

Carshepherd: User Manual

App version: 0.7.24 · Date: 2026-09-11

This manual covers installation, the subscription, calibration and all functions of Carshepherd. The app interface is in English, so this manual uses the **button and menu names exactly as they appear on screen**. The subscription screen is currently in Dutch; where it is quoted, an English translation follows in brackets.

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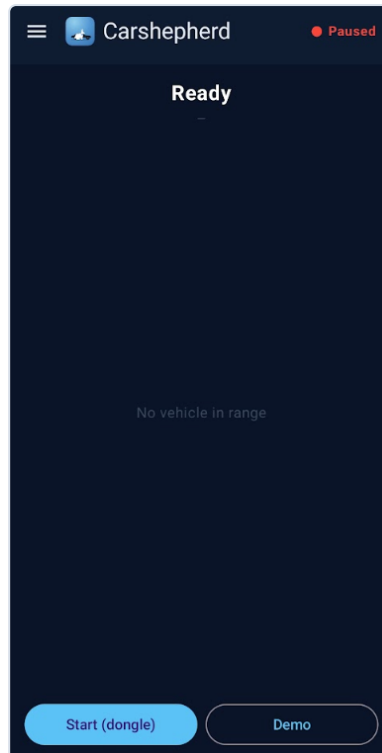
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1. What is Carshepherd?

Carshepherd is a lightweight Android app that uses an **RTL-SDR dongle** to listen in on the radio band of **C2000/TETRA**, the communications network of the Dutch emergency services (police, ambulance, fire brigade, military police). The app **does not read any messages** (that is not permitted and not the point), but detects the **presence and proximity** of transmitting units, so that you know early on that an emergency service is active nearby and can make room in good time and safely.

Carshepherd shows this visually (coloured bars, a radar, a co-mover alert) and audibly (beeps), and can optionally give a pop-up notification. The app also warns you, based on GPS, about **speed cameras and average-speed checks**, and lights up the screen silently when you approach a **police station, hospital, fire station or military area**.

The **real scan** requires a subscription (with a free first month); the **demo** is always free (see [chapter 5](#)).



2. How it works (in brief)

- Emergency service **vehicles transmit** on the **uplink band 380–385 MHz**. The **mast** transmits on the downlink (390–395 MHz). Carshepherd scans **the uplink only**, because that is what tells you something about vehicles near you. The mast is equally loud everywhere.
- The app measures two things per channel, independently of each other:
 - **Detection**: "is there a TETRA signal here?" This is based on the signal-to-noise ratio (SNR) and is independent of your settings: every signal above the noise is seen.
 - **Level/alarm**: "how close?" This is based on the absolute strength, which depends on your antenna, car and gain. That is why you have to **calibrate** this part for each setup (see [chapter 7](#)).
- An important limit of physics: a **non-transmitting** radio is radio-silent and therefore **invisible**, even at one metre. Carshepherd only sees a unit while it is actually **transmitting**.

3. What you need

Hardware

- An **RTL-SDR Blog V4** dongle (or comparable, with an R828D tuner). The older V3 works too.
- An **antenna** tuned to ~380 MHz (quarter wave ≈ 20 cm). An antenna tuned for TETRA performs better than a generic whip, but a good standard whip comes surprisingly close in practice: **the mounting and a good cable matter more than the exact antenna type** (see 4.4 and the antenna advice on the website).
- A **USB OTG connection** from dongle to phone. **Recommended**: a sturdy USB-A extension cable plus a separate USB-A→USB-C adapter. **Avoid** cheap combined charging/OTG splitter cables, which

cause dropped connections. A *powered* OTG hub is the most robust option.

- **A good, shielded cable matters for your setup.** A poor or unshielded USB cable carries noise from the phone, which can produce **weak false detections**: a continuous *network keep-alive* or weak green bars without any real unit being present. In many cases a **ferrite clamp costing about 50 cents**, clamped **as close to the dongle as possible**, already fixes this.

