

Nissan Patrol Y61 4.8 GRX – Full Rear Overhaul and Off-Grid Victron Power System Build

In December 2024, I decided it was time to address the disorganized state of the rear section of my Patrol. The existing setup — including the drawer system, fridge, geyser, water tank, and a clutter of wiring — had become unmanageable. What began as a simple teardown quickly evolved into a complete 12V electrical system overhaul and a full redesign aimed at achieving serious off-grid capability.

Initially, my goal was simply to reorganize the layout and install a dedicated inverter. However, after researching inverter options, I chose to invest in a high-quality Victron Energy unit rather than a standard 3000W pure sine wave inverter. That decision quickly expanded the project: That one choice sent me straight down the "smurfy hole" (not just a rabbit hole!) — because once I had the Victron inverter, it only made sense to build the entire system properly around it.

Over the following months, I engineered and installed a comprehensive off-grid power system utilizing Victron Energy components and high-capacity lithium batteries. The system is designed for true long-term independence, heavy-duty 4x4 use, and overlanding reliability.

This build has been thoroughly documented, including cable sizes, fuse specifications, and considerations specific to 230V AC systems and metric cable standards (although the wiring diagram provided is in AWG for reference).

It started like this:

Even though it looks ok, the cables inside the panels was a complete mess.





And evolved into this: *(Still awaiting custom enclosures for DB and Inverter Isolator)*





The Tear-Down

Stripping everything out was the easy part. What proved far more challenging was uncovering the shocking standard of previous so-called "professional" 4x4 installations. I removed every wire, panel, and connection — either reducing it to the bare essentials or replacing it entirely where necessary.

I began the rebuild without a finalized layout plan. Fortunately, there was no rush; my second Patrol could manage any off-road outings while this project took shape. There was a fair amount of trial and error (and plenty of real-life Tetris) before I found the ideal configuration — carefully balancing accessibility, protection, and weight distribution.

Importantly, not a single 4x4 workshop or third party had a hand in this build. I completed every part of the installation myself to ensure peace of mind — knowing that if anything ever went wrong, there would be no one else to blame but me.

Planning for Real 4x4 Use

If this build were intended purely for touring, the design would have been much simpler. However, because I regularly take the vehicle through challenging 4x4 trails — not just easy tracks like De Wildt or Hennops — the system needed to be exceptionally tough, secure, and capable of withstanding real-world abuse.

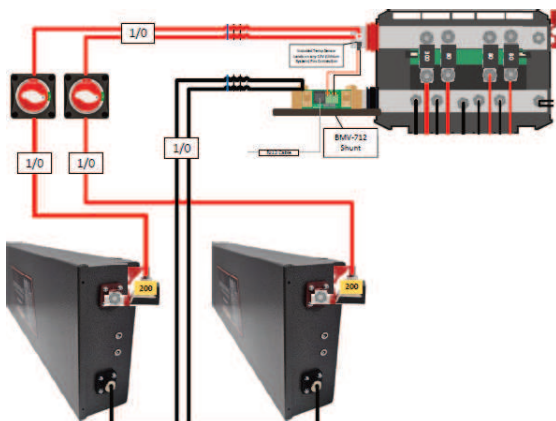
One critical consideration was ensuring that heavy components, particularly the inverter, would not become dangerous projectiles during aggressive sections of a track.

This requirement led to the decision to incorporate structural side panels and to design a reinforced base frame, ensuring that all equipment is properly supported and securely mounted.

Summary of System Build Details

🔋 Batteries and Core Connections

- **2x AdventureX 304Ah Lithium Batteries** (total 608Ah @ 12.8V \approx 7.78kWh usable)
- Each battery has **0.5m of 70mm²** Positive (+) and Negative (-) cabling.
- Positive side fused individually with **200A fuses** at the battery terminals.
- Battery isolators installed on each Positive line before connecting to the **Victron Lynx Distributor (M10)** busbar.
- Negative cable of both connected to the **BMV-712 Smart Shunt** for monitoring and the shunt connected to the negative of the **Victron Lynx Distributor (M10)** busbar

