SWXFR1230 DETAILED WIRING INFORMATION

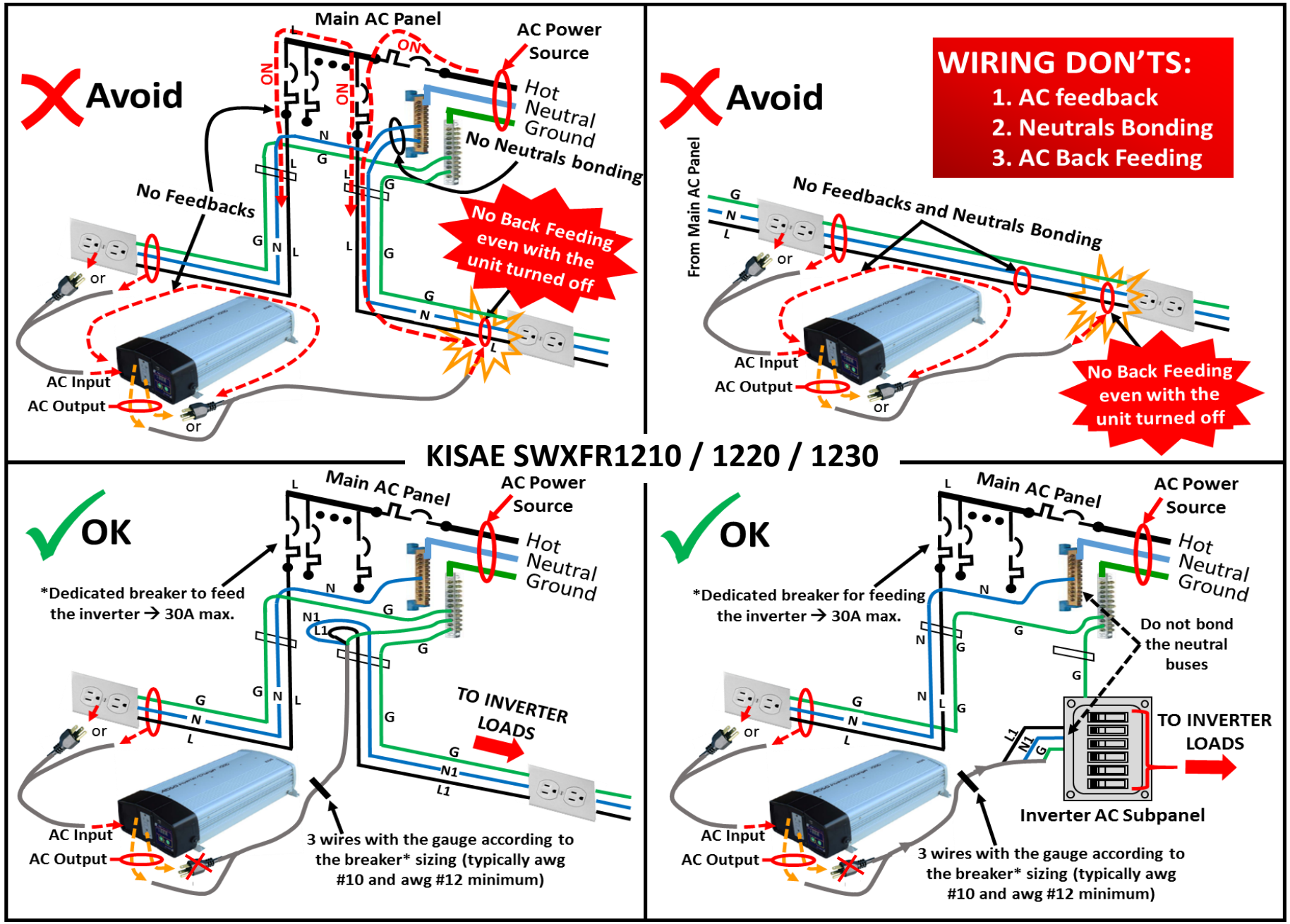
(North American Version)

Version with no GFCI (without GFCI protection at all)

KISAE SWXFR1230

(North American Version)

