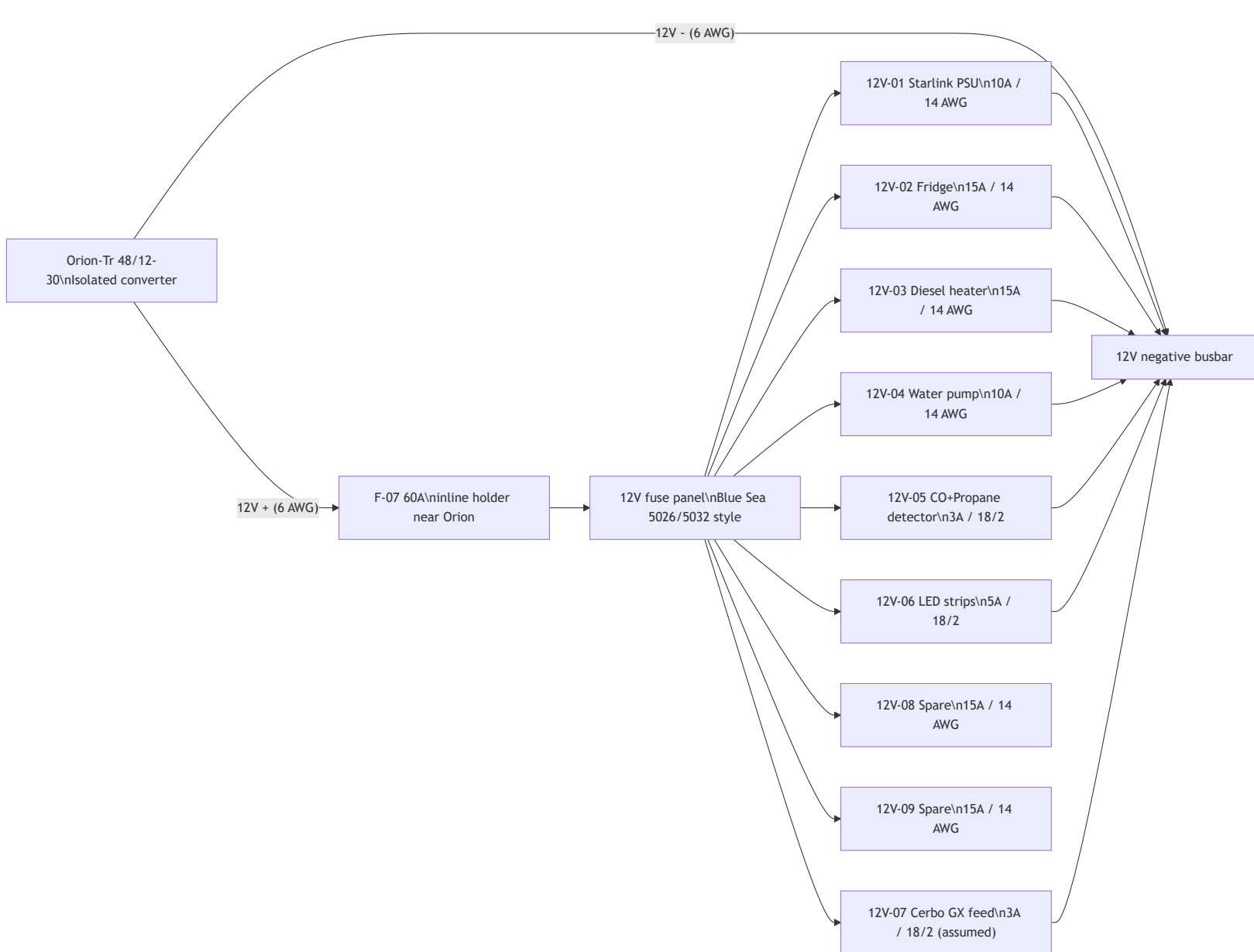