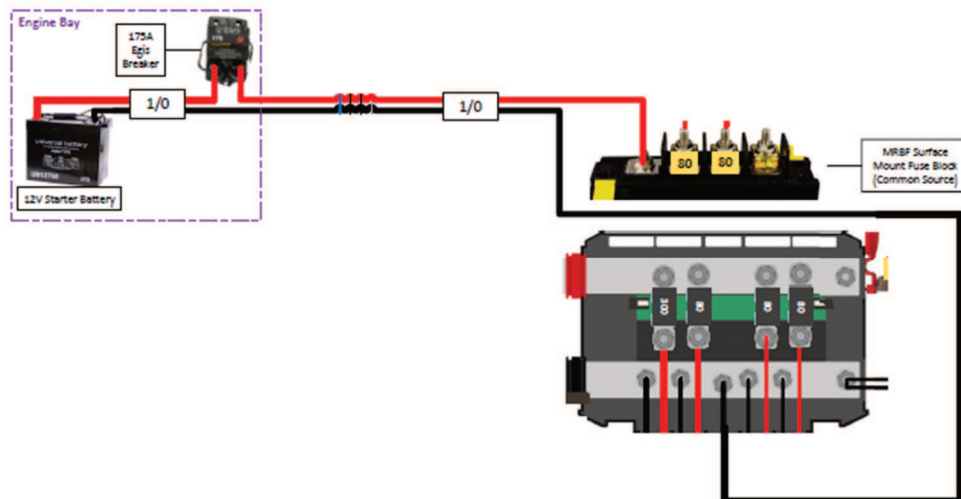


🔌 From Starter Battery

- **70mm² Positive and Negative** cabling from starter battery to rear (6 meters one way).
- Positive line protected with a **175A resettable surface-mount breaker** located ~0.5m from the starter battery.

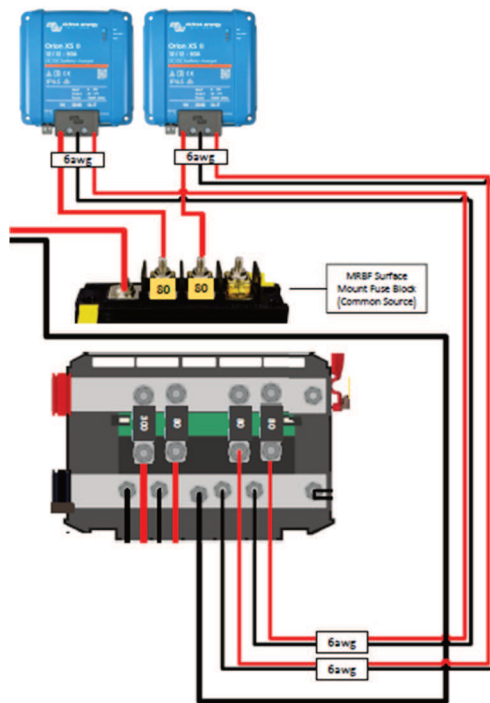


- At the rear the Positive connects to a **Blue Sea Systems common busbar**; Negative connects directly to the Lynx Distributor Negative bus.



⚡ DC-DC Charging (Alternator to Lithium)

- 2x **Victron Orion XS 12/12-50A DC-DC Chargers** (total 100A alternator charging).
- Had to replace alternator with a 320A one to handle the 100A for just the Orions.
- **16mm² cabling** from common busbar to each DC-DC charger input (protected by **80A breakers** each).
- Output and Ground of each of the DC-DC run to the Lynx Distributor using 16mm² cable where they each have an 80A fuse on the Lynx Distributor

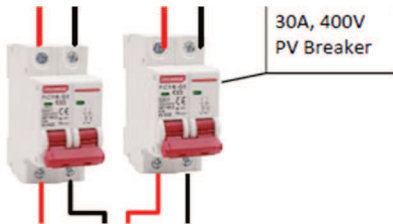


⚡ Big 3 Upgrade

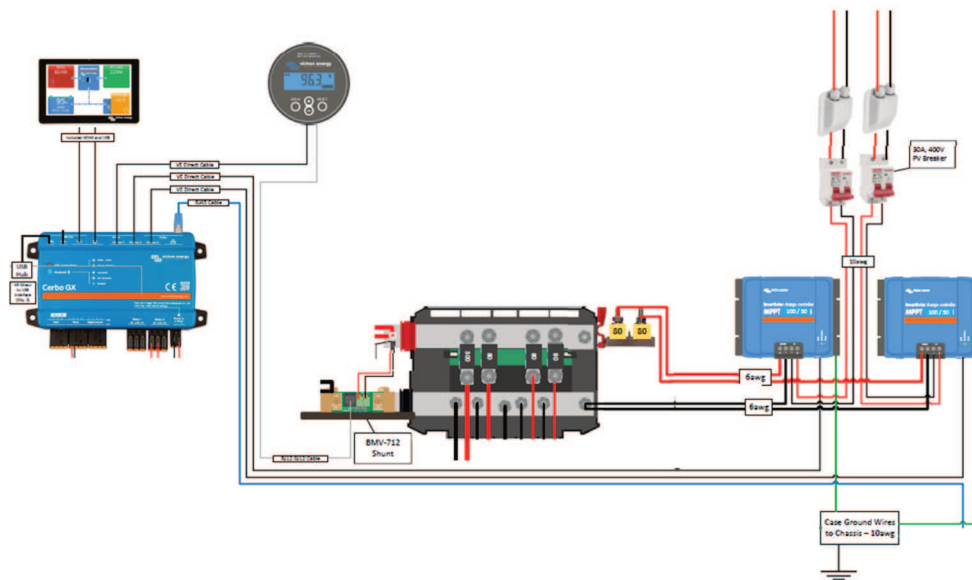
- The original Positive and Negative cables left in place and I just added:
 - **95mm² cabling** from Battery Positive to alternator
 - **95mm² cabling** from Battery Negative to chassis
 - **95mm² cabling** from chassis to engine block.

