

Electrical Topology Diagram (Implementation v4)

As-of date: 2026-02-13

Purpose: provide a complete, install-level electrical topology for the current build scope, including all major electrical components, fuse IDs, fuse housings, and planned wire gauges.

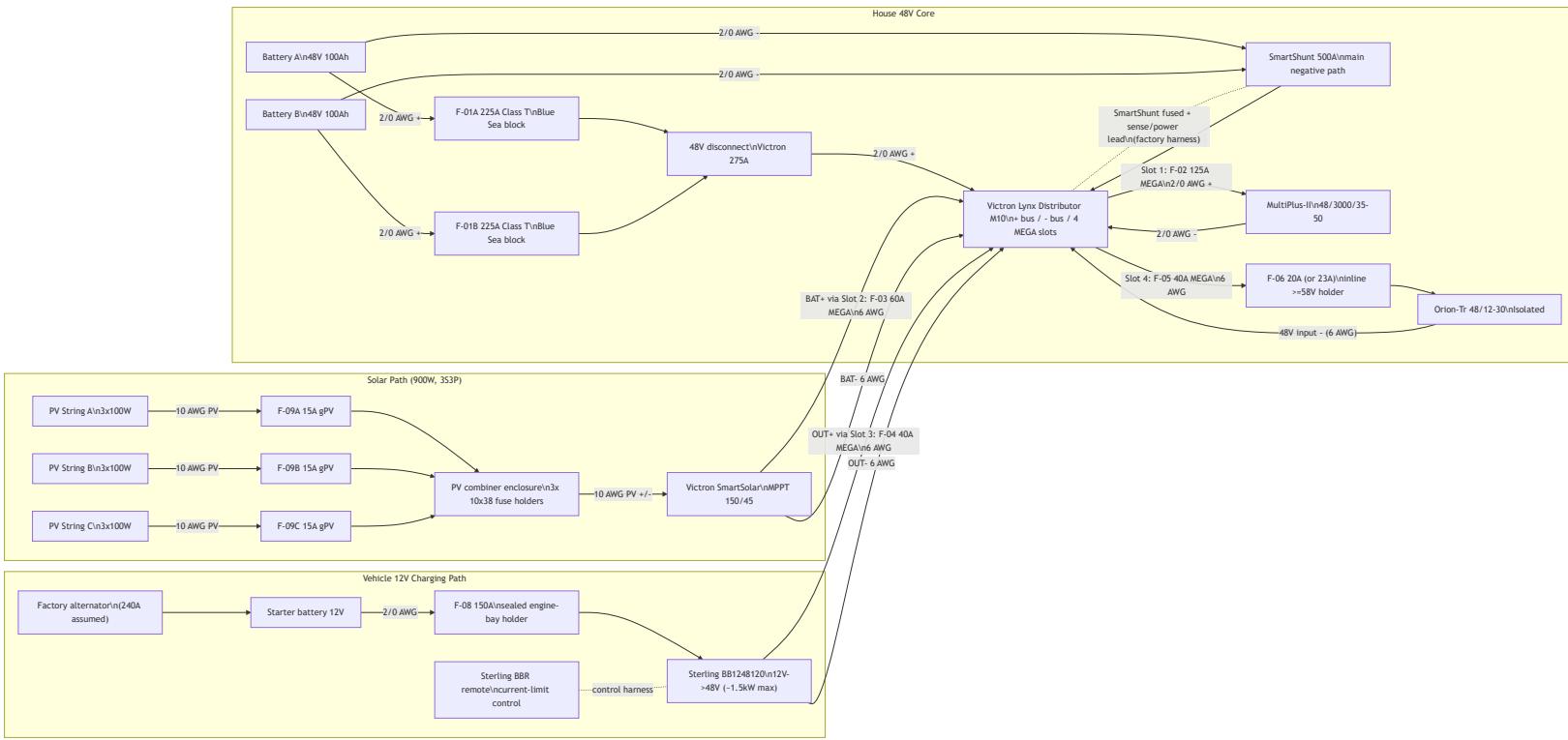
Related docs:

- Canonical electrical/system baseline: [docs/SYSTEMS.md](#)
- Detailed fuse matrix: [docs/ELECTRICAL_fuse_schedule.md](#)
- Decisions and unresolved items: [docs/TRACKING.md](#)
- Procurement source of truth: [bom/bom_estimated_items.csv](#)

