X1 Handling & Setup Guide

Version 1.0 | 2026

1. INTRODUCTION

This guide is a reference only. Every change you make to the X1's setup will affect multiple areas of its behaviour simultaneously — there are no free lunches. The goal is to identify which handling weaknesses are costing you the most lap time and address those first, without creating new problems elsewhere.

Before making any setup change, make sure the information you're working from is reliable. Be specific about where on the circuit the problem occurs — entry, mid-corner, or exit — and whether it happens in slow, medium, or fast corners, or everywhere. Data and video are your best tools for confirming what the driver is actually experiencing.

> **IMPORTANT:** This guide covers the X1 specifically. It is not a generic formula car handling guide. Several setup principles that apply to other cars do not apply here — particularly around damping adjustment, ride height logic, and tyre camber. Read each section carefully before making changes.

THE X1 SETUP PHILOSOPHY

The X1 is built around three principles that shape how it is set up:

- **Ground effects are primary.** The majority of the X1's downforce is generated by the venturi tunnels running along each side of the floor. Wings are a secondary, balancing tool. This means ride height exists to manage the tunnel floor seal — getting the floor sides as close to the ground as possible to trap and accelerate air through the tunnels.
- **Simplicity is deliberate.** The monoshock system has no compression or rebound adjustment. This is by design — it levels the field between well-resourced teams and those running without an engineer. Setup changes happen through ride height, swaybar stiffness, wing angle, toe, and camber.
- **The factory setup is tested and validated.** The baseline alignment — 2.5° negative camber, 0.5° toe-in front and rear — was developed over two years of testing and national championship racing with the car at its limit. Do not deviate from the factory settings without understanding why.

2. TYRES — START HERE

For every handling issue, the first and most important thing to check is the tyres. Pressure, condition, and temperature must be verified before any setup change is considered. A poor tyre will mask the true behaviour of the car and lead to incorrect setup decisions.

TARGET PRESSURES

The X1 runs Hankook slicks. Target hot pressure is 21–22 psi.

Tyre	**Hankook Slick**	
Target Hot Pressure	**21–22 psi**	Measured after a flying lap
Working Temperature	**70–90°C**	Tyre surface temperature

The X1's tyres cool down significantly on the inlap. When setting cold pressures to achieve a desired hot target, account for the length of the pitlane and the pace of your inlap — a slow inlap on a long pitlane will result in pressures that read lower than what the tyre actually reached on the flying lap. Measure pressure as quickly as possible after returning to the garage.

NOTE Tyre temperature on the X1 is used primarily to confirm that camber is set correctly — not as a general tuning tool. See Section 6 for details.

TYRE CONDITION

Before any session, inspect the tyres for:

- Graining or heavy wear
- Unusual surface colouring
- Excessive rubber pickup ('marbles') on the tread surface

Setup changes should ideally be validated on fresh tyres. A set that has covered less than 100km is acceptable as a baseline for setup work.

UNDERSTANDING UNDERSTEER AND OVERSTEER

A clear understanding of the car's balance is essential before any change.

- **Understeer:** The front tyres do not have enough grip to turn the car. More steering lock is required. The car washes wide.
- **Oversteer:** The rear tyres do not have enough grip. The car rotates more than intended. The rear steps out.

Always identify where the imbalance occurs: entry, mid-corner, or exit. Entry and mid-corner understeer will often produce exit oversteer — as the driver applies extra lock, when speed drops and power is applied the car snaps. If you try to fix the exit oversteer without addressing the root cause at entry, the problem will worsen. Ask detailed questions before changing anything.

3. THE X1 AERODYNAMIC PLATFORM

Before adjusting any aero-related setting — ride height, tunnel height, or wing angle — it is important to understand how the X1 generates downforce and how the two systems interact.

GROUND EFFECTS: THE PRIMARY SOURCE OF DOWNFORCE

The X1 uses venturi tunnels running along each side of the floor to generate the majority of its downforce. Air enters the front of each tunnel and accelerates through the narrowing throat, reducing pressure beneath the car. This pressure difference between the underfloor and the top of the car creates a suction force that presses the car into the track — without substantially increasing drag.

