CCG-LR

LONG-RANGE BALLISTIC SOLVER

User Manual

Quick-start & complete reference · Version 1.0

Cap Coast Gunsmithing — Long Range

Powered by Mapped Out Solutions · Offline-first · Metric · Mil

READ ME FIRST

How to use this manual

This manual has two halves. The **Quick Start** gets you from a fresh install to a confirmed firing solution in a few minutes. The **Reference** then walks every screen in the app, one at a time, so you can look up anything in detail. A short **Concepts** primer sits between them, explaining the shooting ideas the app relies on (mil vs MOA, density altitude, truing and so on) in plain language — read it if any term is unfamiliar, skip it if you already shoot long range.

You can open this manual any time — offline
It's built into the app: go to **Settings** → **Help** → **User manual**. No internet needed.

Safety comes first — please read the last section
Every number this app produces is a **prediction**: a starting point you must confirm with live fire (truing) on your own rifle, under supervised and lawful conditions. It does not replace training, a spotter, or your own judgement. The full safety and legal notice is at the back of this manual.

What the colours mean in this manual:

Tip
Cyan boxes are handy shortcuts and things worth knowing.

Good to go
Green boxes describe a confident, do-this situation.

Caution
Amber boxes flag something to check before you trust the result.

Stop
Red boxes are hard limits or safety points — don't skip them.

CONTENTS

What's inside

> The app is **offline-first**. Once installed it needs no internet, no account and collects no personal data — everything lives on your device.

QUICK START

From install to first confirmed shot

Five steps. If you've bought the course, do step 1 first; otherwise the free app still lets you explore the solver on the built-in demo rifle.

1 · Unlock the app with your course code

The app is free to download and try. Buying the Cap Coast Gunsmithing long-range course unlocks the full experience — building your own rifles, logging DOPE, truing and more. Open **Settings** (the gear on the Home screen), find **Account & Entitlement**, type the code from your welcome email into **Have a course code?** and tap **Redeem**.

> **Your code looks like this**
> Codes are formatted `CCG-LR-0001` and up. Redeem once — it then works permanently, offline. You can type it loosely (`ccglr0001` or `CCG LR 0001` also work).

2 · Set up your rifle

From Home tap **Library** → or the **New profile** button on the Profiles screen to open the guided **wizard**. It walks four steps: pick your **calibre** (or choose “Other / not listed” for anything unusual), choose your **bullet** from the built-in library (or enter a custom one), pick a **rifle preset**, then **confirm the details** — name, muzzle velocity, zero range, sight height and barrel twist. Save, and that rifle becomes active.

> **Get these two right**
> Your **muzzle velocity** and **zero range** drive every solution. If you have a chronograph reading, use it; otherwise start with the manufacturer's figure and true it later (step 4).

3 · Get a firing solution

Tap the **Firing Solution** tab. Set your **target range**, choose an **atmosphere preset** (or enter temperature, pressure and humidity), and dial in the **wind** — speed plus a clock direction. The card gives you your **elevation** (come-up) and **wind hold** in your chosen units, plus velocity, energy, time-of-flight and a supersonic / transonic status. Below it, a 100 m step **DOPE table** shows the whole trajectory.

> **In a hurry?**
> The **Basic** tab is a stripped-back version — just range and a rough wind — for a fast come-up when you don't need the full picture.

4 · Confirm it with live fire (truing)

Predictions are a starting point. Shoot at a known distance, see where you actually landed, then open **True your rifle**. Enter the elevation that hit; the app adjusts your muzzle velocity (best up to ~600 m) or your bullet's drag/BC (for the far, transonic stuff) so future predictions match your rifle. True velocity first, then BC for distance.

5 · Log it and build your DOPE

Every confirmed shot goes in the **DOPE log** — range, what you dialled, the result, your position, cold-bore or not, and the conditions at the time. Over a season this becomes the most trustworthy data you own. Export it to CSV or print a **Field Pack** range card to carry.

> **That's the loop**
> Set up → predict → confirm (true) → log. Repeat it and the app gets more accurate to *your* rifle every range trip.

CONCEPTS

The ideas behind the numbers, in plain language

Skip this section if you already shoot long range. Otherwise, a few minutes here makes every screen make sense.

Mil and MOA — angular units

Both measure angles, which is how scopes adjust. A **mil** (milliradian) is 10 cm at 100 m; a **MOA** (minute of angle) is about 2.9 cm at 100 m (roughly 1 inch at 100 yards). The app is mil-first but you can switch to MOA in Settings. A **click** is one turret increment on your scope — usually 0.1 mil or ¼ MOA — and the app converts holds into clicks for you once you enter your scope's click value.

Zero and sight height

Your **zero range** is the distance at which your point of aim equals point of impact. **Sight height** is the vertical gap between the centre of your scope and the centre of the bore — it matters most up close and for the trajectory's early rise. Both are set per rifle profile.

Ballistic coefficient (BC) and drag model

A bullet's **BC** describes how well it slips through the air — higher is slicker. It's quoted against a standard **drag model**: **G1** (flat-base reference, common for hunting bullets) or **G7** (boat-tail reference, better for long, sleek match bullets). For extreme range the app also supports a **stepped BC** (different BC in different speed bands) or a full **Cd table** (drag coefficient vs Mach) for maximum fidelity.

Density altitude (DA)

Air resistance depends on air **density**, which changes with temperature, pressure and humidity. Shooters bundle all three into one number — **density altitude** — so a hot day at sea level might “fly like” 3,000 ft. The app computes DA from the conditions you enter and factors it into every solution.