☀ Solar Charging System

- **2x Victron SmartSolar MPPT 100/50** controllers:
 - One dedicated to a **450W roof panel**.
 - One dedicated to a **300W Redarc blanket** (portable).
- Each MPPT connects with **16mm²** cabling to the Lynx Distributor (80A fused Positive side).
- **6mm² PV** cabling runs from the MPPT's to the solar isolator breakers and from there to Anderson/Brad Harrison plugs.

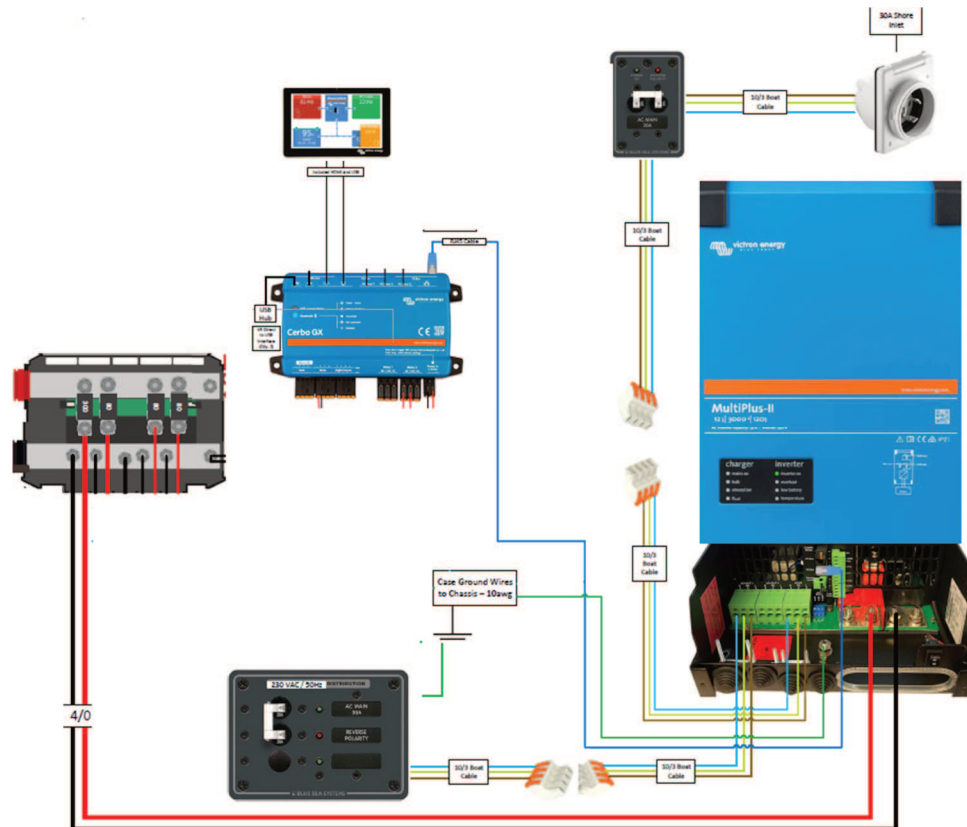


- The ground from both the MPPT casings connects the Patrol's chassis with **16mm²**