This type of downforce increases rapidly with speed. At low speed the tunnels contribute relatively little; at racing speed they are the dominant force. This is why the X1 can feel progressive and forgiving in the pitlane but transform into a high-grip racing car at speed.

> **IMPORTANT** For the tunnel to work effectively, the sides of the floor must be sealed close to the ground. Ride height on the X1 exists to achieve and maintain this seal — that is its purpose.

WINGS: BALANCE TOOL, NOT PRIMARY DOWNFORCE

The front and rear wings on the X1 are used to trim the aerodynamic balance front-to-rear. They are not the primary source of downforce — the tunnel provides that. Think of the wings as the fine adjustment that determines whether the car pushes at the front or rotates more freely at the rear at high speed.

The front wing is more sensitive to adjustment than the rear. Small changes to front wing angle produce a larger effect on high-speed front grip than equivalent changes to the rear. When the car feels loose at high speed (oversteer), adding front wing is usually more effective than reducing rear wing, and vice versa.

PITCH SENSITIVITY

Ground effect downforce is highly sensitive to changes in the car's pitch attitude — the angle at which it sits nose-up or nose-down. Under braking the nose dips, under acceleration the rear squats. These pitch changes alter the tunnel geometry and shift the aerodynamic balance front-to-rear in real time.

This is one reason the monoshock system is tuned for pitch control. A well-controlled pitch attitude means the tunnel geometry stays predictable through braking, corner entry, and acceleration. If the car pitches excessively, the aero balance will shift in ways that compound the mechanical imbalance.

4. RIDE HEIGHT & TUNNEL HEIGHT

The X1 has two related but distinct height measurements: chassis ride height (measured at the front and rear bulkheads) and tunnel floor height (measured at the underside of the floor tunnels). Both must be set correctly. The tunnel height measurements are the critical performance parameter.

FACTORY SETTINGS

Front Ride Height	**125mm**	Ground to bottom of front bulkhead
Rear Ride Height	**155mm**	Ground to lowest point of rear bulkhead
Front Tunnel Height	**52mm**	Ground to underside of tunnel floor
Rear Tunnel Height	**60mm**	Ground to underside of tunnel floor

WHY TUNNEL HEIGHT MATTERS

The tunnel height measurements control how much air the venturi tunnels trap and accelerate beneath the car. Running the tunnel floor too high reduces the sealing effect and costs downforce. Running it too low risks the floor contacting the track on bumps or under aerodynamic load — when the floor bottoms out, the tunnel stalls and downforce is lost suddenly, which can cause a snap loss of balance at high speed.

The factory tunnel heights represent a tested balance between peak downforce and stability. Do not reduce these measurements below the factory settings without understanding the risk.

ADJUSTING RIDE HEIGHT

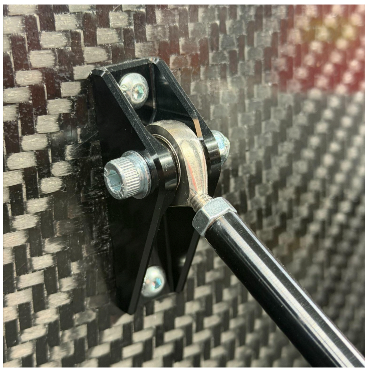
Ride height is set using the four push-rods at each corner of the car. Each push-rod has opposing left and right hand threads — turn the rod to lengthen or shorten it, which raises or lowers that corner.

Push-rods are also used for corner-weighting at the end of the alignment process.

ADJUSTING TUNNEL HEIGHT

Tunnel height is adjusted using the two tunnel brace rods, one on each side. Lengthen the rod to raise the tunnel floor; shorten it to lower the floor.