Software

- An Android phone (Android 8 or newer).
- The free **RTL2832U driver by Martin Marinov** (from the Play Store).
- The **Carshepherd** app (Google Play).

4. Installation

4.1 Installing the driver app

Carshepherd does not talk to the dongle directly, but through the free "**RTL2832U**" **driver** by Martin Marinov. Install that from the Play Store first. Carshepherd connects to it internally, over a local network port.

If the driver is missing, Carshepherd offers to open the Play Store page when it starts ("RTL-SDR driver required" → **Install**).

4.2 Installing Carshepherd

Install Carshepherd from **Google Play**. Open the app once so that you can grant the permissions (4.3).

4.3 Granting permissions

Carshepherd asks for a number of permissions. Grant them for full functionality:

Permission	What for
Location (precise)	speed camera, average-speed check and facility warnings, the speed boost and the co-mover/distance measurements (GPS).
Notifications	the ongoing scan notification and the pop-up on a red alarm.
Display over other apps (overlay)	showing the alarm on top of your navigation app.

Note: after reinstalling the app, the overlay permission ("display over other apps") is sometimes reset. If the overlay no longer appears, grant that permission again.

4.4 Connecting and mounting the hardware

1. Screw the **antenna** onto the dongle. Mount the antenna **vertically**. TETRA is vertically polarised, so horizontal (for example flat on the dashboard) gives worse and erratic reception.
2. Connect the **dongle** to the phone using the OTG cable or adapter.
3. **Make sure nothing heavy hangs from the phone's USB-C port.** A dongle plus antenna adapter dangling freely from the port acts as a lever and loses contact while driving, through vibration. That is the most common cause of "the dongle drops out". Fix the dongle in place (a holder, hook-and-loop tape) so that only a flexible lead runs to the phone.
4. Mount the antenna as high and as unobstructed as possible (a good "view", preferably on a metal ground plane if the antenna needs one).



4.5 Phone settings (keep running in the background)

Some phones (for example Xiaomi/HyperOS) close background apps aggressively. To stop the scan from being killed while your navigation app is in the foreground:

- Set **Battery** → **no restrictions** for **both Carshepherd and the RTL2832U driver**.
- **Lock** both apps in the "recent apps" overview, so they cannot be swiped away.
- Enable **autostart** if your phone offers it.

5. Subscription and free demo

The **real scan** (with your dongle) runs on a **subscription**:

- **First month free**, then **€ 3.99 per month, cancellable monthly** through Google Play.

- You can cancel at any time; if you cancel before the trial month ends, the trial simply stops and you pay nothing. Payment runs through your Google account.

The first time you tap **Start (dongle)** without an active subscription, the screen "**Ontgrendel de echte scan**" [Unlock the real scan] appears. Tap **Start je gratis maand** [Start your free month] to begin the trial, or **Bekijk demo (gratis)** [View demo (free)] to look around without a subscription.

The demo is always free. It shows every function in a loop (keep-alive radar → 1 bar → 2 bars → co-mover overlay), so you can get to know the screen without hardware or a subscription.



6. Starting for the first time

Keep to this **order**:

1. Connect the dongle and antenna.
2. Open Carshepherd and tap **Start (dongle)**. If you do not have a subscription yet, the subscription screen appears first (chapter 5). Carshepherd opens the driver if needed; allow the driver to use the USB dongle.
3. As soon as data arrives you hear a **short confirmation of 3 beeps** ("system check passed"). The status indicator at the top right turns **green** ("Running").

No dongle? Tap **Demo** (or **Bekijk demo (gratis)** [View demo (free)]) to see all the functions.