Wind value and the clock

Only the **crosswind** part of the wind pushes your bullet sideways. You describe wind direction as a clock face (12 = straight into you, 3 = from your right, 6 = from behind). A pure crosswind (3 or 9) is **full value**; a head/tail wind (12 or 6) is **no value**; angles between are **part value**. The app does this maths in the W.I.N.D. tool.

Spin drift and Coriolis

A spinning bullet drifts slightly in the direction of spin (**spin drift**) — a right-hand twist pushes right, growing past ~800 m. The Earth's rotation (**Coriolis**) nudges it too, depending on your latitude and the direction you're firing. Both are small but real at distance; the app includes them (toggle in Settings) and uses your latitude/azimuth for Coriolis.

Transonic and stability

As a bullet slows toward the speed of sound (about Mach 1) it enters the **transonic** zone, where flight gets less predictable. The app flags transonic ranges and warns you to true carefully there. **Stability** (the Sg number, from your barrel twist and the bullet) tells you whether the bullet is spinning fast enough to fly true — *stable*, *marginal*, or *under-stabilised*.

Truing

Truing is correcting the prediction to reality. You compare what the app said to where your shots actually landed, and it adjusts your muzzle velocity or effective BC so future predictions match your rifle, your ammo and the day's air. It's the single biggest thing you can do for accuracy at distance.

Hit probability

Even a perfect solution can miss because of your grouping, an imperfect wind call, or range error. The **Hit probability** tool runs many simulated shots against a target of a given size and returns your realistic odds of a first-round hit — a sober check before you take a shot on game or a small target.

REFERENCE

Every screen, one at a time

The app has four tabs along the bottom — **Home**, **Basic**, **Firing Solution** and **Library** — and a set of tool screens you open from Home or from within a workflow. This section covers them in that order. For each screen: what it's for, what you set, what you get, and whether it needs a course code.

The four tabs

Home

Your dashboard and launch pad for every tool.

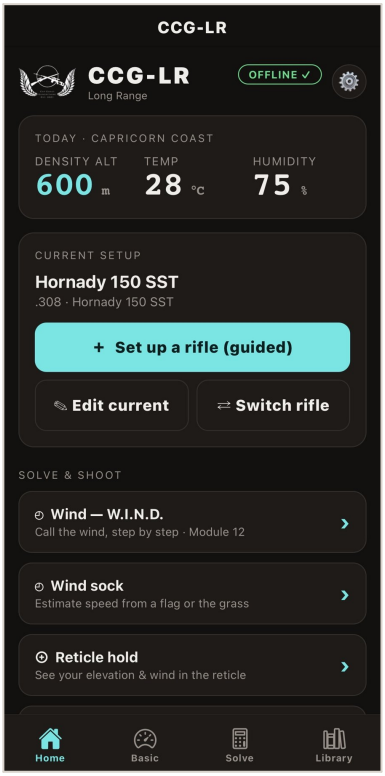
You set:

- Nothing here is an input — Home is a hub. The gear icon opens Settings.

You get:

- Today's density altitude, temperature and humidity at a glance
- Your active rifle: name, calibre, bullet and muzzle velocity
- Quick links grouped as **Solve & Shoot** (Wind, Wind sock, Reticle, Hit probability), **Your Data** (DOPE, True my rifle, Zero), and **Setup & Reference** (Library, Compare, Derive BC, Field tools, Field Pack)

Everything is at most one tap from here. If a number looks wrong, it usually traces back to the active profile or the environment shown at the top.



The Home dashboard

Basic

A fast, stripped-back come-up when you don't need the full solver.

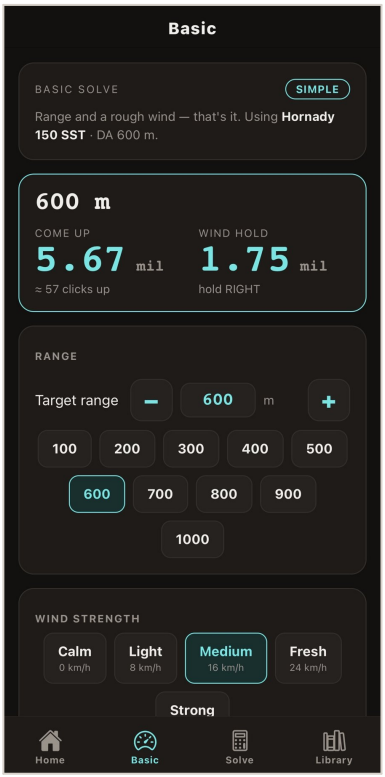
You set:

- Target range (quick chips 100–1000 m, or the slider)
- Wind strength (five presets, Calm to Strong) and a rough direction (head / tail / left / right)

You get:

- **Come up** — elevation in your units, plus estimated clicks
- **Wind hold** — magnitude and direction (left / right)
- A clear flag if the range is beyond your load's usable distance, and a transonic marker

Think of Basic as the “walking around the paddock” screen. When conditions matter, step up to the Firing Solution tab.



The Basic tab

Firing Solution

The full solver: elevation, wind, atmosphere, slope and stability.