Tunnel brace rod



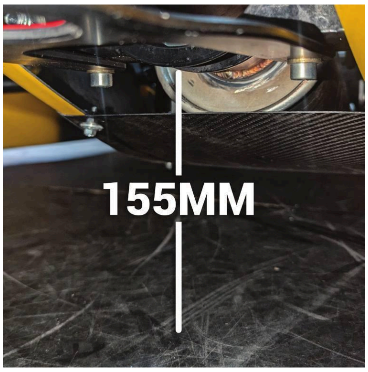
Rod end adjustment

EFFECT OF RIDE HEIGHT CHANGES

- **Raising the rear:** Increases rear tunnel seal, increases overall downforce, shifts aero balance rearward. May reduce mechanical rear grip at low speed.
- **Lowering the rear:** Reduces tunnel seal, reduces overall downforce, shifts aero balance forward. Improves mechanical rear grip at low speed.
- **Raising the front:** Reduces front tunnel seal and front end downforce, shifts aero balance rearward.
- **Lowering the front:** Increases front tunnel seal and front end grip. Risk of floor contact on bumpy circuits.

NOTE For medium to high speed handling issues, ride height and wing angle should be the first tools you reach for. Changes to ride height affect both mechanical grip and aerodynamic balance simultaneously — change one thing at a time.

125mm front bulkhead target



155mm rear bulkhead target

5. WING ADJUSTMENT

Wing adjustment is the primary tool for tuning high-speed aero balance. Because the wings operate independently of the ground effect system, they can be changed without altering the tunnel geometry or mechanical setup. This makes them the first adjustment to try when the car's handling changes with speed.

FRONT WING — MORE SENSITIVE

The front wing is the more sensitive of the two. A given increment of angle change produces a larger effect on front-end high-speed grip than the same change at the rear. Start with front wing changes when addressing high-speed balance issues.

- **More front wing angle:** Increases front downforce, reduces high-speed understeer, adds drag.
- **Less front wing angle:** Reduces front downforce, increases high-speed understeer, reduces drag, increases straight-line speed.

REAR WING

- **More rear wing angle:** Increases rear downforce, reduces high-speed oversteer, adds drag.
- **Less rear wing angle:** Reduces rear downforce, increases high-speed oversteer, reduces drag, increases straight-line speed.

PRACTICAL APPROACH

The wings on the X1 are a balance tool, not a downforce tool. The ground effect tunnels produce the majority of the downforce — the wings exist to trim the front-to-rear aero balance at high speed.

Testing with heavily reduced wing angles at both ends produced almost no measurable gain in straight-line speed. Chasing a low-downforce setup on the X1 has no meaningful benefit and significant trade-offs in corner speed. Run the wing angle that gives you the best high-speed balance and don't chase drag reduction through the wings.

If the car feels neutral at low speed but unstable at high speed, this is an aero balance issue — not a mechanical one. Address it with wings before touching ride height, swaybar, or toe.

6. MONOSHOCK SYSTEM

The X1 uses a monoshock suspension system. There is a single centrally-mounted shock absorber at the rear, connected via a rocker mechanism. There is no compression or rebound adjustment on the shocks.

WHAT THE MONOSHOCK CONTROLS

Because both sides of the axle share one shock, the monoshock responds to heave (both wheels moving in the same direction) and pitch (the car rocking nose-up or nose-down), but not to roll (the body leaning into a corner). Roll is handled separately by the swaybar.

- **Monoshock = pitch control.** How much the nose dips under braking and how much the rear squats under acceleration.
- **Swaybar = roll control.** How much the body leans in cornering. Adjusted independently. See Section 7.

WHY NO COMPRESSION OR REBOUND ADJUSTMENT?

The decision to run non-adjustable shocks is deliberate. Shock tuning is one of the most resource-intensive parts of traditional formula car racing — it requires specialist equipment and an experienced engineer to do correctly. By removing this variable, the X1 equalises competition between well-resourced and independent teams. Racing is decided by driver skill and the setup changes described in this guide, not by shock calibration budgets.

> **NOTE** If you are used to adjusting compression and rebound damping on other formula cars, resist the instinct to look for that adjustment here. It does not exist. Focus on ride height, swaybar, wing, and alignment instead.

PITCH AND AERO

Because pitch attitude directly affects the tunnel geometry and therefore the aero balance, managing pitch through ride height is more important on the X1 than on a conventional car. A car that pitches excessively under braking will shift its aero balance forward, potentially creating turn-in oversteer that is aerodynamic rather than mechanical in origin. If you are seeing corner-entry instability that doesn't respond to mechanical changes, consider whether pitch behaviour is contributing.