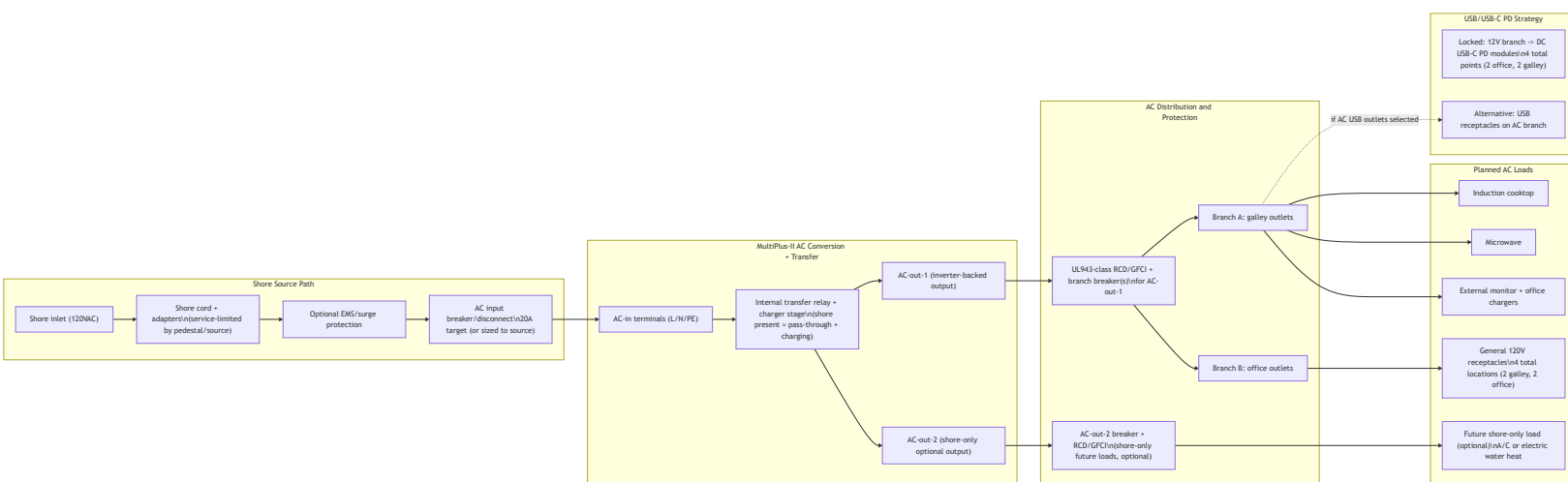


