - SimConnect details	Use the detected port/config repair, restart MSFS, and rerun the check.
X-Plane briefly connects then drops	Packet age and local UDP	Check firewall/port state; the three-second stale watchdog is reporting lost data.
MOZA detected but idle	MOZA Cockpit mode and ownership	Return Cockpit to normal/default mode, close competing force apps, rerun Flight Check.
All forces too strong	Hardware ceiling and Master gain	Lower the physical ceiling first for safety, then Master gain for profile feel.
One effect feels wrong	Dashboard channel chips	Mute its effect group for A/B, then adjust only the identified row.
Force stops after unplug/sim crash	FAULTED ARM state	Restore the prerequisite, inspect Diagnostics, acknowledge the fault, and re-arm.
App crashes	Next-launch recovery and Diagnostics	Preserve the crash report/log and submit a support bundle before clearing local data.

Linux permission repairs

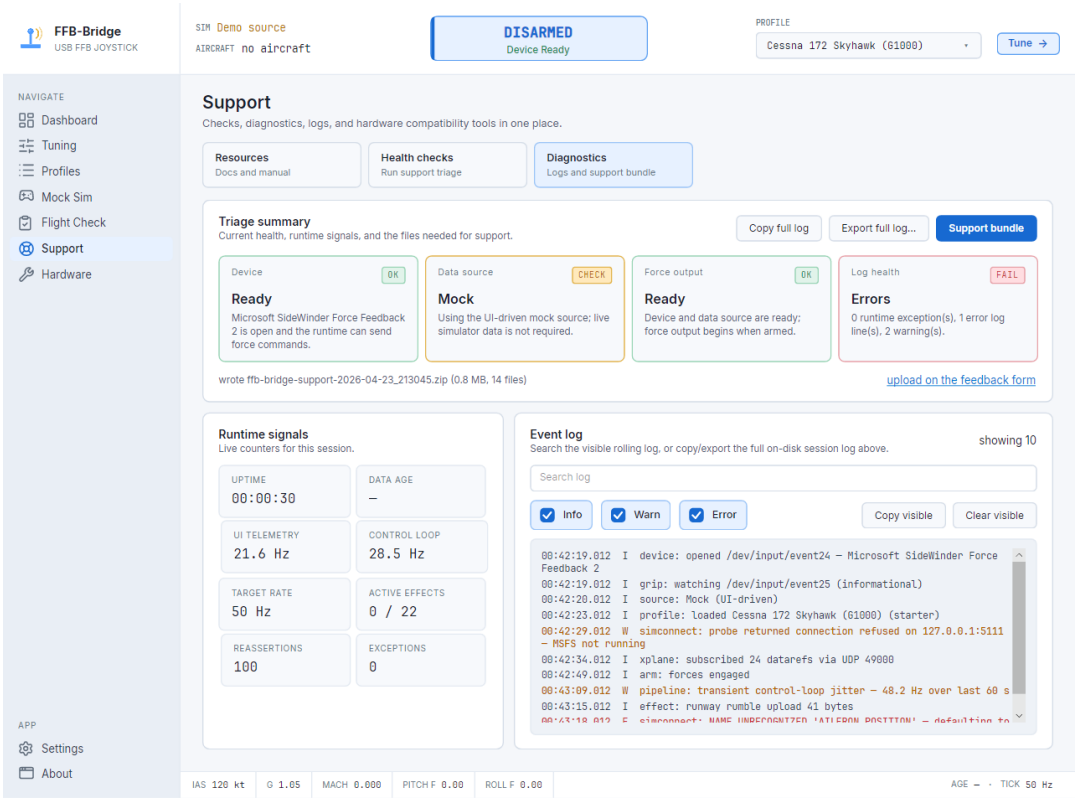
Use Support to install or refresh the udev rule. Replug the device after the repair. If the app recommends a restart, do it before concluding that the rule failed.

Hardware-effect crashes

Run Test hardware effects. If the probe fails or the app classifies a native-effect crash, switch to Software-blended periodics and restart. A generic unclean exit alone is not evidence that the renderer must change.