You set:

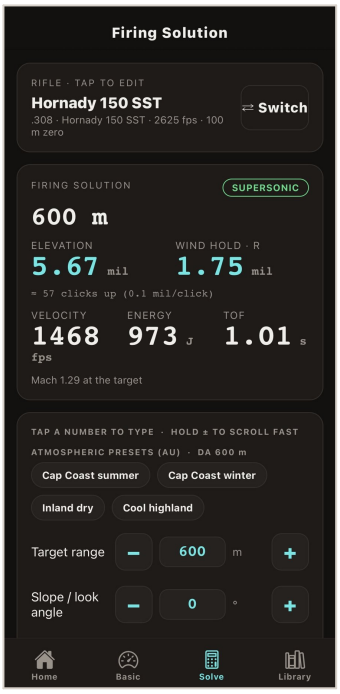
- Rifle & load (tap to edit or switch profile)
- Atmosphere — pick an Australian preset or enter temperature, station pressure and humidity
- Target range and slope / look angle (uphill or downhill, –45° to +45°)
- Wind speed and clock direction

You get:

- Elevation and wind hold (with clicks), plus velocity, energy, time-of-flight and Mach at the target
- A status pill: **Supersonic**, **Transonic** or **Beyond range**
- A **Stability & transonic** panel (Sg rating and the supersonic/subsonic band)

- A 100 m step **DOPE table** for the whole trajectory, with the row nearest your target highlighted and transonic rows flagged

This is the screen you'll live in on a shooting day. The DOPE table is your come-up card at a glance.



The firing-solution card

The 100 m DOPE table

> **Slope matters**
> On steep uphill or downhill shots, set the look angle — gravity only acts on the horizontal part of the distance, so a raw range over-predicts your come-up.

Library

Browse the built-in bullet database, manage packs, and pick your load.

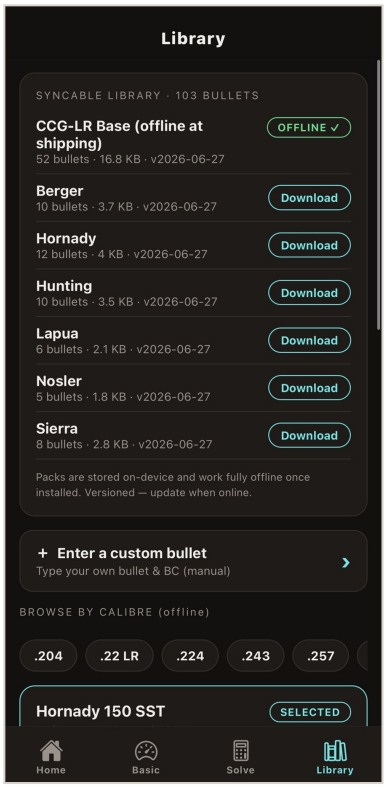
You set:

- A calibre filter (scroll the chips)
- Which bullet is active for the current rifle
- Which optional bullet packs are installed

You get:

- A searchable list by calibre, each bullet showing weight, drag model (G1/G7), BC and any advanced-drag flags
- Pack cards showing size and version — bundled packs are **Offline**, others you install once and keep

Everything is stored on-device and works offline once installed.



The bullet library

> **Needs a course code**
> Changing the selected bullet and installing or removing packs need a course code. Browsing is always free.

Rifle setup

New-profile wizard

A guided, four-step setup for a new rifle and load.

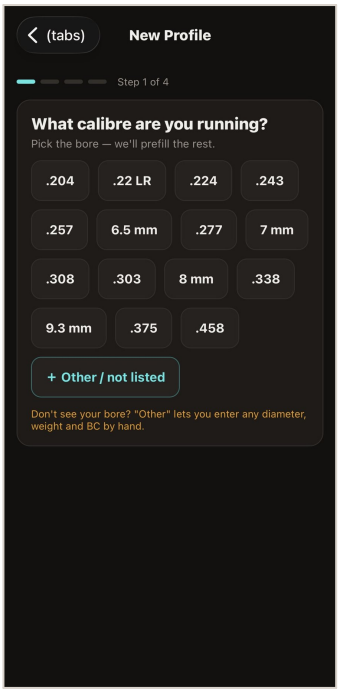
You set:

- **Step 1 — Calibre:** choose from the chips, or “Other / not listed” to enter a custom diameter
- **Step 2 — Bullet:** pick from the library for that calibre, or enter a custom bullet (name, weight, length, drag model, BC)
- **Step 3 — Rifle preset:** sensible starting values for sight height, zero, twist and twist direction
- **Step 4 — Confirm:** profile name, muzzle velocity (and its SD), zero range, sight height, twist and direction, and your scope's click value

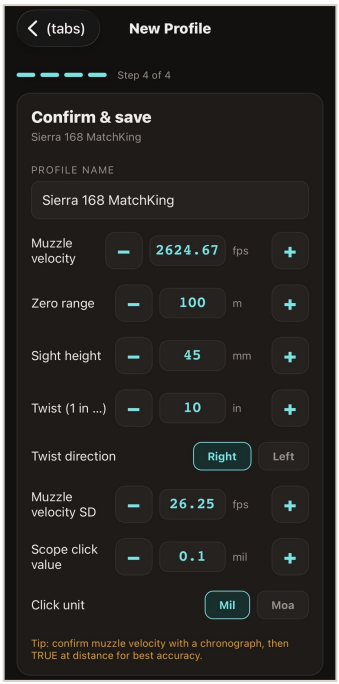
You get:

- A saved rifle profile that becomes active and feeds every solving screen

The SD (standard deviation) of your muzzle velocity is optional but improves the Hit-probability estimate.