12V Distribution Topology (From Orion)



AC Path Topology (Shore + Inverter Output, Full Hierarchy)



AC Operating Behavior (Expected)

- Shore present: MultiPlus transfer relay closes, AC-in is passed to AC-out paths, and charger stage charges the **48V** bank.
- Shore absent: MultiPlus transfers to inverter mode and powers **AC-out-1** from battery; **AC-out-2** drops by design.

AC Safety/Protection Chain (What Must Exist)

- Upstream AC input protection/disconnect before MultiPlus AC-in.
- AC-out branch protection including UL943-class residual-current protection and overcurrent protection sized to branch wiring and expected load.
- Continuous equipment grounding path from shore inlet through MultiPlus and branch circuits, plus chassis bond in mobile install context.
- Neutral/ground handling must follow MultiPlus relay behavior; do not add an always-bonded downstream neutral-ground bond in branch receptacle wiring.

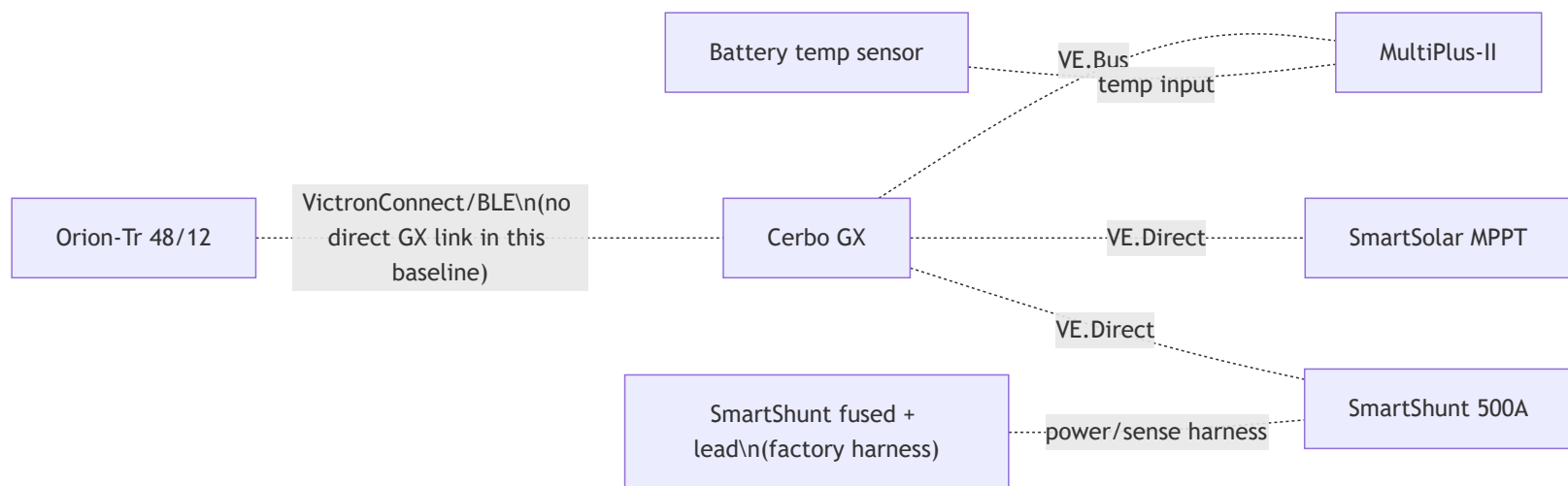
AC Reference Basis (Manufacturer Guidance)

- Victron MultiPlus-II 120V installation guidance (AC-in breaker sizing, UL943-class residual-current protection on outputs, and AC-out-2 shore-only behavior): https://www.victronenergy.com/media/pg/MultiPlus-II_120V/en/installation.html
- Victron MultiPlus-II datasheet (48/3000/35-50 baseline model reference): <https://www.victronenergy.com/upload/documents/Datasheet-MultiPlus-II-inverter-charger-120V-EN.pdf>

AC/USB Baseline Locked For BOM

- Shore interface: 30A RV-style inlet baseline with adapter kit for 15A / 20A hookups.
- AC input protection: dedicated AC input breaker/disconnect upstream of MultiPlus AC-in.
- AC-out-1 distribution: two protected branches (20A galley, 15A office) with GFCI-at-first-outlet strategy.
- Receptacle plan: 4 total 120V receptacle locations (2 galley, 2 office).
- USB charging plan: 4 DC-fed USB-C PD points on 12V branches (2 office, 2 galley) with 10A per-zone branch fuse baseline.
- AC-out-2 remains optional and not in Phase 1 procurement baseline.

Monitoring and Control Topology



Fuse Housing Map (Where Each Fuse Is Physically Housed)

Fuse ID	Fuse value	Housing method	Location
F-01A	225A Class T	Blue Sea Class T fuse block	Battery compartment near Battery A +
F-01B	225A Class T	Blue Sea Class T fuse block	Battery compartment near Battery B +
F-02	125A MEGA	Lynx integrated slot holder	Lynx Slot 1
F-03	60A MEGA	Lynx integrated slot holder	Lynx Slot 2
F-04	40A MEGA	Lynx integrated slot holder	Lynx Slot 3
F-05	40A MEGA	Lynx integrated slot holder	Lynx Slot 4
F-06	20A target / 23A MIDI fallback	Inline sealed holder (>=58VDC)	Electrical cabinet near Orion branch source