7. SWAYBAR (ROLL CONTROL)

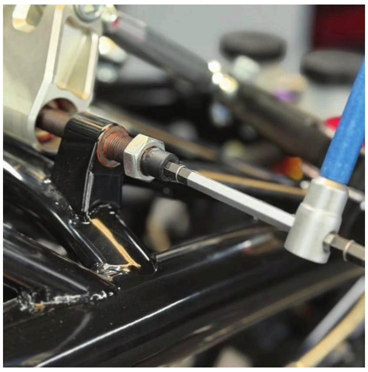
The X1 swaybar uses rubber damper contacts rather than a conventional metal anti-roll bar. Stiffness is adjusted by moving the rubber contact points closer to or further from the bar using a 6mm Allen key. This controls the amount of body roll in cornering.

ADJUSTMENT

Loosen the 1/2" locking nut to unlock the swaybar pins, then use the 6mm Allen key to rotate the adjustment:

- **Clockwise:** Moves the rubber contact inward — reduces roll stiffness, allows more body roll (softer).
- **Anti-clockwise:** Moves the rubber contact outward — increases roll stiffness, reduces body roll (stiffer).

Swaybar adjustment — locking nut



Allen key adjustment

EFFECT OF SWAYBAR CHANGES

STIFFER SWAYBAR

- Less body roll in cornering — keeps the tyre contact patch flatter.
- More load transfer through the swaybar — increases mid-corner grip.
- Reduced traction out of low-speed corners — the car transfers load more abruptly.
- Increased rear tyre wear if running stiff on a slow circuit.

SOFTER SWAYBAR

- More body roll — contact patch tilts more in cornering.
- Better traction out of slow corners — load transfers more progressively.
- Reduced mid-corner grip — the car leans more.

BALANCE EFFECT

Stiffening the swaybar increases overall mechanical grip but transfers load more quickly, which can reduce traction. The key is finding the stiffness that controls roll without overwhelming the tyres' ability to manage the load transfer rate.

In fast corners, a stiffer swaybar generally increases grip. In slow corners, softer gives better traction. If the circuit is a mix of both, a medium setting and wing adjustment to balance high-speed behaviour is usually the best approach.

8. CAMBER

Camber is the inward or outward lean of the tyre when viewed from the front. Negative camber means the top of the tyre leans inward. The X1 runs significant negative camber at all four corners — more than most people expect when they first see the car.

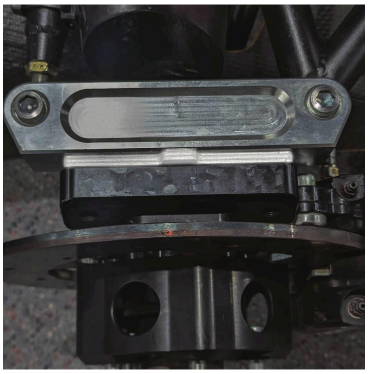
FACTORY SETTING

Factory Camber	**2.5° negative**	Front and rear
Measurement	**17mm**	Straight edge across tyre — speed square just touching outside

For reference: 14mm ≈ 2.0°, 17mm ≈ 2.5° (factory), 21mm ≈ 3.0°.

ADJUSTMENT

Camber is set using shims installed between the camber arm and the upright. Add shims to increase negative camber; remove shims to reduce it. Cars come aligned from the factory and will often have uneven numbers of shims across the four corners — this is normal.



Camber shim plate

Measuring with straight edge

WHY SO MUCH CAMBER?

At 2.5° negative camber, the top of the tyre leans inward significantly. This looks wrong to anyone accustomed to road cars or lightly cambered track cars. It is correct for the Hankook tyre.

In cornering, the car rolls and the tyre leans outward. High negative camber pre-compensates for this roll — when the car is cornering at the limit, the tyre contact patch is flat on the track surface, maximising grip exactly when it is needed most. This only shows up in the tyre temperature data when the car is genuinely being driven at its limit.

IMPORTANT: Do not reduce camber based on how the car looks at rest or on a slow inlap. The validation for this camber setting is tyre surface temperature while the car is at speed, not visual inspection.