Step 1 — pick calibre



Step 4 — confirm & save

Profiles

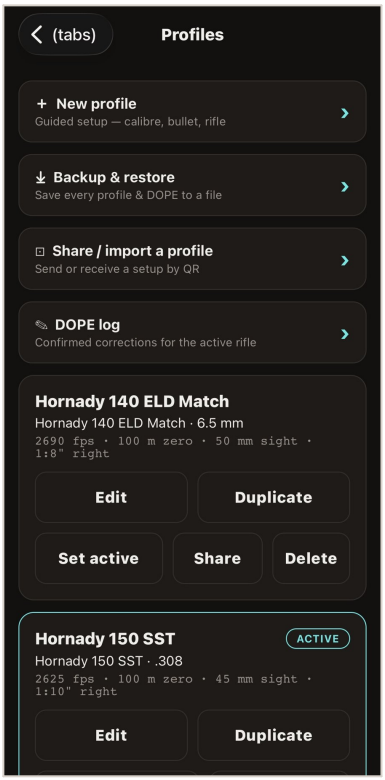
Your rifle bench — view, switch, and manage every saved setup.

You set:

- Tap a profile to make it active and jump to the solver

You get:

- Cards for each rifle with its bullet and key specs, and buttons to Edit, Duplicate, Set active, Share or Delete
- Quick links to the wizard, Backup & restore, Share/import, and the DOPE log



Your saved rifles

Deleting a rifle deletes its DOPE
A rifle's DOPE log belongs to that rifle, so deleting the rifle removes its logged shots. The app asks you to confirm first, and won't let you delete your only profile.

Needs a course code
Adding a new profile and duplicating one need a course code; you can always view, share and back up.

Edit profile

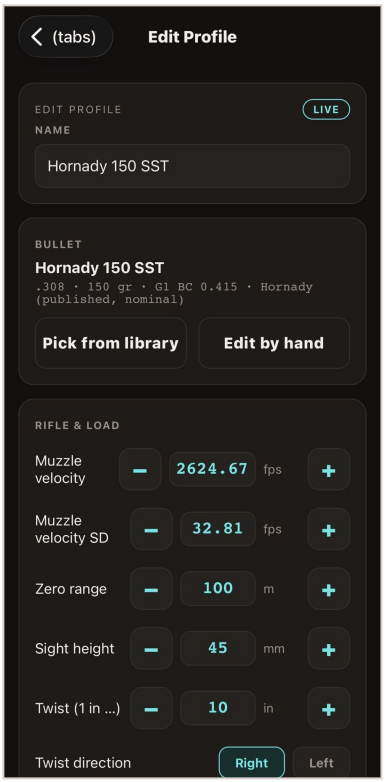
Fine-tune an existing rifle's rifle and load parameters.

You set:

- Name, muzzle velocity and SD, zero range, sight height, twist and direction, and scope click value
- Swap the bullet (from the library or a custom entry)

You get:

- Changes save instantly and flow through to every solution. The current effective BC is shown, including any truing scale factor (e.g. BC 0.567 × 0.983)



Editing a rifle profile

> **Needs a course code**
> Editing needs a course code.

Custom bullet

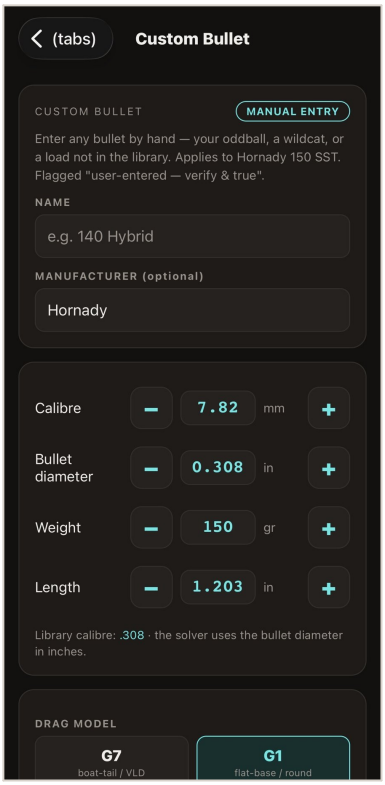
Enter a bullet that isn't in the library — a wildcat, milsurp or unlisted load.

You set:

- Name, optional manufacturer, diameter and weight, length, and drag model (G1/G7)
- One of three drag inputs: a single **BC**; a **stepped BC** (different BC per speed band); or a full **Cd table** (drag coefficient vs Mach) for extreme range

You get:

- A custom bullet applied to your active profile, with the chosen drag mode confirmed



Entering a custom bullet

Which drag input?
Most shooters just enter a single BC. Reach for stepped BC or a Cd table only if you're chasing extreme-range accuracy and have the data to support it.

Needs a course code
Saving a custom bullet needs a course code.

Reading the wind

W.I.N.D. — guided wind call

A step-by-step wind read: Watch, Identify, Number, Dial.

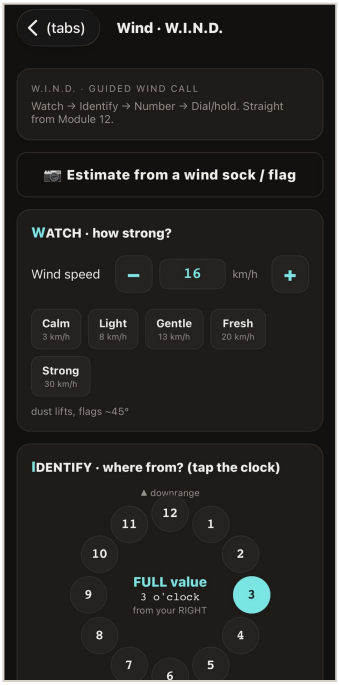
You set:

- **Watch:** wind speed (slider or five presets from Calm to Strong)
- **Identify:** tap the clock dial for the direction it's coming from