F-07	60A	Inline sealed holder (>=32VDC)	Electrical cabinet at Orion 12V + source end
F-08	150A	Sealed engine-bay MEGA/ANL holder	Engine bay near starter battery +
F-09A/B/C	15A gPV each	10x38 touch-safe fuse holders in PV combiner	Roof-entry combiner enclosure
F-10	Per branch (ATO/ATC)	Integrated blade sockets in 12V panel	Electrical cabinet
OEM-SHUNT	Factory low-current inline fuse (SmartShunt harness)	Integrated inline holder in Victron harness lead	Electrical cabinet near Lynx positive tap

Conductor Schedule (Start-to-Finish)

Segment ID	Circuit segment	Nominal voltage	Current basis	Overcurrent protection	Planned wire gauge
C-01	Battery A + -> F-01A	48V	Battery branch, fuse-limited	F-01A 225A	2/0 AWG
C-02	Battery B + -> F-01B	48V	Battery branch, fuse-limited	F-01B 225A	2/0 AWG
C-03	Class T outputs -> disconnect input	48V	Combined trunk current	F-01A/B	2/0 AWG each branch
C-04	Disconnect output -> Lynx + bus	48V	Aggregate branch current (<=265A theoretical from Lynx slots)	Upstream Class T fuses	2/0 AWG
C-05	Battery negatives -> SmartShunt battery side	48V	Aggregate return current	N/A (main negative path)	2/0 AWG each branch
C-06	SmartShunt load side -> Lynx - bus	48V	Aggregate return current	N/A	2/0 AWG
C-06A	Lynx positive tap -> SmartShunt positive sense/power lead	48V	Shunt electronics supply (very low current)	Factory inline fuse in OEM harness	OEM harness lead
C-07	Lynx Slot 1 (F-02) -> MultiPlus DC+	48V	Inverter branch, fuse-limited	F-02 125A	2/0 AWG (manual minimum AWG 1 on short runs)
C-08	MultiPlus DC- -> Lynx - bus	48V	Inverter return current	F-02 protects paired positive	2/0 AWG
C-09	MPPT BAT+ -> Lynx Slot 2 (F-03)	48V	Controller output (45A max)	F-03 60A	6 AWG
C-10	MPPT BAT- -> Lynx - bus	48V	Controller return current	F-03 protects paired positive	6 AWG
C-11	Sterling output + -> Lynx Slot 3 (F-04)	48V	Charger output (~26A nominal max)	F-04 40A	6 AWG planned (10 AWG minimum per Sterling table)
C-12	Sterling output - -> Lynx - bus	48V	Charger return current	F-04 protects paired positive	6 AWG
C-13	Lynx Slot 4 (F-05) -> F-06 holder	48V	Orion branch feeder, fuse-limited	F-05 40A	6 AWG
C-14	F-06 -> Orion 48v + input	48V	Orion input, fuse-limited	F-06 20A/23A	6 AWG planned (8 AWG minimum per Orion table)
C-15	Orion 48v - input -> Lynx - bus	48V	Orion input return current	F-06 protects paired positive	6 AWG