19. Export evidence and ask for help

A useful report includes what you expected, what happened, the aircraft/simulator/device, and a support bundle captured before logs are cleared.



Diagnostics exports a bounded support ZIP and provides the direct feedback path.

Support bundle workflow

1. Reproduce the problem once if it is safe to do so.
2. Open Support - Diagnostics and export the support bundle.
3. Use the shown feedback link, describe the exact sequence, and attach the ZIP.
4. Do not edit the bundle or paste the full logs into a public forum post; it can contain device, path, and system details useful to support.

Privacy	Nothing is transmitted by the export action itself. The bundle remains local until you deliberately attach it to the feedback form.

Useful links

- Support and feedback: https://ffb-bridge.com/feedback
- Current documentation: https://ffb-bridge.com/docs
- Profile Library: https://ffb-bridge.com/profiles
- Community forum: https://ffb-bridge.com/community

SECTION 07

Reference

A compact map of the force model, file locations, safety gates, and product boundaries for quick lookup.

20. Force effects reference

Family	Effect	What you feel
Stick feel	Centring spring	Baseline return-to-centre force, shaped by trim and aircraft context.
Stick feel	Airspeed pitch/roll load	Sustained control effort that grows with airspeed and deflection.
Stick feel	Rate damping	Viscous opposition to aircraft rotation rates.
Stick feel	Stick drop	Low-speed forward gravity bias for conventional controls.
Stick feel	Autopilot Follow	Bounded movement toward the autopilot reference; profile-owned authority from 0 to 50 percent.
Ground	Runway rumble	Continuous surface and speed-dependent texture.
Ground	Touchdown thump	One impulse scaled by the landing transition.
Ground	Aircraft impact	A stronger profile-scaled thump on a simulator crash edge; fires once per impact and stays inside every normal force bound.
Ground	Brake shudder	Low-frequency vibration from measured wheel skid when available, with brake input as its gate.
Ground	Gear bumps / shimmy	Discrete taxi bumps and lateral nosewheel vibration.
Ground	Acceleration cue	Pitch-axis cue during ground acceleration/deceleration.
Airframe	Stall / overspeed / Mach buffet	Progressive onset from valid AoA/redline data, with simulator warnings as the fallback.
Airframe	Spoiler / flap / gear buffet	Configuration-dependent vibration using actual deployment where available.
Airframe	Turbulence / vertical wind	Bounded disturbance texture; vertical wind is default-off and uses aircraft-point environmental wind.

20. Force effects reference - continued

Family	Effect	What you feel
Airframe	Stall stick shaker	Sharp continuous warning buzz gated by the simulator stall warning.
Engine	Engine rumble	RPM/combustion/vibration evidence aggregated across every installed engine.
Engine	Reverse rumble	Rollout vibration when reverse thrust is active.
Mechanical	Gear-deploy one-shot	Short shudder when gear state changes.
Mechanical	Flap travel / arrival	Continuous actual-surface motion texture plus a separate arrival bump.
Configuration	Flap/spoiler/gear drag	Sustained pitch bias that mirrors the need to trim configuration drag.
Configuration	Propwash pitch	Power-dependent pitch bias on applicable aircraft.
Rotorcraft	Cyclic centring/damper	Rotorcraft-specific cyclic holding and damping behavior.
Rotorcraft	Force-trim reference	Captured cyclic reference after force-trim release/toggle.
Rotorcraft	Beep trim	Small four-direction trim-reference adjustments.
Safety	Pause/stale watchdog	Dynamic force fades or cuts when telemetry is unsafe or stale.

How effects combine

Every enabled contribution resolves into pitch and roll output, then passes through the per-profile output limit, Master gain, device renderer, and final Hardware physical ceiling. The physical ceiling is always the last authority.

When in doubt Lower the Hardware ceiling, disarm, and use Flight Check. Do not solve an unidentified effect by increasing unrelated gains.