DON'Ts and DO's when connecting to an existing AC wiring



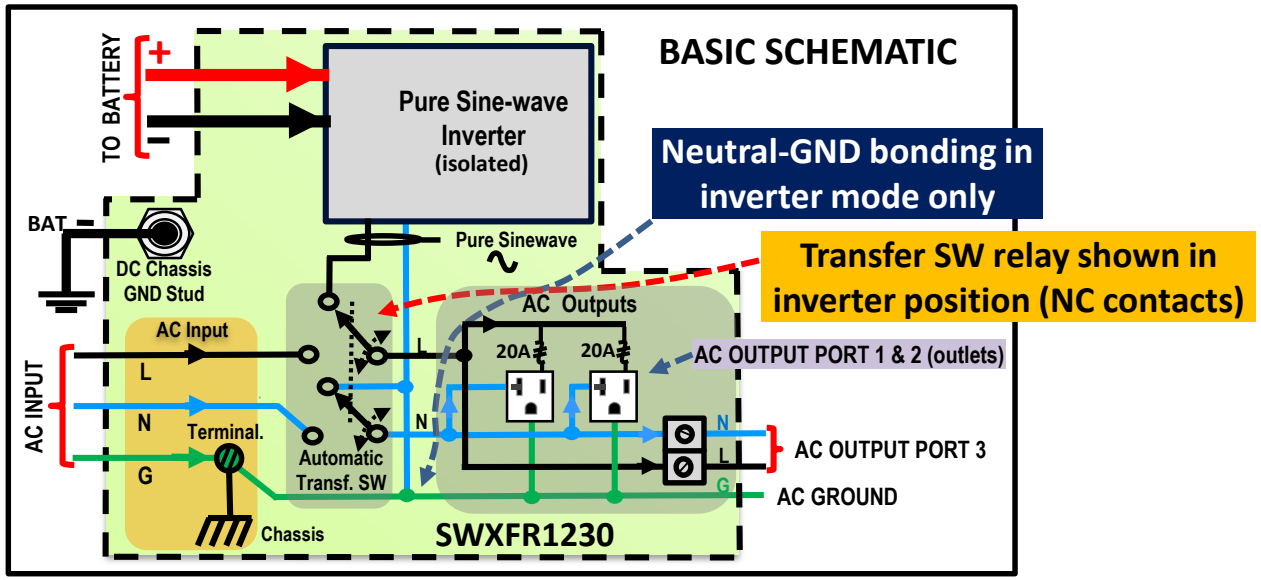
AC Output Neutral Ground Bonding (SWXFR1230 North American Version):

When the KISAE Inverter is running in Backup (=battery = inverter) Mode, the internal neutral-to-ground bonding system is enabled. The unit acts as an AC source and will automatically connect the AC Output Neutral (N) circuit to the AC safety ground.

When the unit is running in Pass-Through (bypass) Mode (the AC output is supplied by the utility/shore or gas generator through the AC Input terminals) the internal neutral-to-ground bonding system is disabled. The unit will act as a passive power bar and not as an AC source.

Because of that neutral bonding mechanism, **DO NOT connect the Neutral of the unit's AC Outputs to other Neutrals of external AC Power Sources.** This is because there could be a little voltage between the "N" of the shore/facility power and ground for several reasons (i.e. phase imbalance and/or voltage drop along the neutral wire). If you connect them through the unit when it is in backup mode, the current to equalize the electric potential difference between the Ns will pass through the internal neutral-to-ground bonding of the KISAE unit. Even if the voltage is very low (perhaps less than 1 volt) the currents can be proportionally much higher and some internal component in the way of the bonding could fail (i.e. some of the transfer switch relay contacts).

It is highly recommended to either plug the loads directly to the unit AC-Outputs or to use a **dedicated** distribution panel for the loads connected to the inverter. On this dedicated distribution panel, DO NOT connect the neutral to ground or bond the neutral to other neutrals coming from different distribution panels. See more on the "Do's and Don'ts when connecting to an existing AC wiring system". The following **BASIC SCHEMATIC** shows how the neutral is bolded and connected in the internal transfer switch inside the unit.



Using two distribution panels: one for the heavy AC loads and another for the inverter non-so-heavy AC loads (SWXFR1230, N. America)

① Isolator is required for recharging 2 or more separate battery banks with a common alternator preventing the starting battery to end up drained by the other bank. There are smart isolators with more wiring and features like: regulation, priority, current pass-through, under-voltage shutdown and/or 0V drop. The KISAE DMTxxxx series of DC-DC chargers act as advanced battery isolators as well. The lacking of an isolator can be compensated partially keeping the batteries isolated at all or connecting them in parallel and using the inverter's highest under-voltage shutdown "SdH" setting.