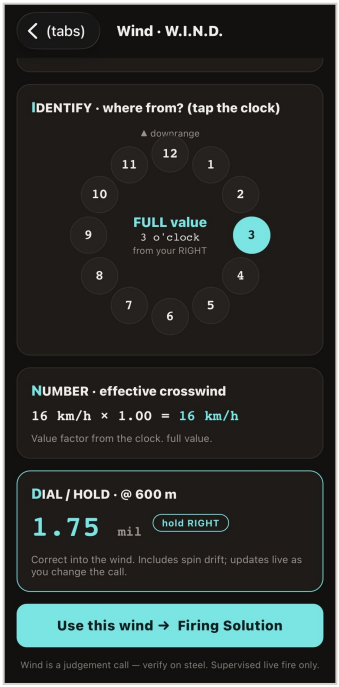
You get:

- A plain-language readout (strength, from which side, full/part/no value)
- The effective crosswind, and your **hold** — magnitude and direction — with spin drift already included
- A one-tap “Use this wind → Firing Solution” button

Wind is the hardest variable in long range. This tool structures the call so you're consistent every time.



Watch — set the speed



Identify, number & hold

> **Safety**
> Wind is a judgement call — verify on steel before trusting it on game.

Wind sock / flag

Estimate wind speed from how far a flag or sock is drooping.

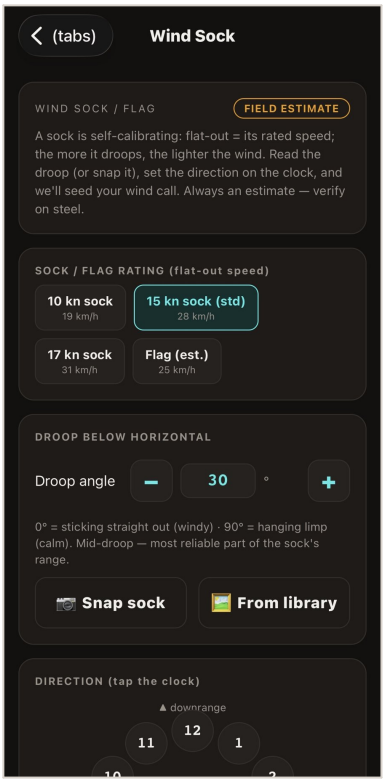
You set:

- The sock's flat-out rating, the droop angle (slider, or tap two points on a photo), and the clock direction

You get:

- A wind speed estimate with a confidence hint, and an effective-crosswind band
- A one-tap hand-off into the W.I.N.D. tool

A fast first read, not a measurement — socks vary and gusts lie. Refine by watching mirage and grass.



Estimating wind from a flag

Sighting in

Zero & correction

Measure a group and get the exact turret correction to centre it.

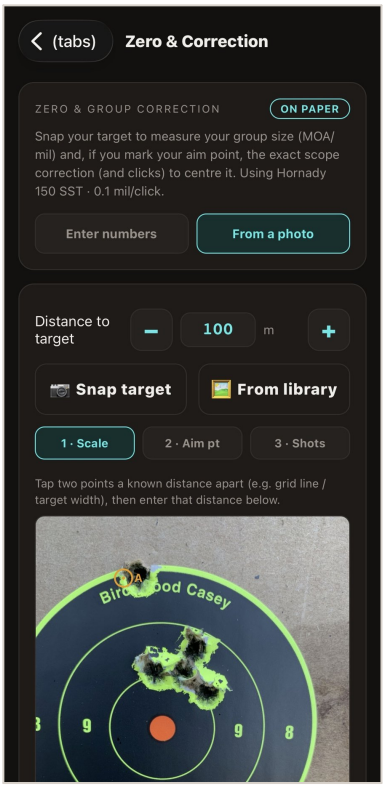
You set:

- Distance to the target
- Either: the group's vertical and horizontal offset by hand (cm), or a **photo** — set the scale by tapping a known distance, mark your aim point, then tap each shot

You get:

- From a photo: group size as extreme spread and mean radius (in MOA, mil and cm), with a precision estimate and a plot
- The **correction** to centre: elevation and windage, each as a magnitude, a direction (up/down, left/right) and clicks

Dial the correction, then fire another group to confirm. Mean radius is a steadier measure of your rifle's precision than a single worst-pair spread.



Measuring a group from a photo

Reticle hold

A visual reticle showing your come-up and wind as a single hold point.

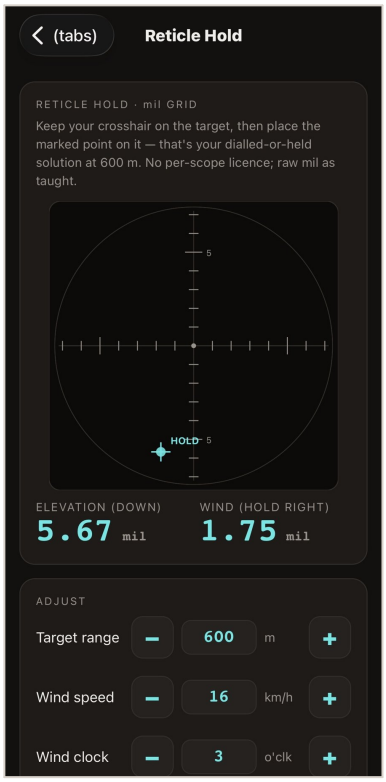
You set:

- Target range, wind speed and clock direction

You get:

- A reticle grid with a marked hold point — put that point on the target instead of dialling
- The elevation (down) and wind (left/right) in mil or MOA

A teaching and holdover aid. Spin drift is included in the wind mark, which sits on the correct drift side.