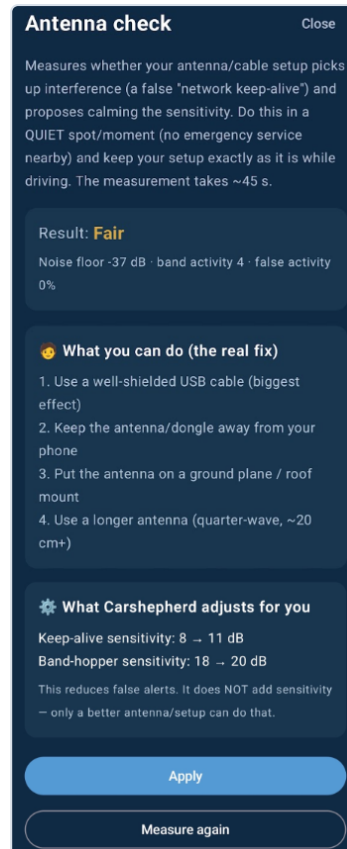
7. Calibration and Antenna check

Detection works the same everywhere (on SNR). But whether something turns **yellow, orange or red**, that is to say the proximity and alarm scale, depends on your **antenna, car and gain**. That is why you set that scale once per setup. The settings for it are in the menu under **Advanced**; on top of that there is the easy-to-use **Antenna check** as a first step.

7.1 Antenna check (recommended first step)

Menu → **Antenna check**. In **about 45 seconds** this measures whether your **antenna and cable setup picks up interference** that leads to **false activity** (a false "network keep-alive" radar or a false "🚗 bandhopper?"). Start the scan with the dongle on the main screen first; the check needs **live data**.

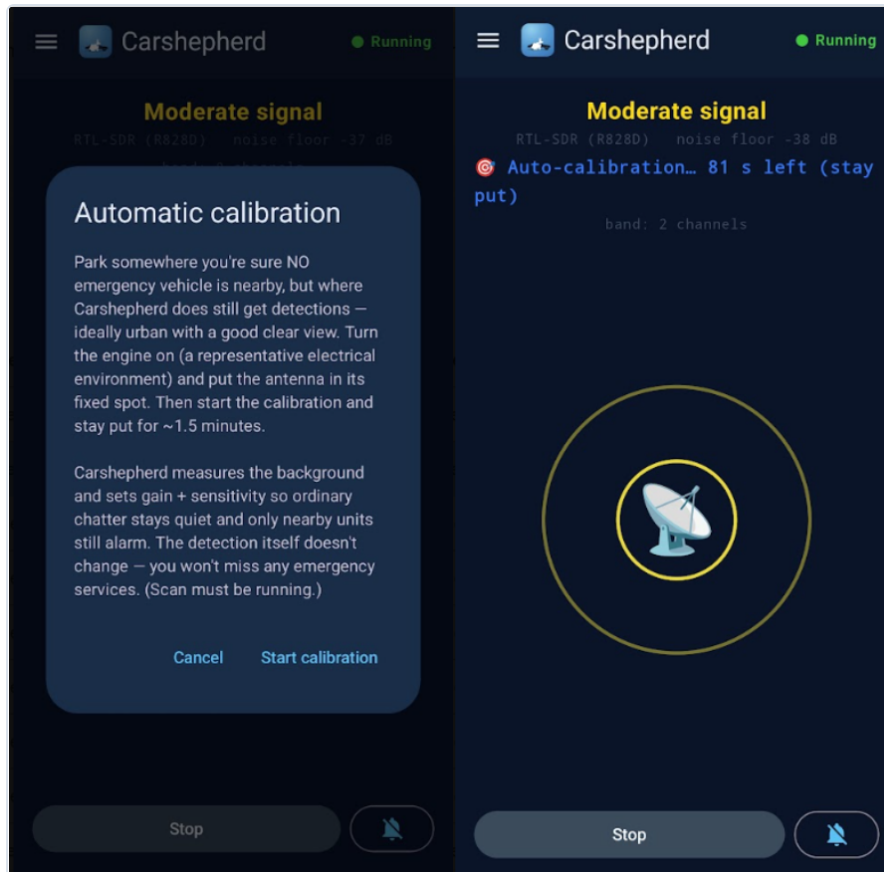
- Preferably measure in a **quiet spot**. After the measurement Carshepherd shows the measured noise floor and activity, plus a recommendation:
 - **"Your setup is clean — no adjustment needed 👍"** → nothing to do.
 - Otherwise the app proposes **calmer thresholds** (keep-alive presence and band-hopper sensitivity, shown as *from* → *to* dB). Tap **Apply** to apply them, **Measure again** to measure again, or **Reset to default settings** to return to the defaults.
- In short: a **noisy cable or antenna** can produce phantom activity; Antenna check measures that and **calms the detection** so that you do not get ghost alerts, without losing sensitivity to real units. A good, shielded USB cable is often the biggest gain.



