NO SIGNAL

Build a dedicated, off-grid survival computer.
No internet required. No cloud. No telemetry. Ever.

Raspberry Pi 5 (16GB) · NVMe Storage · Pelican 1150 Case
Offline AI (Qwen 2.5 3B) · 5,000+ Page Survival Library
Topographic Maps · Star Chart · Navigation Tools
Solar-Chargeable · 5–15W Draw · Fully Air-Gapped

When there's no signal, there's still an answer.

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All component prices verified against official Raspberry Pi, Amazon, and manufacturer pricing as of February 2026. Performance claims based on published community benchmarks, not synthetic estimates.

Why Raspberry Pi 5

We evaluated every viable platform. The Pi 5 wins for a dedicated survival device — but it's not because it's the fastest or cheapest.

The Raspberry Pi 5 occupies a unique position: it has enough RAM (16GB) to run a 3B-parameter AI model alongside a full RAG pipeline, while drawing only 5–15 watts under load. That power efficiency is what makes true off-grid operation possible. A laptop can run larger models, but it drinks 30–60W and dies in 2–4 hours on battery. The Pi runs all day on a single charge and indefinitely with a modest solar panel.

- 16GB RAM — enough to run Qwen 2.5 3B (Q4_K_M, ~2GB) plus ChromaDB, the RAG pipeline, and the full UI simultaneously, with memory to spare
- 5V USB-C power input — charges from any solar panel, battery bank, car adapter, or wall outlet. No proprietary chargers, no voltage converters needed
- NVMe boot via M.2 HAT+ — fast, reliable storage for the AI model, 5,000+ page document library, and offline map tiles. The official 512GB SSD kit costs $55
- 5–15W total system power — a 24,000mAh battery provides 8–17 hours of active use. A 28W folding solar panel produces more than the Pi consumes in direct sun
- Massive ecosystem — every case, HAT, screen, and cable is designed specifically for it. Every problem has been solved by the community already
- AI HAT+ 2 (optional) — the Hailo-10H accelerator ($130) adds 8GB dedicated RAM and can offload vision/speech tasks, though for LLMs specifically the Pi's CPU currently outperforms it (see Section 07)

PLATFORM COMPARISON

Platform	RAM	Power	Board Cost	Ecosystem	Off-Grid Ready
Raspberry Pi 5	16GB	5–15W	$205	Excellent	Purpose-built
Orange Pi 5 Pro	16GB	8–20W	~$110	Poor	Difficult
Jetson Orin Nano	8GB	15–25W	$499	Moderate	Power-hungry
Used ThinkPad	16–32GB	30–60W	$350+	N/A	Fragile, heavy

A note on pricing: The Pi 5 16GB launched at $120 in March 2025. Due to the global LPDDR4 memory shortage driven by AI datacenter demand, it has undergone two price increases — to $145 in December 2025 and $205 in February 2026. Raspberry Pi has stated these increases are temporary and will be reversed when memory prices stabilize.

COMPONENTS
02

Complete Parts List

Every component across three build tiers. All prices verified against official retailers as of February 2026.

TIER 1 — STANDARD FIELD UNIT

Component	Product	Source	Price
Computer	Raspberry Pi 5 — 16GB	Official reseller	$205
Storage + HAT	Raspberry Pi SSD Kit 512GB (M.2 HAT+ bundled)	Official reseller	$55
Display	Raspberry Pi Touch Display 2 — 7" (720×1280, DSI)	Official reseller	$60
Case	Pelican 1150 Protector Case (black, with foam)	Amazon / B&H;	$55
Cooling	Raspberry Pi Active Cooler	Official reseller	$5
Battery	Anker 737 PowerCore 24K (24,000mAh, 140W PD)	Amazon / Anker	$90
Power Supply	Official Raspberry Pi 27W USB-C PSU	Official reseller	$12
Internal Frame	3D-printed PETG frame or Kaizen foam insert	Print / Amazon	$15
Cables + HW	M2.5 standoffs, DSI ribbon, USB-C cable, zip ties	Amazon	$15
Setup Peripherals	Micro HDMI adapter + USB keyboard (one-time use)	Amazon	$20
	TIER 1 TOTAL (approximate)		**~$532**

TIER 2 — WITH AI ACCELERATOR · add ~$130

Everything in Tier 1, plus the AI HAT+ 2. Important: as of February 2026, the Hailo-10H NPU on the AI HAT+ 2 is best suited for vision models, speech-to-text, and offloading inference from the CPU. For pure LLM text generation, the Pi 5's own CPU currently produces faster token speeds. The HAT+ 2 becomes valuable when you want to run AI vision (plant identification, wound assessment) alongside the LLM without competing for CPU.