TYRE TEMPERATURE AND CAMBER CONFIRMATION

On the X1, tyre temperature readings are used primarily to confirm that camber is set correctly — not as a general tuning signal. The temperature spread across the tyre surface from inside to outside edge should be 10–15°C hotter on the inside than the outside when the car is being driven at its limit.

A spread larger than 15°C suggests the camber may be excessive (too much negative). A spread of less than 10°C suggests insufficient camber, or that the car is not being driven at its limit during the reading.

NOTE: The X1's tyres cool off rapidly. Account for inlap pace and pitlane length when interpreting temperature readings. Temperatures measured after a long slow inlap will be significantly lower than actual on-track temperatures.

TYRE PICKUP AND THE INLAP

Because the X1 runs significant negative camber, the inside shoulder of the tyre picks up rubber marbles from the track surface on the inlap. The inside shoulder is the part of the tyre that is not loaded in the straight-ahead position — it contacts the marbles rather than scrubbing them off.

This is normal. It is not tyre wear. It is not a sign of incorrect camber. If you clean the inside edge of the tyre and drive another session, the same pickup will occur. The presence of inside-edge rubber pickup is not evidence that the camber is too aggressive.

EFFECT OF CAMBER CHANGES

- **More negative camber:** Better grip in high-speed cornering. Reduced contact patch under braking, light acceleration, and low-speed corners. More inside-edge tyre wear over time.
- **Less negative camber:** Better traction in low-speed corners and under braking. Reduced high-speed cornering grip. Smaller temperatures spread across the tyre.

NOTE The factory 2.5° setting was validated over two years of testing with the car being driven at the limit. Do not change camber unless you have clear tyre temperature evidence from a competitive lap that supports doing so.

9. TOE

Toe refers to whether the fronts of the tyres point inward (toe-in) or outward (toe-out) when viewed from above. The X1 runs toe-in at both front and rear as the factory baseline.

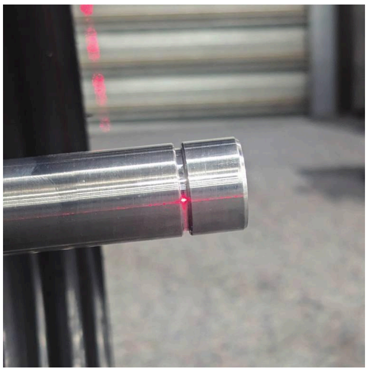
FACTORY SETTING

Front Toe	**0.5° toe-in**	Laser alignment to centre groove on pin
Rear Toe	**0.85° toe-in**	Laser alignment to centre groove on pin

SETTING TOE

Toe is set using the laser alignment tool and the machined alignment pins fitted to each wheel hub. Install the appropriate pin (marked 'F' or 'R') into the top stud of the wheel. Fix the steering wheel so it cannot move during adjustment. Hold the laser tool against the wheel and adjust the steering rod (front) or track rod (rear) until the laser aligns with the centre groove on the opposite alignment pin. This position achieves 0.5° toe-in.

Laser tool against wheel



Laser aligned to pin groove

FRONT TOE EFFECTS

- **Toe-in:** More straight-line stability, better over bumpy surfaces. Reduces front-end responsiveness and feel.
- **Toe-out:** Sharper initial turn-in response. Can destabilise the rear on corner entry. Increases tyre temperature and wear.

REAR TOE EFFECTS

- **Toe-in:** More stability and traction. Increases drag and tyre temperatures slightly.
- **Toe-out:** Rear wheel steer effect — can sharpen rotation. Reduces rear stability especially under braking and at high load.

10. CASTER

Caster is the forward or rearward lean of the steering axis when viewed from the side of the car. A positive front caster means the steering axis tilts rearward at the top. It affects straight-line stability, self-centring, and the amount of camber gain during steering lock.

FACTORY SETTINGS

Front Caster	**4.5° positive**
Rear Caster	**2° negative**

WHO SHOULD CHANGE CASTER

Caster adjustment is for experienced setters working from clear data. Most drivers will never need to touch it. The factory caster settings were developed alongside the baseline camber and toe alignment and should be treated as a system. Changing caster without adjusting camber will alter both measurements.