The reticle hold view

Safety

Confirm holds on steel — a hold aid is only as good as your range and wind call.

Confidence & planning

Hit probability

Your realistic first-round hit odds against a real target.

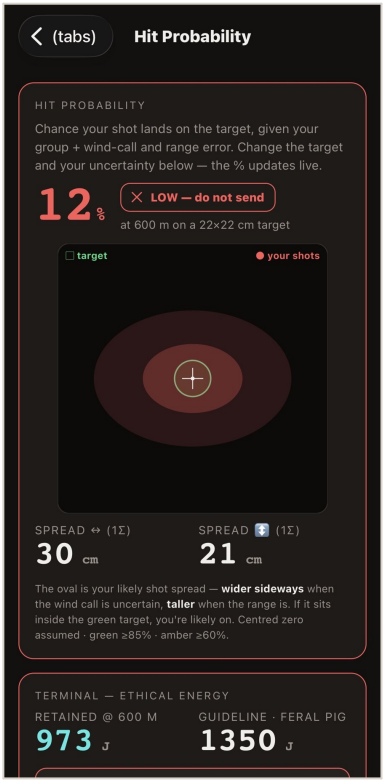
You set:

- A target (presets like feral-pig vitals, goat, fallow deer, IPSC steel, or a custom size)
- Your uncertainty: grouping precision (1σ), wind-call error, and range error

You get:

- A hit-probability percentage with a Go / Caution / No-go band, and a plot of your shot spread against the target
- For game species: retained energy at range against an ethical-energy guideline

This is the honesty check. Small targets and big wind/range uncertainty pull the odds down fast at distance.



A first-round hit estimate

Compare loads

Two rifles or loads side by side.

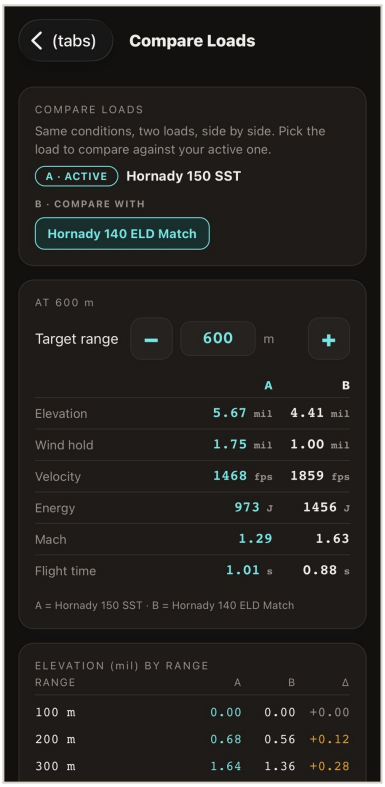
You set:

- Pick a second profile to compare against your active one, and a range

You get:

- A head-to-head table at that range (elevation, wind, velocity, energy, Mach, flight time)
- An elevation-by-range table in 100 m steps with the difference highlighted; rows stop at each load's usable range

Handy for choosing between two bullets or judging what a faster load actually buys you.



Two loads side by side

Field tools

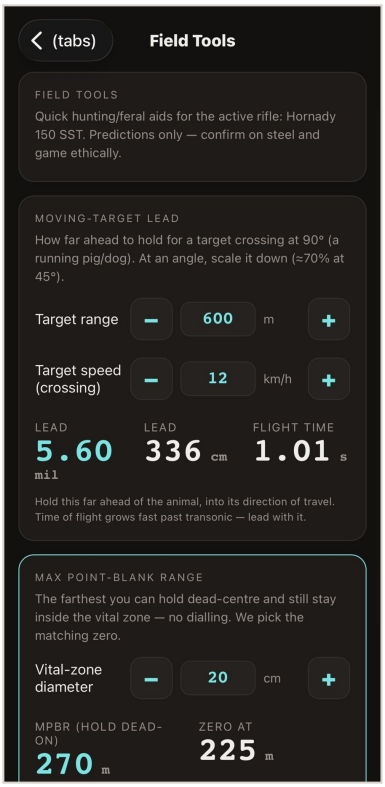
Hunting aids: moving-target lead and max point-blank range.

You set:

- For lead: target range and speed. For MPBR: your vital-zone diameter

You get:

- **Lead** for a crossing target in mil/MOA and cm/in, with time-of-flight (lead grows past transonic)
- **Max point-blank range**: the farthest you can hold dead-on without dialling for that vital zone, plus a recommended zero



Lead & max point-blank range

Safety

Ethics first — take only shots you can place, and comply with your hunting and firearms laws.

Your data

DOPE log

Log confirmed shots per rifle and watch your real-world trends.

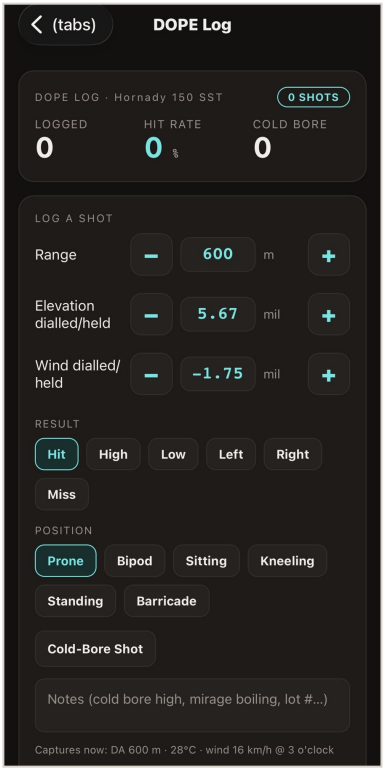
You set:

- Range, elevation and wind you dialled/held, the result (hit/high/low/left/right/miss), your position, and a cold-bore toggle and notes

You get:

- Running stats (shots logged, hit rate, cold-bore count) and a trend nudge if a pattern appears
- A history list you can export to CSV. The conditions (DA, temp, wind) are captured automatically with each shot

Your DOPE is the truth — true to it. Over time it beats any prediction.