Component	Product	Source	Price
AI Accelerator	Raspberry Pi AI HAT+ 2 (Hailo-10H, 40 TOPS, 8GB LPDDR4X)	Official reseller	$130
	TIER 2 TOTAL (approximate)		**~$662**

TIER 3 — FULL SURVIVAL STATION · add ~$175

Everything in Tier 2, plus solar charging and a backup battery for indefinite off-grid runtime.

Component	Product	Source	Price
Solar Panel	BigBlue 28W USB Solar Charger (foldable, 2× USB)	Amazon	$60
Backup Battery	Second Anker 737 or equivalent 20,000mAh+ PD bank	Amazon	$90
Sealed I/O	IP67 panel-mount USB-C connectors (if drilling case)	Amazon	$20

	TIER 3 TOTAL (approximate)		~$832

Hardware Assembly

Assemble the Pi 5, storage, and cooling before mounting in the enclosure.

STEP 01
Attach the Active Cooler

The Active Cooler clips directly onto the Pi 5's SoC using spring-loaded push pins. Align the pre-applied thermal pad over the Broadcom BCM2712 chip, press down firmly on both pins until they click. Connect the small JST connector to the FAN header on the board. Active cooling is essential — without it, the Pi 5 will thermal throttle under sustained AI inference, reducing token speed significantly.

STEP 02
Install the M.2 HAT+ and NVMe SSD

Screw the four threaded brass standoffs into the Pi 5 mounting holes (the Active Cooler sits between the board and HAT+). Connect the short FPC ribbon cable from the Pi 5's PCIe connector to the HAT+. Insert your NVMe SSD into the M.2 M-key slot at a 30° angle, press flat, and secure with the included screw. The official SSD Kit supports 2230 and 2242 form factors. Place the HAT+ onto the standoffs and fasten with the included screws.

STEP 03
Flash the Operating System

On a separate computer, download and run Raspberry Pi Imager. Select Raspberry Pi OS (64-bit, Lite edition). You want Lite because No Signal provides its own kiosk-mode UI — no desktop environment needed. In the Imager settings: set hostname to 'nosignal', enable SSH, set your credentials, and configure WiFi temporarily (for initial package downloads only). Flash to an SD card first for initial boot.

STEP 04
First Boot and NVMe Configuration

Insert the SD card, connect a monitor via micro-HDMI, and power on with the official 27W PSU. Once booted, run 'sudo raspi-config'. Under Advanced Options: set Boot Order to 'NVMe/USB' first, and enable PCIe Gen 3 speed (under Performance). Enable the DSI display interface. Then clone your SD card to the NVMe using 'sudo dd' or Raspberry Pi Imager, and reboot from NVMe. Remove the SD card — it's no longer needed.

> The Pi 5 requires stable 5.1V/5A power delivery. Always use the official 27W supply or a USB-C PD battery that negotiates the correct voltage. Underpowered supplies cause boot failures, SD card corruption, and random crashes. The lightning bolt icon on screen means your supply is insufficient.

ENCLOSURE
04

Pelican Case Build

The Pelican 1150 interior is 8.3" × 5.8" × 3.75" — enough for the Pi stack, battery, and touchscreen.

OPTION A: 3D-PRINTED FRAME

The 'cyberdeck' approach. A three-piece PETG frame press-fits into the Pelican 1150 opening. The front panel holds the 7" touchscreen. Two internal brackets mount the screen from behind. No holes are drilled — the frame friction-fits, preserving the full waterproof seal. Search Printables.com or Thingiverse for 'Pelican 1150 Raspberry Pi' — the community has published frames updated for the Pi 5 and Touch Display 2. If you don't own a printer, JLCPCB or Craftcloud will print and ship for $15–30.

Setting	Value	Why
Material	PETG	Heat-resistant to 80°C, impact-resistant, no warping
Layer Height	0.2mm	Good balance of speed and surface finish
Infill	30–40%	Structural rigidity without excess weight
Supports	None needed	Flat parts designed without overhangs
Print Time	6–8 hours	All three pieces total

OPTION B: KAIZEN FOAM INSERT

Simpler and arguably more rugged. Buy pre-cut Kaizen foam sized for the Pelican 1150 interior (~$15). Trace and cut cavities for the Pi + HAT stack, battery, and cable channels using a sharp utility knife. Mount the touchscreen in the lid using 3M Dual Lock or M3 bolts with rubber washers. Foam absorbs shock better than rigid frames and requires no special tools — but looks less polished.

FINAL ASSEMBLY

STEP 05
Mount the Touchscreen

The Touch Display 2 connects via DSI ribbon cable and draws power from the Pi's GPIO pins. Mount it to your 3D-printed front panel or the Pelican lid. The DSI connection avoids HDMI entirely — one less cable, one less potential failure point.