7.2 Automatic calibration (alarm distance)

Menu → **Advanced** → **Automatic calibration**. CarShepherd measures the background for about 1.5 minutes and sets the sensitivity (and the gain if needed) automatically, so that the alarm threshold sits just above the background. **Stay stationary** during the measurement, in a representative spot with background traffic. If the measurement fails with "too few ambient signals", it was too quiet; try a busier place (a town, a busy road) at a quiet moment.

Rule of thumb: calibrate at a place and time **with** normal background TETRA but **without** an active emergency service nearby.



7.3 Manual fine-tuning (Advanced)

- **Sensitivity** (Menu → Advanced → *Sensitivity*): your **alarm distance dial**. Higher = weaker (more distant) signals reach the threshold = earlier and more alarms, but also more false alarms from the surroundings. Set it so that the screen stays just **green and quiet** in a background location. (If the speed boost is on and active, you see for example *Sensitivity (50 → 70)* .)
- **Antenna gain** (Menu → Advanced → *Antenna gain*): the hardware gain of the tuner. **Note:** more gain does **not** give more range (signal and noise rise together), and too much gain causes overloading (noise and false detections). Set the gain at the point where the noise floor is still tidy: with a sensitive antenna often somewhat **lower** than with a small whip.

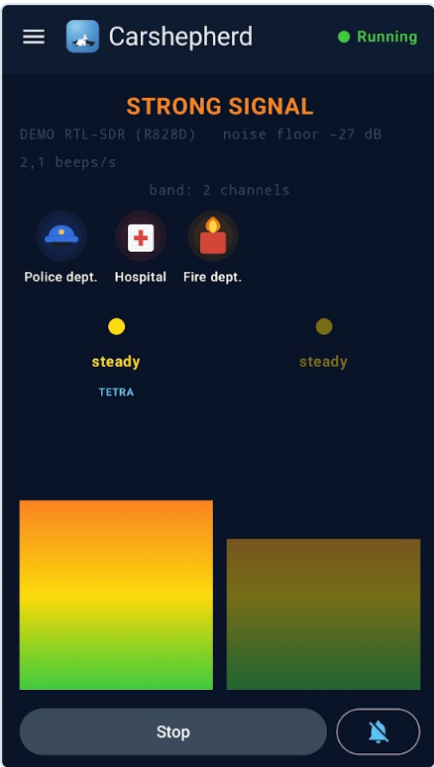
In short: **Sensitivity** = where you draw the alarm line; **Antenna gain** = coarse hardware adjustment against overloading; **Antenna check** = calming false activity from a noisy setup. Real range comes from the **antenna plus mounting**, not from these dials.

7.4 Saving and loading calibrations (per car)

Do you drive different cars, or use different antennas? Save your setting under a name:

- **Advanced → Save current calibration:** give it a name (for example "BMW TETRA antenna").
- **Advanced → Load saved calibration:** select a saved calibration to restore.

8. The main screen explained



8.1 Status indicator (top right). Shows the state: **Paused** (red, not active), **Connecting...** (orange), **Running** (green, scanning) or **Error** (red).

8.2 Header. Below the title you see the source (for example "DEMO RTL-SDR" or "RTL-SDR"), the **noise floor** (for example `noise floor -42 dB`) and, during an alarm, the **beep rate** (`x.x beeps/s`).