② Fuse amps rating depends on the alternator maximum one. Pass-through type isolators may require higher rating

③ Plug & receptacle shown as per RV 30A. There are others for 30A and 50A-240V-2-hots for RV and Marine applications. An ELCI** ground fault protection device may be required* within 10 feet of the shore power inlet

④ Neutral bars isolated from the common GND and between AC Main panel and Inverter subpanel. Do not bond them

⑤ Typically AC Port 3 is used for maximum 30A rating. Alternatively AC Port 1 & 2 (outlets) can be used instead, rated to 20A max each one. The total AC-Output power rating is 25A/30A in Inverter/Bypass mode respectively

⑥ For 120V (1 Hot) systems in marine applications, the Neutral should be included* using a Dual-pole transfer switch coming from the gas generator or shore power.

⑦ For marine applications* include a pole for the Neutral to protect against possible Neutral-Hot reversal from the shore power. This means a breaker minimum amps rating as the sum of the one in the inverter breaker in point ⑧ plus the max. current to the non-inverter loads, and no more than the amps rating of the transfer switch at ⑥

⑧ Single pole 30A max.. For servicing purposes turn the main breaker ⑦ off just in case the Neutral and Hot are reversed

⑨ Min. gauge as per point ⑧, typically for 30A, AWG #10 min. (copper)

⑩ Minimum gauge as per the max. current coming from the transfer SW in ⑥ and so from ③ or the gas generator

⑪ DC and AC grounds bonding to provide a path to shore GND for any stray AC current in the DC-GND, reinforcing the one between points A and B through the chassis. The gauge should be no thinner than the GND wire coming from ③

⑫ The wire of the DC chassis GND should* be sized not less than one size smaller than the wire carrying the DC current at point ⑭. It means no thinner than AWG 3/0 (copper). This is to avoid risk of fire in case of a DC short circuit event before the big fuse ⑬ blows up. The use of this AC to DC ground bonding wire in marine applications* could produce galvanic corrosion if the boat is not adequately protected with galvanic AC isolators (transformers)

⑬ Use either a DC fuse (class T or ANL type) or DC breaker rated at 350A with an Ampere Interrupt Capacity (short circuit) that exceeds 2 or 3 times the total cold cranking current of the battery bank (in parallel connections the total cranking current is the sum)

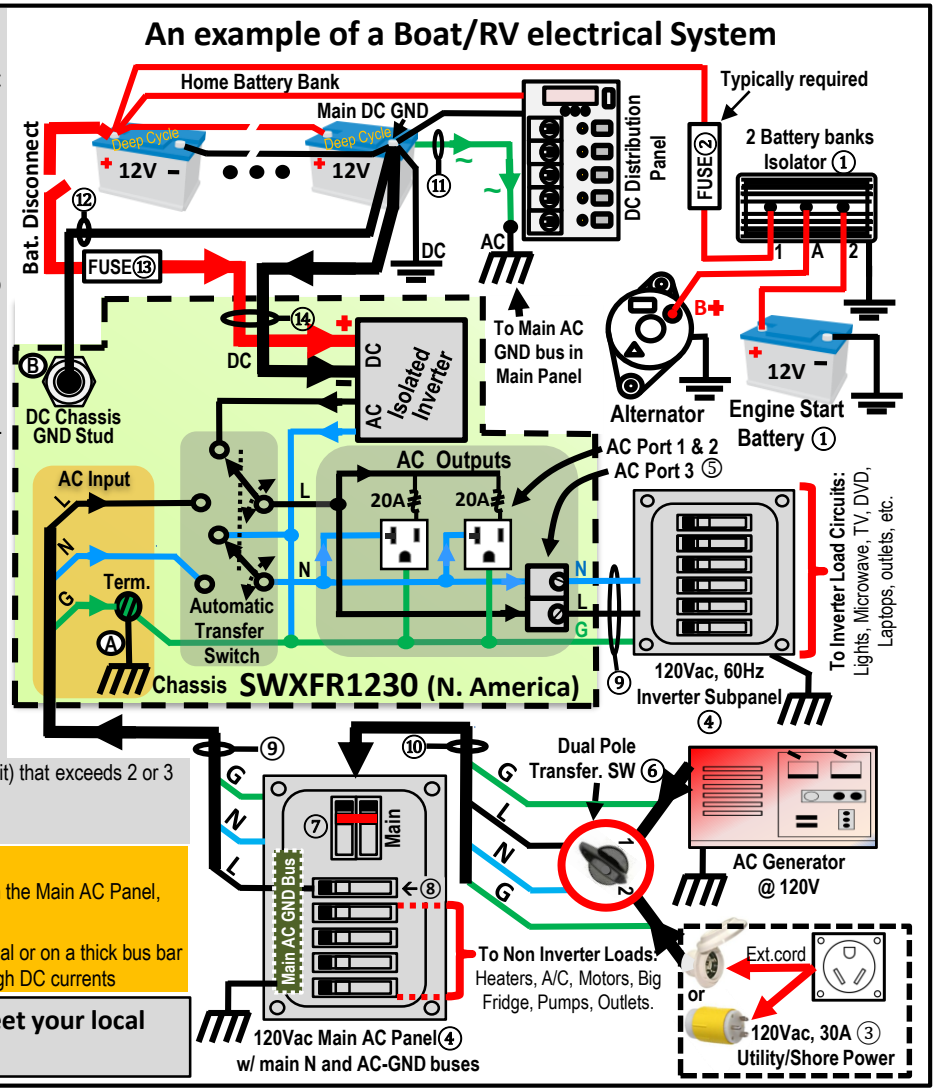
⑭ Use wire gauge no thinner than AWG # 4/0 and no longer than 5 feet long for each polarity (positive and negative).