STEP 06
Route Cables and Battery

Run the DSI ribbon cable along the hinge side with enough slack for the lid to open fully. Secure the Anker 737 in the base with Velcro strips or foam cutout. Run a short USB-C cable from battery to Pi. Keep cable routing tidy — pinched cables at the hinge are the most common failure mode.

STEP 07
Test Before Closing

Power on. Confirm touchscreen displays correctly. Test touch input. Verify WiFi is disabled (airplane mode icon or check 'ip link'). Close gently, ensure no cables are pinched at the hinge. Latch the Pelican case.

SHOULD YOU DRILL THE CASE?

Our recommendation: don't. Drilling breaks the IP67 waterproof seal. Route the charging cable through the Pelican's automatic pressure equalization valve opening, or simply open the lid to charge. In a genuine survival scenario, a sealed waterproof case matters more than charging convenience. If you must drill for a permanent panel-mount USB-C port, use a step drill bit, install rubber gaskets, seal with marine-grade silicone, and pressure-test by submerging before field deployment.

SOFTWARE
05

Software Stack

Install the AI inference engine, RAG pipeline, and configure kiosk auto-boot.

STEP 08
Install Core Dependencies

SSH into your Pi (or use the connected keyboard). The No Signal stack requires: llama-cpp-python (AI inference engine optimized for ARM), FastAPI (backend server), ChromaDB (vector database for document retrieval), a sentence-transformer model (for RAG embeddings), and Node.js (for the Svelte frontend).

```
sudo apt update && sudo apt upgrade -y
sudo apt install -y python3 python3-pip python3-venv \\
git cmake build-essential libopenblas-dev
python3 -m venv /opt/nosignal/venv
source /opt/nosignal/venv/bin/activate
CMAKE_ARGS="-DGGML_BLAS=ON -DGGML_BLAS_VENDOR=OpenBLAS" \\
pip install llama-cpp-python
pip install fastapi uvicorn chromadb \\
sentence-transformers langchain
curl -fsSL https://deb.nodesource.com/setup_20.x | sudo bash -
sudo apt install -y nodejs
```

Building llama-cpp-python with OpenBLAS support is critical for ARM performance. Without it, you lose significant token speed.

STEP 09
Download the AI Model

We recommend Qwen 2.5 3B Instruct in Q4_K_M quantization. File size is approximately 2GB. This model is released under the Apache 2.0 license (fully commercial, no restrictions). It provides the best balance of intelligence and speed for RAG-assisted survival Q&A on this hardware. Download from HuggingFace:

```
wget https://huggingface.co/Qwen/Qwen2.5-3B-Instruct-GGUF/resolve/main/\\
qwen2.5-3b-instruct-q4_k_m.gguf \\
-O /opt/nosignal/models/qwen2.5-3b-instruct-q4_k_m.gguf
```

STEP 10
Configure Auto-Boot Kiosk Mode

Create a systemd service that launches No Signal's FastAPI backend on boot. Then configure Chromium in kiosk mode (via a second systemd unit or .bashrc on auto-login) pointing at localhost:8080. Result: power on the Pi, wait 30–45 seconds, and the No Signal interface appears. No login screen, no desktop, no distractions — just the tool.

STEP 11
Air-Gap the System

For a truly air-gapped device with zero radio emissions, add these lines to /boot/firmware/config.txt:

```
dtoverlay=disable-wifi
dtoverlay=disable-bt
```

After reboot, the Pi has no wireless capability at all. No WiFi scanning, no Bluetooth beacons, no signals out. To re-enable for updates, comment these lines and reboot.

Survival Library & Maps

Load the document library, index it for vector search, and cache offline map tiles.

DOCUMENT LIBRARY

No Signal ships with over 5,000 pages of survival reference material across 16 categories, including FM 21-76 (U.S. Army Survival Manual), FEMA emergency preparedness guides, WHO field health references, and wilderness medicine resources. All documents are chunked, embedded with a lightweight sentence-transformer model, and indexed in ChromaDB for semantic search. The full indexed library occupies 2–5 GB on disk.

OFFLINE MAP TILES

Before going off-grid, use a tile-downloading tool to cache topographic map tiles for your region. No Signal uses Leaflet with a local tile server.

Coverage	Zoom Levels	Disk Space	Use Case
Single state	1–12 (trail level)	2–5 GB	Backcountry navigation
Single state	1–15 (street level)	15–30 GB	Urban evacuation
Multi-state region	1–12	8–20 GB	Regional preparedness
Continental US	1–8 (overview)	1–3 GB	Big-picture context

On a 512GB NVMe, you have room for trail-level maps of multiple states plus the full survival library and AI model — with hundreds of GB to spare.

Performance Reality

Honest numbers. No synthetic estimates — these are based on published community benchmarks.