21. Paths, privacy, and product boundaries

Local data

Data	Windows	Linux / macOS
Profiles	`%APPDATA%\ffb-bridge\profiles`	`~/.config/ffb-bridge/profiles`
Config	Open from Settings - Local data	Open from Settings - Local data
Diagnostics	Open from Settings or Support	Open from Settings or Support
Crash/support evidence	Local until explicitly submitted	Local until explicitly submitted

Privacy contract

- Simulator telemetry and force computation stay on the computer.
- The app does not require a cloud account for normal flight.
- Profile Library browsing/downloading is public; publishing is an explicit member action.
- Support bundles and feedback are submitted only when you choose to send them.
- Pro entitlements are signed and tolerate offline use; local Pro features do not turn customer data into cloud AI input.

Free and Pro

The complete force-feedback bridge, hardware setup, Flight Check, tuning, profiles, diagnostics, and community profile downloads remain part of the core product. Pro adds connected conveniences such as Cockpit Web, local Voice Tune, and profile history; it does not weaken the safety or privacy boundaries described here.

Licence and disclaimer

FFB-Bridge is independent software and is not affiliated with Microsoft, Laminar Research, MOZA Racing, Logitech, Brunner, or the aircraft manufacturers named in starter profiles. Force-feedback hardware can move unexpectedly if misconfigured or physically obstructed. The operator is responsible for secure mounting, conservative limits, and safe use.

KEEP FLYING

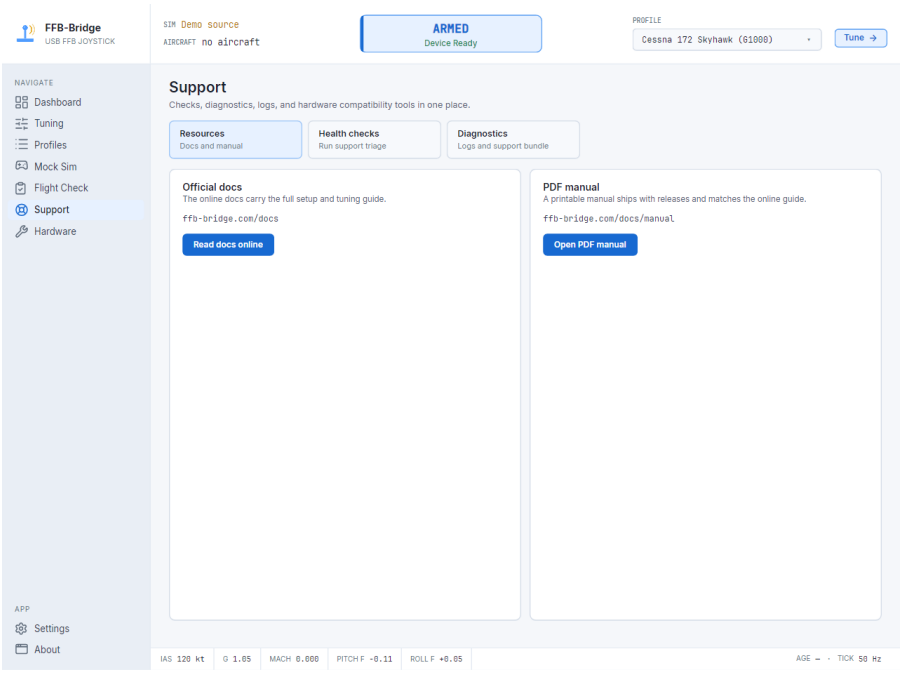
Your offline manual is ready

This PDF is the durable reference you can save, print, or bundle with FFB-Bridge. The website manual page always points to the stable current filename.

Download address https://ffb-bridge.com/downloads/FFB-Bridge-User-Manual.pdf

Three habits that prevent most problems

- Keep the physical ceiling conservative and the base secure.
- Use Flight Check after hardware, firmware, renderer, or axis changes.
- Watch the Dashboard, then export a support bundle before clearing evidence.



The in-app Help page keeps online documentation, this PDF manual, setup guidance, and support paths together.

FFB-BRIDGE / USB FORCE FEEDBACK FOR FLIGHT SIMULATION

Version 1.4.0 | July 2026 | Rohsam Inc.