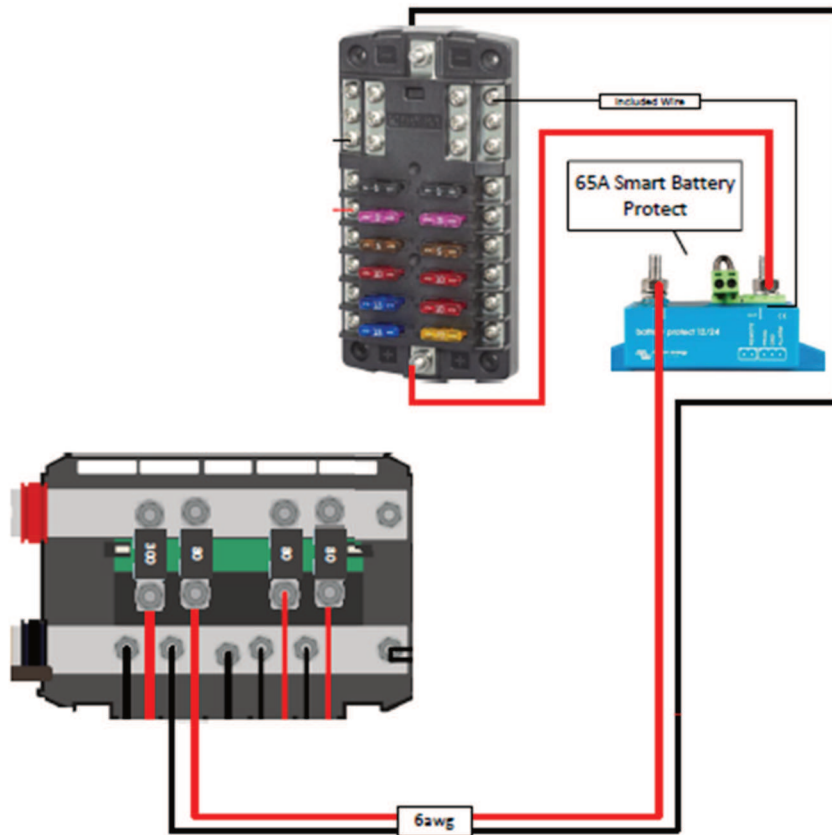
⚡ Victron MultiPlus-II Inverter/Charger

- **Victron MultiPlus-II 12/3000/120-32:**
 - 120mm² Positive and Negative cabling (~1m runs) to the Lynx Distributor.
 - Protected by a **300A MEGA fuse** on the Positive side.
 - The ground from the Inverter's case connects the Patrol's chassis with **75mm²**



🔋 12V Load Management

- 12V loads powered by a **12-way fuse panel**.
- Feed from Lynx Distributor via **16mm² cable** protected by an **80A fuse**.
- **65A Smart Battery Protect** installed to manage sensitive loads.



Water System Overview

To complement the off-grid electrical system, a fully independent water system was also installed:

- **Water Storage:**
 - **2× 40L water tanks** (80L total capacity)
- **Water Pump:**
 - **12V 7L/min water pump**
 - Directly connected to the 12V fuse panel and protected by an inline fuse.
 - Capable of supplying consistent water pressure to the geyser and tap points.
- **Hot Water System:**
 - **Dew Hot 5L Low Pressure Eco-Flow Gas Geyser**
 - Ideal for off-grid environments, providing instant hot water without requiring high-pressure feed.

The system was designed to prioritize:

- **Compactness** to fit into the rear build.
- **Robustness** for rough trails and vibration.
- **Serviceability** with accessible plumbing and drainage points.
- **Ease of Expansion**, allowing future upgrades like integrated tank monitoring or additional tap/shower points.

All water lines use reinforced flexible hose suitable for potable water, and fittings are secured with stainless steel hose clamps to withstand off-road vibration.

System Specifications

Item	Details
Total Storage	608Ah (7.78kWh)
System Voltage	12V DC
Solar Input	750W total (roof + portable)
Alternator Charging	100A (2x 50A Orion XS)
AC Charging	230V Shore Power, 16A inlet, Breaker protected
Inverter Output	3kVA continuous

Equipment List (Major Components)

- 2× AdventureX 304Ah LiFePO₄ batteries
- 1× Victron MultiPlus-II 12/3000/120-32 Inverter/Charger
- 2× Victron Orion XS 12/12-50A DC-DC Chargers
- 2× Victron SmartSolar MPPT 100/50 Controllers
- 1× Victron Cerbo GX + GX Touch 50
- 1× Victron Lynx Distributor (M10)
- 1× Victron BMV-712 Smart Monitor
- 1× Victron VE.Bus Smart Dongle
- 1× National Luna 90L Dual-Zone Fridge
- 12V Fuse Distribution Board

Monitoring & Control

- Full system visibility through **Cerbo GX** and **GX Touch 50**.
- Remote access possible via **Victron VRM Portal**.
- Battery status monitored with **BMV-712 Smart**.
- Temperature monitoring and future tank monitoring ready with **GX Tank 140** and Ruuvi Tag sensors.

Custom Wiring

- **European metric sizes**, not AWG.
 - Main wire specs:
 - 120mm² (4/0 AWG equivalent)
 - 70mm² (1/0 AWG equivalent)
 - 16mm² (6 AWG equivalent)
 - 6mm² (10 AWG equivalent)
 - Custom battery isolators, marine-grade cable, MRBF & MEGA fuse protection throughout.
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Cable Lengths Overview

Connection	Length
Starter Battery → Lynx Distributor	6m
Each Lithium Battery → Lynx	0.5m
Inverter → Lynx Distributor	1m
Each DC-DC Charger → Lynx	1m
Each MPPT → Lynx Distributor	1m
12V Fuse Panel → Lynx Distributor	1m

Solar Setup Details

Component	Details
Roof Panel	450W
Portable Blanket	300W, Voc 20V, Imp 18A

So far, no issues but the next year or two will tell. The river trip in August 2025 would be a nice, real-world test.