Configuration	AI Model	Token Speed	Quality	Source
Pi 5 16GB CPU + OpenBLAS	Qwen 2.5 3B (Q4_K_M, ~2GB)	4–7 tok/s	Good — strong for RAG-assisted Q&A;	Multiple community tests
Pi 5 8GB CPU + OpenBLAS	Llama 3.2 1B (Q4_K_M, ~0.7GB)	8–15 tok/s	Basic but fast. Good fallback	Stratosphere Lab, 2025
Pi 5 8GB CPU + OpenBLAS	Llama 2 7B (Q4_K_M, ~4GB)	0.7–3 tok/s	Slow but possible. Not recommended	Jeff Geerling, Tom's HW
Pi 5 + AI HAT+ 2 Hailo-10H NPU	Qwen2 1.5B (HAT+ native)	~3–6 tok/s *	Below CPU speed. See notes	Jeff Geerling Jan 2026

* AI HAT+ 2 NOTE: Jeff Geerling's January 2026 review found that for LLM text generation specifically, the Pi 5's ARM CPU outperforms the Hailo-10H NPU across every tested model. The NPU's 3W power limit and 8GB RAM ceiling hold it back vs. the CPU's 10W SoC budget and access to 16GB system RAM. The HAT+ 2 excels at vision tasks (object detection, pose estimation) and can run speech-to-text — but don't buy it expecting faster chat responses. Hailo's software stack is also still maturing. This may improve significantly as the ecosystem develops.

WHAT THIS MEANS IN PRACTICE

On the recommended Tier 1 build — Pi 5 16GB running Qwen 2.5 3B with OpenBLAS — you ask a survival question and get a multi-paragraph, source-cited response in roughly 15–45 seconds depending on response length. That's not instant, but it's entirely usable. You're not waiting minutes.

The critical insight: No Signal is not a general-purpose chatbot. It's a domain-specific RAG system. The AI retrieves relevant passages from the 5,000+ page survival library, then synthesizes them into a coherent answer with citations. This is a dramatically easier problem than open-domain conversation, which means a 3B model performs far better at this specific task than its general benchmarks would suggest.

POWER
08

Battery & Solar

The Pi 5's low power draw is what makes true off-grid operation viable.

Scenario	Power Draw	Runtime (Anker 737, 86.4Wh)	Solar Viable?
Active AI inference (display on, all cores)	10–15W	6–9 hours	Yes — 28W panel
Display on, AI idle (browsing maps/docs)	5–8W	11–17 hours	Yes — 20W panel
Display dimmed, standby (low-power monitoring)	3–5W	17–29 hours	Yes — 15W panel
Deep sleep (systemd suspend)	<1W	3+ days	Any small panel

The Anker 737 has a 24,000mAh / 86.4Wh capacity (3.6V nominal). At the Pi 5's typical 10W active load, that's roughly 8–9 hours of continuous AI queries with the display on — enough for a very long day in the field. Dimming the display when not actively reading extends this significantly.

SOLAR CHARGING

The BigBlue 28W foldable solar panel outputs 5V via USB in direct sunlight. At the Pi 5's ~10W average draw, the panel produces more power than the system consumes during peak sun hours. This means indefinite runtime during daylight. The panel folds to roughly the size of a paperback book and weighs 1.3 lbs. In overcast conditions, output drops to 5–15W — still enough to slow-charge the battery when the Pi is in standby.

With Tier 3's dual batteries (2× Anker 737), you have approximately 173Wh total — enough for 17–35 hours of active use without any solar input. Combined with the solar panel, the system can operate indefinitely in any location with periodic sunlight.

STRATEGY
09

From Guide to Product

This build guide is the marketing. Here's the plan.

IMMEDIATELY
Publish this build guide as a free PDF on nosignal.app. Prepper forums, YouTube maker channels, and cyberdeck communities will share it. Some people build their own and buy the $149 software license. Others see the complexity and pay $599 for a pre-built unit. Both outcomes are wins.

MONTH 1—2
Create a custom No Signal OS image (based on Raspberry Pi OS Lite) that users can flash directly to NVMe or SD card. Pre-configured with the AI model, survival library, kiosk auto-boot, and disabled radios. Sell for $149. Users buy their own Pi and parts. Near-zero marginal cost.

MONTH 3—6
Hand-build 50 complete Field Unit prototypes. Sell at $599. Test demand, gather feedback, photograph everything. These photos become hero images for the website — the hardware is what people share, review, and put on camera.

MONTH 6+
If demand validates, partner with a small electronics assembly shop. The build is straightforward enough for contract manufacturing in batches of 100–500. Pelican case + Pi + touchscreen assembly is well within standard capabilities.

THE KEY INSIGHT

The prepper market values gear over software. A dedicated device in a Pelican case, sitting next to a ham radio and a water filter, feels like it belongs. A $149 app on a laptop doesn't carry the same weight. The hardware legitimizes the brand. The software scales the business. Show the hardware first, sell the software most.

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nosignal.app