NOTE Adjusting the front caster rods will also alter camber. If caster is changed, camber must be rechecked and corrected before the car goes on track.

11. DIAGNOSING HANDLING PROBLEMS

The X1's setup menu is intentionally small. There are no shock adjustments to chase. That constraint is a feature — it means when something feels wrong, you work through a short, logical sequence rather than getting lost in variables. The framework below is that sequence.

> **IMPORTANT:** Change one thing at a time. Every adjustment has a trade-off somewhere else on the circuit. If you change two things at once you will not know which one worked.

STEP 1 — CHECK THE TYRES

Before anything else. Every session, every time. Pressure, temperature, and condition. A tyre that is under-pressure, over-heated, or grained will give the driver false information about the car's balance. No setup change should be made until the tyre baseline is confirmed.

- Pressure: 21–22 psi hot. Account for inlap cooling when measuring.
- Temperature: 70–90°C working range. Spread across the tyre should be 10–15°C hotter inside than outside.
- Condition: check for graining, unusual wear, or heavy rubber pickup.

STEP 2 — IS IT TECHNIQUE OR SETUP?

This is the most important question and the one most often skipped. On the X1, slower drivers consistently experience more understeer and faster drivers on the same setup consistently experience more oversteer. This is not a setup problem — it is a function of slip angle. A driver who is not committing to entry speed or not rotating the car sufficiently will never generate enough slip angle at the front to produce grip, regardless of what is done to the setup.

Before making any change, ask: does this problem appear in data and video, or only in the driver's feedback? If a faster driver is comfortable on the same setup, the problem is almost certainly technique. Chasing it with setup changes will make the car worse for the faster driver and will not fix the root cause.

> **NOTE** If multiple drivers report the same issue on the same setup, it is a setup problem. If only one driver reports it, look at technique first.

STEP 3 — WHERE DOES IT HAPPEN?

Be specific. The answer tells you which part of the corner to focus on and which adjustments are relevant.

- **Entry (turn-in to apex):** The car is not rotating, or rotating too much. This is about front grip, rear stability, and how the car transitions weight on corner entry.
- **Mid-corner (at the apex):** The car is not holding its line at speed. At high speed this is almost always an aero balance issue. At low speed it is mechanical balance.
- **Exit (apex to track-out):** The car is not putting power down cleanly. Exit problems are often caused by what happened in the mid-corner — do not address exit in isolation without understanding what preceded it.

STEP 4 — IS IT SPEED-DEPENDENT?

This separates aerodynamic problems from mechanical ones.

- **Problem only at high speed:** Aero balance. The tunnels and wings are the primary tools. Start with the front wing angle — it is more sensitive than the rear. Check tunnel heights are at factory spec.
- **Problem only at low speed:** Mechanical balance. Swaybar, toe, and ride height are the levers. Rear toe adjustment is the biggest lever of these three for stability adjustment, front toe out can be added to increase initial turn in.

12. FACTORY SETUP REFERENCE

All factory settings were developed over two years of testing and national championship racing. This is the verified baseline. Deviations should be intentional, documented, and reversible.

Front Camber	**2.5° negative**	17mm straight-edge measurement
Rear Camber	**2.5° negative**	17mm straight-edge measurement
Front Toe	**0.5° toe-in**	Laser to pin centre groove
Rear Toe	**0.85° toe-in**	Laser to pin centre groove
Front Caster	**4.5° positive**	
Rear Caster	**2° negative**	
Front Ride Height	**125mm**	Ground to front bulkhead
Rear Ride Height	**155mm**	Ground to rear bulkhead lowest point
Front Tunnel Height	**52mm**	Ground to underside of tunnel floor
Rear Tunnel Height	**60mm**	Ground to underside of tunnel floor
Tyre	**Hankook Slick**	
Tyre Pressure (hot)	**21–22 psi**	Measure immediately after inlap

This document should be read alongside the Hyper Racer X1 User Manual (Version 6, 2026), which contains full adjustment procedures, torque specifications, and service intervals.