8.3 The bars (columns). Each bar is one tracked vehicle or channel. The **height and colour** show the strength and proximity:

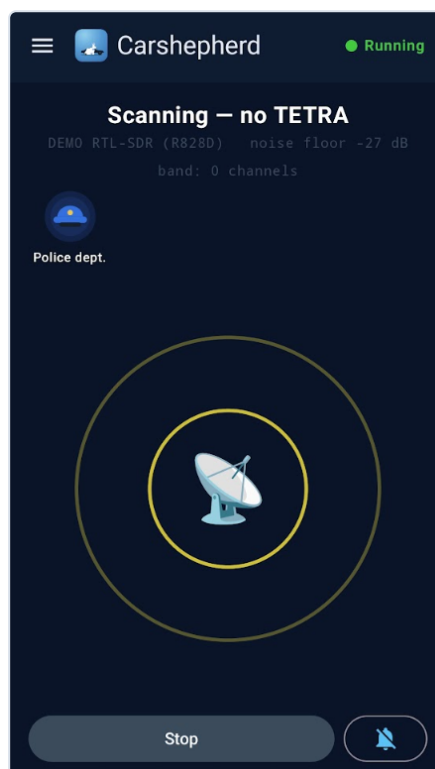
Colour	Meaning
Green	weak/far: detection, no alarm yet
Yellow	moderate
Orange	strong (close): beeping starts
Red	very strong (very close)

Above a bar you see "**TETRA**" when the signal is sync-confirmed (real TETRA modulation, not noise). The **frequency** is shown below it, with a ✓ when it is confirmed.

8.4 The blue glow. A bar gets a **blue border and glow** when it is (a) **confirmed** TETRA and (b) has been heard back **at least 3 times** on the same channel. Meaning: *a real, nearby unit with active radio traffic*, not a single distant burst. It is a sign of certainty and persistence, not an extra measure of strength.

8.5 Bandhopper indicator. The header shows "🚚 bandhopper? N channels active" when many different channels light up at once across the whole band, which is characteristic of a unit hopping quickly between channels (or of several units). If you get this falsely on a quiet drive, run an **Antenna check** (§7.1).

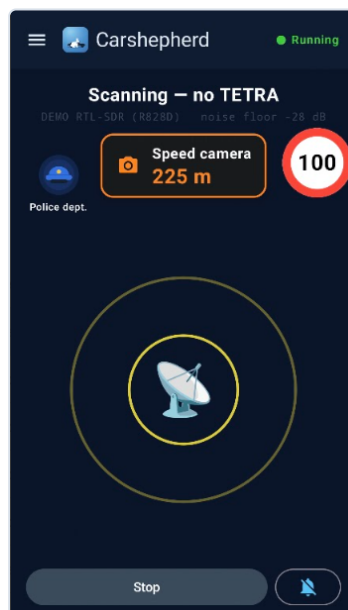
8.6 Keep-alive presence radar (📡). On a quiet drive with only **weak** TETRA activity (below the alarm threshold), Carshepherd shows a silent **radar pulse** instead of empty bars. This is deliberately **silent**: a subtle sign of activity without alarm fatigue. As soon as there is a real alarm, the bars and beeps take over.



8.7 Co-mover alert (🚚). When a unit is **travelling with you** (the same channel stays strong while you cover hundreds of metres to kilometres), a **police car with blue and red flashing lights** appears over the bars, together with the text "**CO-MOVER ALERT!**". This is the "loud big brother" of the radar. See also [chapter 10](#).



8.8 Speed camera and average-speed check warning. Based on GPS plus map data, Carshepherd shows a **warning** below the header, for both **fixed speed cameras** and **average-speed checks** (for an average-speed check it reads "Average-speed check"), and on the right a round **speed limit sign** when a limit is known. This warning is **optional**: you can switch it on or off under *Menu → Scan preferences → Speed camera alerts* (§9.1).



8.9 Nearby facilities (police, hospital, fire, military). When you come within **500 metres** of a **police station, hospital, fire station** or **military area**, a small, **silent** icon lights up at the top of the screen for as long as you are nearby (police cap · white building with a red cross · red building with a flame · green helmet). For military areas the distance is measured from the **outer boundary** of the area. The data comes from OpenStreetMap and you refresh it through the menu (§9.5). If you want to mute the TETRA alarm at such a place, use **Alarm preferences** (§9.2).