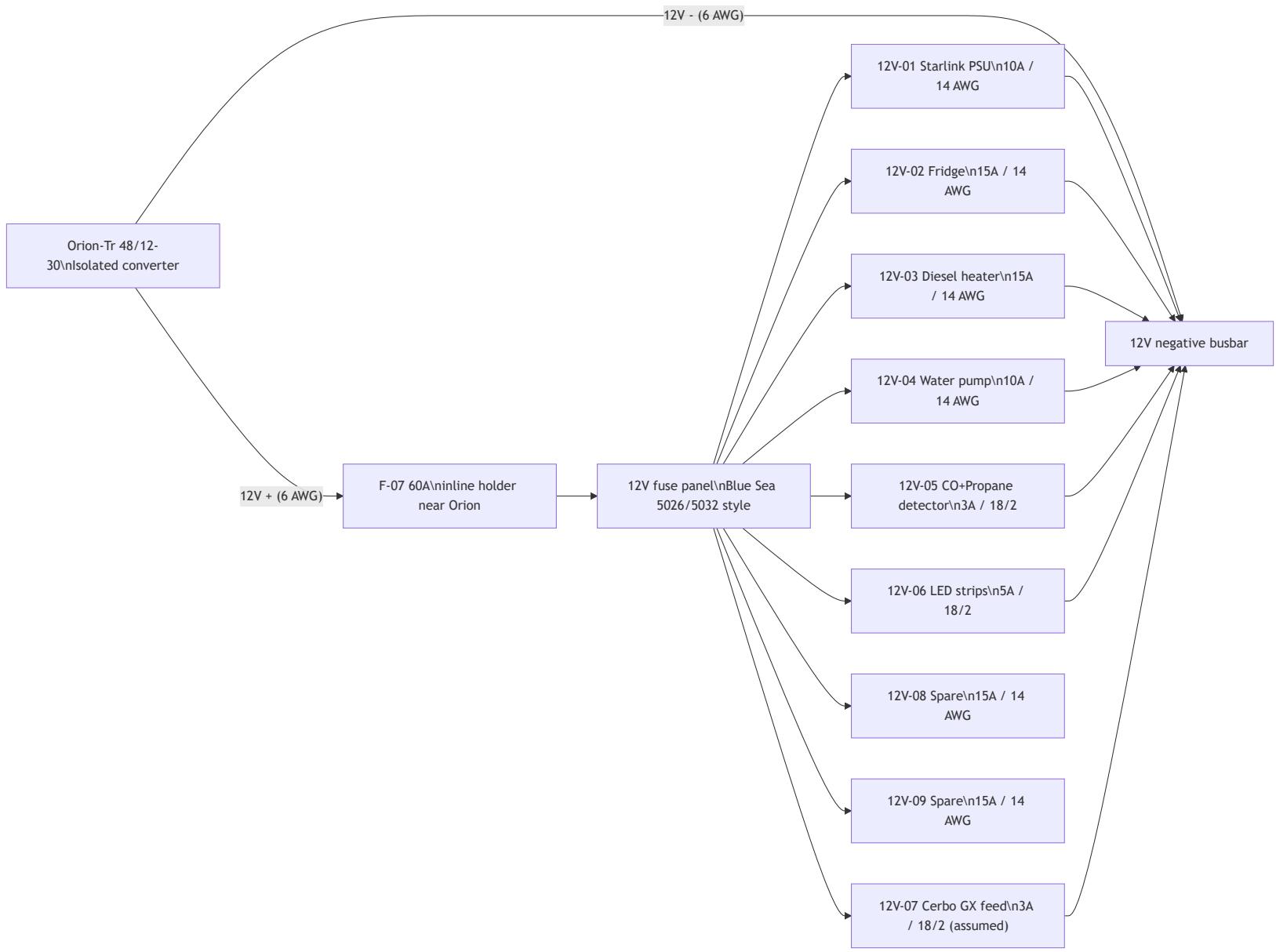
Sweep Outcomes Included In This Revision

- Corrected Sterling BB1248120 modeling basis to ~1500W max output (~26A at 57.6V), replacing prior 120A @ 48V planning assumption.
- Added explicit fuse-holder/housing definitions for every fuse family (Class T , Lynx MEGA , inline MIDI/ANL/AMI , PV gPV , and ATO/ATC).
- Added conductor schedule across 48V , 12V , PV, and AC segments with explicit assumptions.