C-16	Starter battery + -> F-08 -> Sterling input +	12V	Charger input path, fuse-limited	F-08 150A	2/0 AWG planned (2 AWG minimum per Sterling table)
C-17	Vehicle return/chassis -> Sterling input -	12V	Charger input return	F-08 protects paired positive	2/0 AWG planned
C-18	Orion 12V + -> F-07 -> 12V panel + bus	12V	Converter output path (30A continuous, 60A fuse)	F-07 60A	6 AWG planned (8 AWG minimum per Orion table)
C-19	Orion 12V - -> 12V negative busbar	12V	Converter output return	F-07 protects paired positive	6 AWG
C-20	12V panel -> Starlink PSU	12V	Branch load	F-10 10A	14 AWG duplex
C-21	12V panel -> Fridge	12V	Branch load	F-10 15A	14 AWG duplex
C-22	12V panel -> Diesel heater	12V	Branch load	F-10 15A	14 AWG duplex
C-23	12V panel -> Water pump	12V	Branch load	F-10 10A	14 AWG duplex
C-24	12V panel -> CO + propane detector	12V	Branch load	F-10 3A	18/2
C-25	12V panel -> LED strips	12V	Branch load	F-10 5A	18/2
C-26	12V panel -> Cerbo GX power feed	12V	Branch load (~3W)	F-10 3A (assumed)	18/2
C-27	PV strings -> F-09 combiner -> MPPT PV input	PV string voltage (3s)	String current + combiner output current	F-09A/B/C 15A each	10 AWG PV wire
C-28	Shore inlet -> shore cord/adaptor -> AC input breaker/disconnect	120VAC	Source-limited shore current	Source-size-matched AC breaker/disconnect (20A target baseline)	10/3 shore feed to inlet/breaker area
C-29	AC input breaker/disconnect -> MultiPlus AC-in	120VAC	MultiPlus AC input current	Upstream AC breaker/disconnect (C-28)	12 AWG stranded AC conductors
C-30	MultiPlus AC-out-1 -> branch RCD/GFCI + breaker assembly	120VAC	Inverter-backed branch distribution current	UL943-class RCD/GFCI + branch breakers (20A galley, 15A office)	12 AWG stranded AC conductors
C-31	Branch A -> galley receptacle locations (2)	120VAC	Branch load (induction, microwave, galley outlets)	C-30 branch protection stack	12 AWG stranded AC conductors
C-32	Branch B -> office receptacle locations (2)	120VAC	Branch load (monitor and office outlet use)	C-30 branch protection stack	12 AWG stranded AC conductors
C-33	MultiPlus AC-out-2 (optional) -> shore-only future load branch	120VAC	Shore-only branch current	Dedicated breaker + UL943-class RCD/GFCI for AC-out-2	12 AWG stranded AC conductors
C-34	12V panel -> USB-C PD branch (office zone, 2 outlets)	12V	Device charging branch current (zone budget target ~100-120W)	F-10 branch fuse (10A baseline)	14 AWG duplex baseline
C-35	12V panel -> USB-C PD branch (galley zone, 2 outlets)	12V	Device charging branch current (zone budget target ~100-120W)	F-10 branch fuse (10A baseline)	14 AWG duplex baseline

Additional Components Included In Topology Scope

- 48V disconnect (275A)
- Pre-charge resistor (commissioning/soft-charge aid before connecting large DC loads)
- 12V negative busbar

- Shore AC inlet + cord/adapter interface hardware
- AC input breaker/disconnect hardware (compact load-center baseline; DIN-only if swapped at SKU lock)
- AC branch RCD/GFCI + breaker hardware
- Receptacle boxes + 120V outlets (4 planned locations: 2 galley, 2 office)
- Optional AC-out-2 branch protection path for future shore-only loads
- USB-C PD branch hardware (4 DC-fed points, 2 office + 2 galley)
- Battery temperature sensor wiring to inverter/monitoring path
- SmartShunt fused positive sense/power lead (factory harness)

Assumptions (Explicit)

1. Cable sizing assumes stranded copper conductors, enclosed vehicle routing, and typical one-way run lengths of ≤ 10 ft unless otherwise stated.
2. Voltage-drop design intent used here: $\leq 2\%$ on major 48V power runs and $\leq 3\%$ on 12V branch circuits.
3. F-09 PV string fuse value (15A) remains provisional until final module datasheet max-series-fuse rating is confirmed.
4. Cerbo GX feed is assumed from the 12V panel (12V-07) for branch-level serviceability.
5. Orion branch remains split-protection (F-05 upstream feeder + F-06 device-level input fuse).
6. Big 3 alternator-upgrade path is purchase-later; this diagram captures the current stock-alternator-first architecture.

Completion Status

- DC/PV topology is complete for current BOM scope and load model scope.
- AC hierarchy is now complete at architecture level, including transfer behavior, branch strategy, and protection chain.
- Remaining work is SKU-level part lock and run-length field validation for the now-locked AC/USB architecture.