Logging a shot

> **Needs a course code**
> Logging new shots needs a course code; viewing and exporting are always available.

Field Pack card

A printable range card for the active rifle and conditions.

You set:

- Nothing — it uses your active profile, environment and wind

You get:

- A compact 100 m step table (range, elevation, wind, drop, velocity) with transonic rows flagged

- Export or print to PDF, or export CSV for your paper DOPE book

Share / import a profile

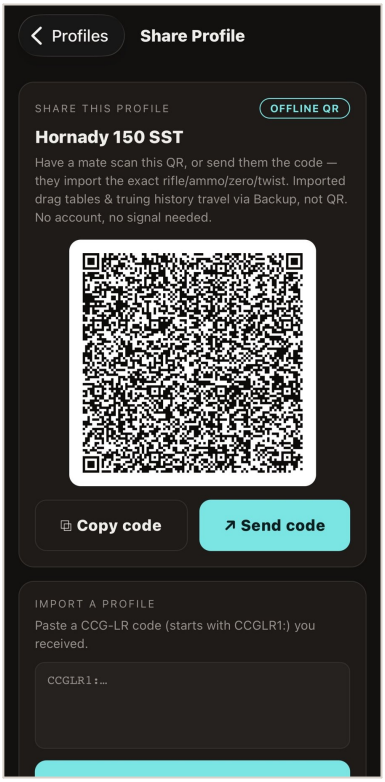
Send a rifle setup to a mate — no internet or account needed.

You set:

- To share: nothing (it builds a QR and text code from the active profile). To import: paste a received code

You get:

- A QR code and a copyable text code (starting `CCGLR1:`) you can send any way you like
- Importing adds the profile and makes it active



Share by QR or code

> **Truing history doesn't travel by QR**
> A shared code carries the rifle setup but not its truing log — use Backup & restore to move a full history between devices.

> **Needs a course code**
> Importing a profile needs a course code.

Backup & restore

Save everything to a file, or move to a new phone.

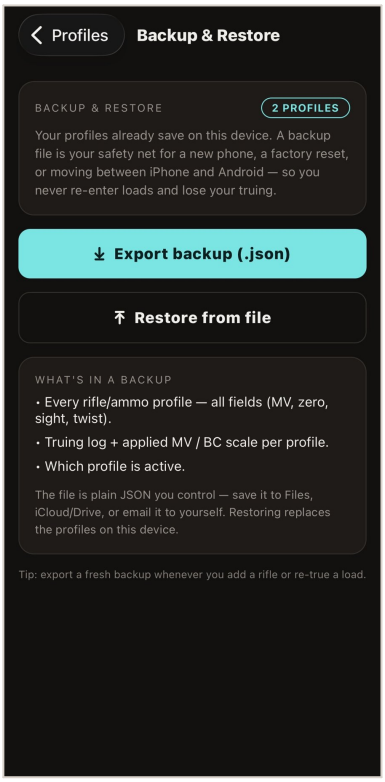
You set:

- Export: nothing. Restore: pick a backup file

You get:

- A plain JSON backup of all profiles, DOPE logs and your active rifle — store it in Files, iCloud or email
- Restore replaces what's on the device with the backup's contents (it confirms first)

Unlike a shared QR, a backup includes your full truing history. This is your safety net and your iPhone-to-Android bridge.



Backup & restore

Precision tools

Derive BC

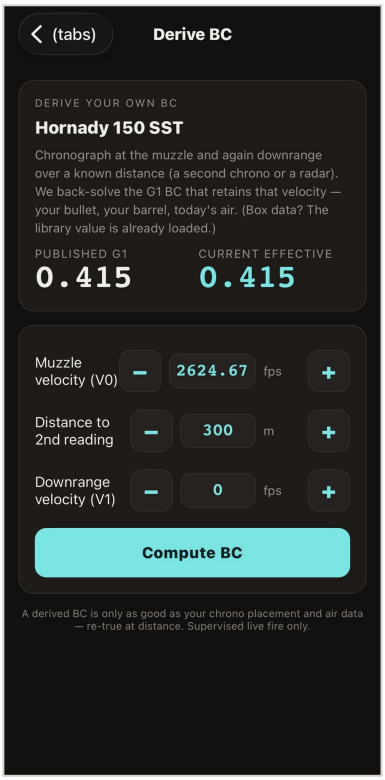
Back-calculate your bullet's real BC from two velocity readings.

You set:

- Muzzle velocity, the distance to a second reading, and the velocity there (from a second chrono or radar)

You get:

- The BC your bullet is actually showing in your barrel and today's air, versus the published figure
- An option to apply it to your profile as a BC scale factor



Back-solving BC from two speeds

> **Needs a course code**
> Applying the derived BC needs a course code; computing it is free.

True your rifle

Match the solver to your live-fire results — the accuracy multiplier.