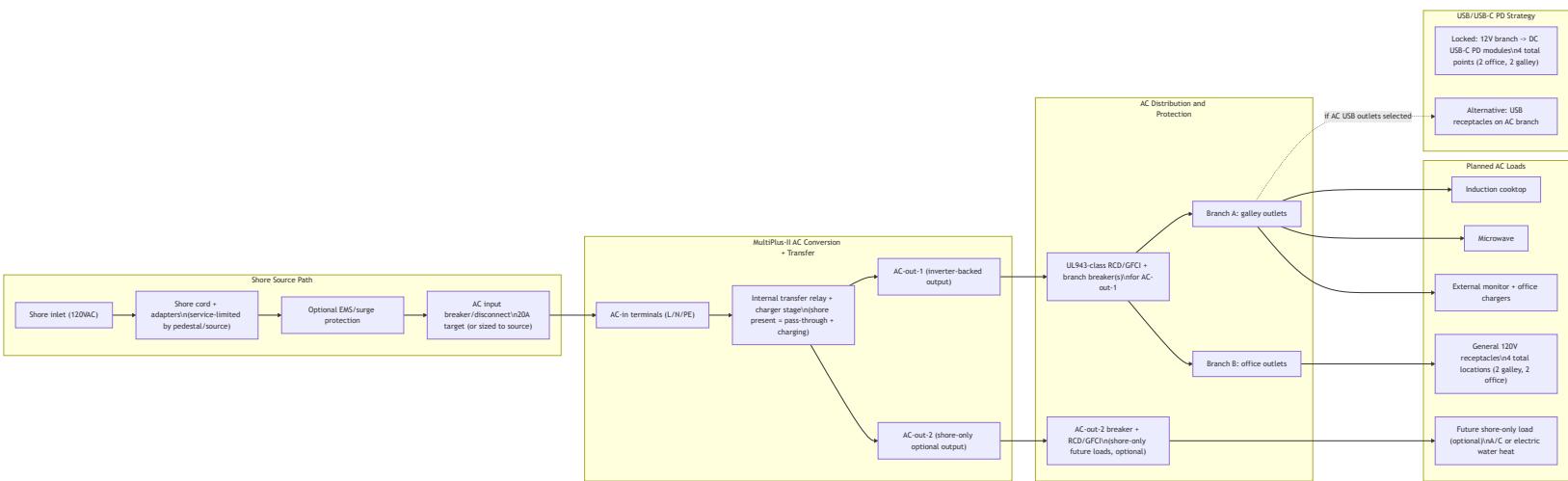
Complete Power Topology (48V Core + Charge Sources)



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.

- Input current limit should be set to the actual shore source (15A , 20A , or 30A adapter-limited) to avoid pedestal/source breaker trips.

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.

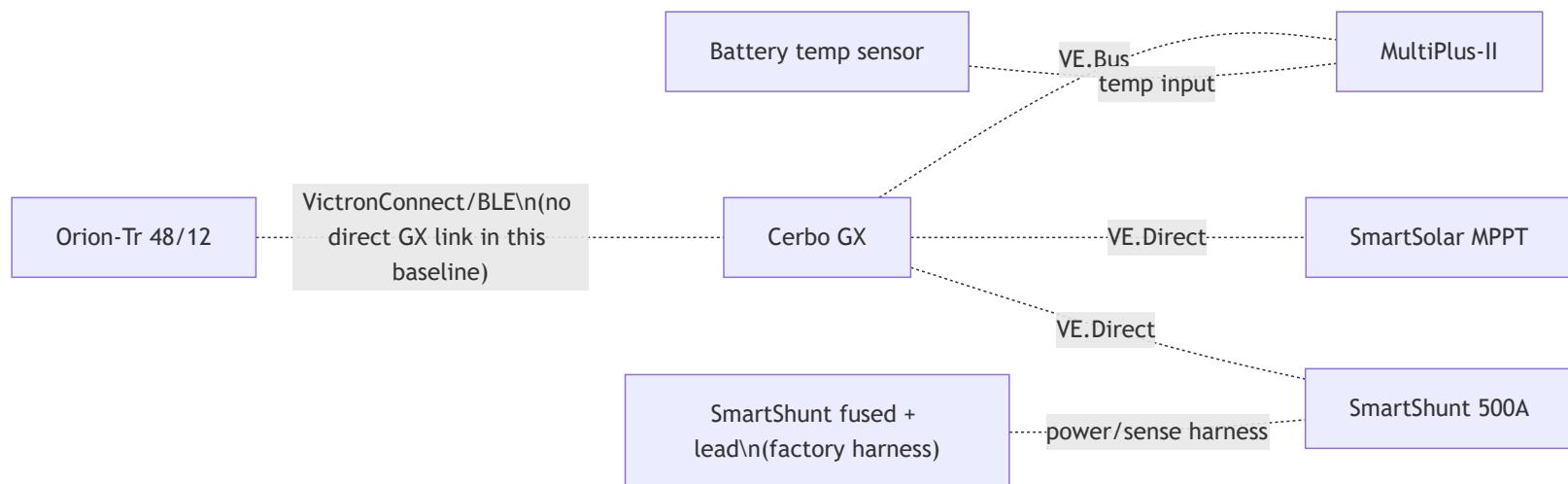
AC Reference Basis (Manufacturer Guidance)

- 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/adapter -> 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: <=2% on major 48V power runs and <=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.