8.10 Start / Demo / Stop.

- **Start (dongle):** starts a real scan (opens the driver if needed; shows the subscription screen if you do not have a subscription yet).
- **Demo:** starts the feature demonstration without hardware (free).
- While scanning: **Stop**.

9. The menu

Open the menu with the **hamburger icon** (☰) at the top left. The sections:

9.1 Scan preferences

On/off options with a **slider switch** (red = off, green = on):

Option	What it does
Receive pop-up alerts	shows a heads-up notification on a red alarm.
Ride summary on stop (from 0.7.24)	sends one summary notification at the end of the ride, on Stop or when the dongle drops out: the number of red alarms with their time and frequency, and the number of co-mover detections with their time and the distance covered. Off by default. Independent of <i>Receive pop-up alerts</i> : the warning while you drive keeps working. No summary appears in the demo.
Speed camera alerts (from 0.7.23)	switches the speed camera and average-speed check warning (§8.8) on or off; on by default. Off = no speed camera display and no gong; the rest of the app (TETRA detection, facility icons, GPS) keeps working.
Speed sensitivity boost	raises the sensitivity automatically at higher speed (so you pick things up earlier on the motorway).
Show over other apps	shows the alarm as an overlay on top of your navigation app (requires the overlay permission).
Network keep-alive	switches the silent 📶 presence radar on or off.
Smart damping in busy TETRA areas	(<i>off by default</i>) automatically raises the alarm threshold while you drive through an area with a lot of TETRA that never comes close, typically open countryside. As soon as something strong passes, the damping drops away immediately. Useful if you get a lot of alarms without seeing anything.

9.2 Alarm preferences

Suppresses the TETRA alarm **per facility type** while you are within **500 m** of that type. Useful in places where there is a lot of emergency service TETRA in the air anyway (near a police station or a military area, for example). All switches are **off by default**. Per type (**Police station, Hospital, Fire station, Military area**) there are two options:

Option	What it does
... : suppress alarm sound	mutes the sound of the TETRA alarm (including the co-mover siren) within 500 m.
... : suppress alarm visuals	hides the alarm visuals (bars / co-mover) within 500 m.

The facility icon itself (§8.9) always keeps lighting up; you can still see that you are nearby, even when you have muted the alarm.

9.3 Antenna check

Measures in about 45 s whether your setup picks up interference, and proposes calmer thresholds against false activity. See §7.1.

9.4 Advanced

The calibration settings:

Option	What it does
Sensitivity	the alarm distance dial (§7.3). Shows the current value, for example <code>Sensitivity (50)</code> .
Antenna gain	hardware gain of the tuner (§7.3). Shows for example <code>Antenna gain (37 dB)</code> .
Automatic calibration	measures the background and sets the alarm threshold automatically (§7.2).
Load saved calibration	load a previously saved calibration.
Save current calibration	save the current setting under a name.
Band (<i>from 0.7.24</i>)	which band is swept. 380–385 (recommended) is the default and correct for the Netherlands and Belgium. 410–413 sweeps only that band instead of 380–385, and is needed where the uplink sits there, such as the police in London. Both / wide scan adds 410–413 on every fourth sweep and costs a measured 2.5 times the sweep time; pick it only when you do not know where to look. Because a wrong band leaves the app silent without anything on screen showing it, Carshepherd warns you at start-up whenever this is not set to 380–385, and keeps a small red Scan band line under the header for as long as it is not. Tap that line to bring the explanation back.

9.5 Refresh GEO points (cameras, hospitals, etc)

Fetches the most up-to-date **GEO points** around your position from OpenStreetMap: **speed cameras and average-speed checks** as well as the **facilities** (police, hospital, fire, military area). Requires a GPS fix; the data also refreshes automatically while you drive.