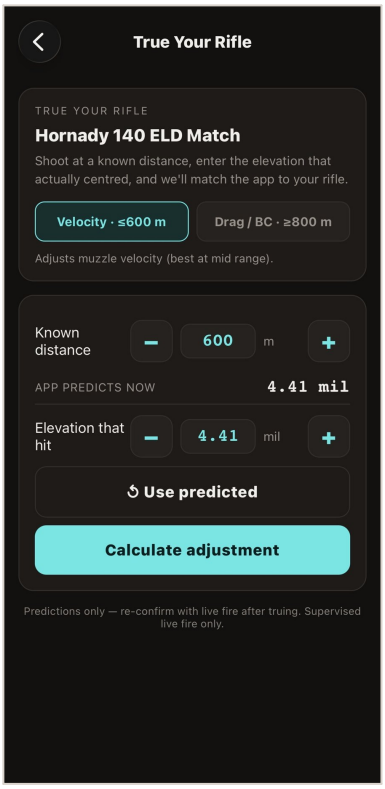
You set:

- A method: velocity truing (best up to ~600 m) or drag/BC truing (for far, transonic shots)
- The known distance and the elevation that actually hit (or let the app pre-fill its prediction)

You get:

- A suggested adjustment (before → after), the resulting match, and an Apply button that stores it against the profile with the day's conditions
- A truing log so you can see how your rifle has behaved over time

Do velocity first, then BC for the far stuff. This is the single most valuable habit for distance accuracy.



Truing to a live-fire result

> **Needs a course code**
> Applying truing needs a course code; calculating is free.

Settings & reference

Settings

Unlock, solver options and display units.

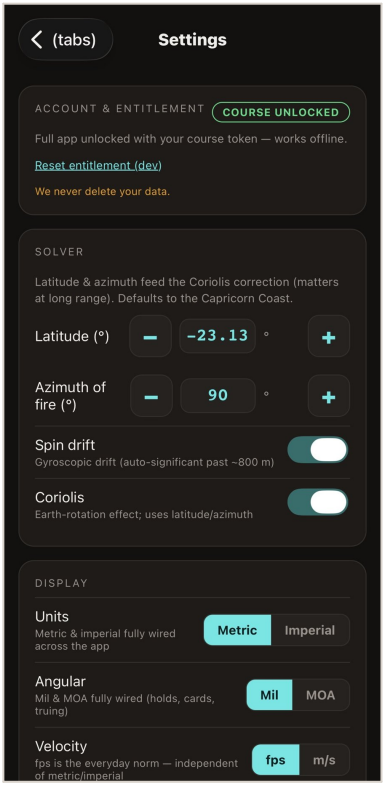
You set:

- **Account & Entitlement:** your status (Free or Course unlocked) and the course-code redeem field
- **Solver:** latitude and azimuth (for Coriolis), and toggles for spin drift and Coriolis
- **Display:** units (metric/imperial), angular (mil/MOA) and velocity (m/s or fps)

You get:

- A permanent unlock once a valid code is redeemed, and app-wide unit preferences
- App info and confirmation that everything runs offline with no data collection

Defaults suit the Capricorn Coast (latitude –23.13°). Set your own latitude for accurate Coriolis at long range.



Settings & unlock

Firearms regulations

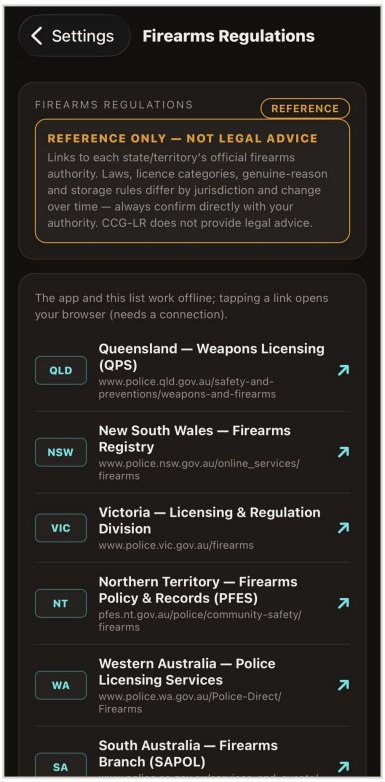
Quick links to the right authority — reference only.

You set:

- Nothing — tap your state or territory

You get:

- Official links for all eight Australian jurisdictions, plus general background on categories and requirements



State authority links

Safety

This is reference only, not legal advice. You are responsible for lawful, safe use in your jurisdiction.

PLEASE READ

Safety, accuracy & legal

Predictions are a starting point, not a guarantee
Every solution this app produces is a calculated estimate. Real bullets are affected by your exact rifle, ammunition lot, barrel condition, the day's air, and your own technique. You **must** confirm predictions with live fire (truing) before relying on them, and re-confirm when anything changes.

Supervised, lawful use only.

Use this app only in the context of safe, supervised and lawful shooting. It supplements — it never replaces — proper training, a competent spotter, range discipline and your own judgement. Never take a shot you cannot positively identify, safely place, and legally make.

Bullet data.

Library figures are manufacturer-published or user-trued. Treat them as a starting point and true them to your own rifle. Ballistic coefficients in particular vary between lots, barrels and conditions.

Hunting ethics.

The energy and hit-probability guidelines are aids to good decisions, not permission. Take only shots you can place cleanly, within your confirmed ability and the animal's welfare.

Legal.

The regulations section provides links and general background for reference only — it is not legal advice. Firearms and hunting laws differ by state and territory and change over time. You are solely responsible for complying with the laws that apply to you.

Privacy.

CCG-LR is offline-first. It works without an internet connection or an account, and it does not collect or transmit your personal data — your profiles, DOPE and settings stay on your device. Use Backup & restore to keep your own copy.