10. Terms and meanings

TETRA / C2000. The digital radio network of the emergency services. Vehicles transmit on the **uplink (380–385 MHz)**, the mast on the **downlink (390–395 MHz)**. Carshepherd looks only at the uplink.

Detection vs. level (alarm). *Detection* = "is there a signal?" (on SNR, the same everywhere). *Level* = "how close?" (on absolute strength, to be calibrated per setup). That is why a yellow bar means something different for one person than for another until you have calibrated.

Idle radio limit. A radio that is not transmitting cannot be detected, not even close by. If you see an emergency service but get no alarm, the radio was probably silent at that moment.

Co-mover. A unit travelling with you. Recognisable because the same channel stays **strong** while you cover a long distance, something a *fixed* source cannot do (it would be a kilometre behind you and lost in the noise). Carshepherd flags this with the 🚚 overlay. In a traffic jam (low speed) the app bridges a longer silence, because a co-mover is then standing still too.

Blue glow. Confirmed TETRA plus repeated on the same channel = a real, active, nearby unit.

Bandhopper. Many channels active at once = a unit hopping quickly between channels. False bandhopper reports (from a noisy setup) are fixed with **Antenna check** (\$7.1).

11. Troubleshooting

Symptom	Likely cause / solution
Dongle drops out while driving (orange → red, "cannot connect")	Mechanical: weight hangs from the USB-C port and vibrates loose. Fix the dongle in place and use a sturdy cable; avoid combined charging/OTG splitters. Carshepherd tries to reconnect automatically and restarts the driver if needed; if that fails, tap Start (dongle) again.
App stops in the background	Battery set to "no restrictions", lock the app in recent apps, autostart on, for both apps (4.5).
"Too many alarms"	Lower Sensitivity or run an Automatic calibration . Check that the antenna is vertical .
False "🚚 bandhopper?" or a constant keep-alive radar (or continuous weak green bars without a "TETRA" label)	Noisy antenna or cable : a poor USB cable radiates phone noise that pollutes reception. Fix it with a ferrite clamp (about 50 cents) as close to the dongle as possible , a better or shielded USB cable, and an Antenna check (\$7.1).

Symptom	Likely cause / solution
Automatic calibration fails ("too few ambient signals")	Location too quiet. Calibrate in a busier place (town, busy road) at a quiet moment.
Overlay no longer appears (after reinstalling)	Grant the "display over other apps" permission again.
No alarm for an emergency service you can see	Idle radio: the radio was not transmitting at that moment. That is normal.
"RTL-SDR driver required"	Install the free Marinov driver from the Play Store (Install).
"no_devices_found" / "no compatible devices" (on Start)	The phone does not see the dongle. Usually USB OTG is switched off in the phone settings (on many devices it switches itself off after a period of inactivity). Search for "OTG" in Settings, switch it on and connect the dongle immediately . If no "open RTL2832U driver?" pop-up appears when you plug it in, check that you are using an OTG data cable (not a charging cable) and consider a <i>powered</i> OTG hub.
Subscription screen appears on Start	Your trial or subscription is not (yet) active. Choose Start je gratis maand [Start your free month], or use the free Demo .

12. Important and legal

- Carshepherd **does not decrypt or read any messages**. It measures only the **presence and strength** of signals on the uplink band. Listening in on or decrypting the content of C2000 is not permitted in the Netherlands and falls **outside** the function of this app.
- Proximity is determined from the **uplink** (vehicles), never from the downlink (mast).
- A non-transmitting unit is **invisible**, so Carshepherd gives no guarantee that there is no emergency service nearby. Use the app as a **situational awareness aid**, not as a certainty, and keep obeying the traffic rules.
- Carshepherd is tuned to the **Dutch C2000 (TETRA)**. Abroad the network differs: in **Belgium (ASTRID)**, for example, it is also TETRA and the app works, but countries using **TETRAPOL** (including France and Spain) use a different technology that this app does **not** detect.

Questions, or a feature you are missing? Note it with your scan logs; the app is improved continuously on the basis of real drives.