NOTES: *As per ABYC = American Boat and Yacht Council; **ELCI = Equipment Leakage Circuit Interrupter.

AC Safety Ground to be connected to all the chassis of devices with AC power. The main AC-GND bus should be in the Main AC Panel, being connected to the GND coming from the shore / pedestal power at point ③

DC Ground as the return path of the battery currents. The main DC GND should be on the negative "-" battery terminal or on a thick bus bar very close to it. The gauge of the DC-GND wire in ⑫ is thicker than the AC-GND in cable ⑨ due to the potential high DC currents

WARNING: This information is for reference purposes only. Always make sure to meet your local electric codes. For proper installation ask a qualified electrician.



Using a single distribution panel for non-so-heavy AC loads only (SWXFR1230, North America)

① Isolator is required for recharging 2 or more separate battery banks with a common alternator preventing the starting battery to end up drained by the other bank. There are smart isolators with more wiring and features like: regulation, priority, current pass-through, under-voltage shutdown and/or 0V drop. The KISAE DMTxxxx series of DC-DC chargers act as advanced battery isolators as well. The lacking of an isolator can be compensated partially keeping the batteries isolated at all or connecting them in parallel and using the inverter's highest under-voltage shutdown "SdH" setting.

② Fuse amps rating depends on the alternator maximum one. Pass-through type isolators may require higher rating

③ Plug & receptacle shown as per RV 30A. There are others for 30A and 50A-240V-2-hots for RV and Marine applications. An ELCI** ground fault protection device may be required* within 10 feet of the shore power inlet

④ Neutral bars isolated from the common GND and between AC Main panel and Inverter subpanel. Do not bond them

⑤ Typically AC Port 3 is used for maximum 30A rating. Alternatively AC Port 1 & 2 (outlets) can be used instead, rated to 20A max each one. The total AC-Output power rating is 25A/30A in Inverter/Bypass mode respectively

⑥ For 120V (1 Hot) systems in marine applications, the Neutral should be included* using a Dual-pole transfer switch coming from the gas generator or the SWXFR1230 inverter.

⑦ For marine applications* include a pole for the Neutral to protect against possible Neutral-Hot reversal from the shore power.

⑧ Breaker amps rating 30A maximum (25A typical) and dual pole for marine applications to include the Neutral. Minimum wire gauge AWG #10 (copper)

⑨ Min. gauge as per point ⑧, typically AWG #10 (copper)

⑩ Minimum gauge as per the max. current coming from the Xfer-SW in ⑥ and so from either ⑨ or the gas generator

⑪ DC and AC grounds bonding to provide a path to shore GND for any stray AC current in the DC-GND, reinforcing the one between points A and B through the chassis. The gauge should be no thinner than the GND wire coming from ③

⑫ The wire of the DC chassis GND should* be sized not less than one size smaller than the wire carrying the DC current at point ⑭. It means no thinner than AWG 3/0 (copper). This is to avoid risk of fire in case of a DC short circuit event before the big fuse ⑬ blows up. The use of this AC to DC ground bonding wire in marine applications* could produce galvanic corrosion if the boat is not adequately protected with galvanic AC isolators (transformers)

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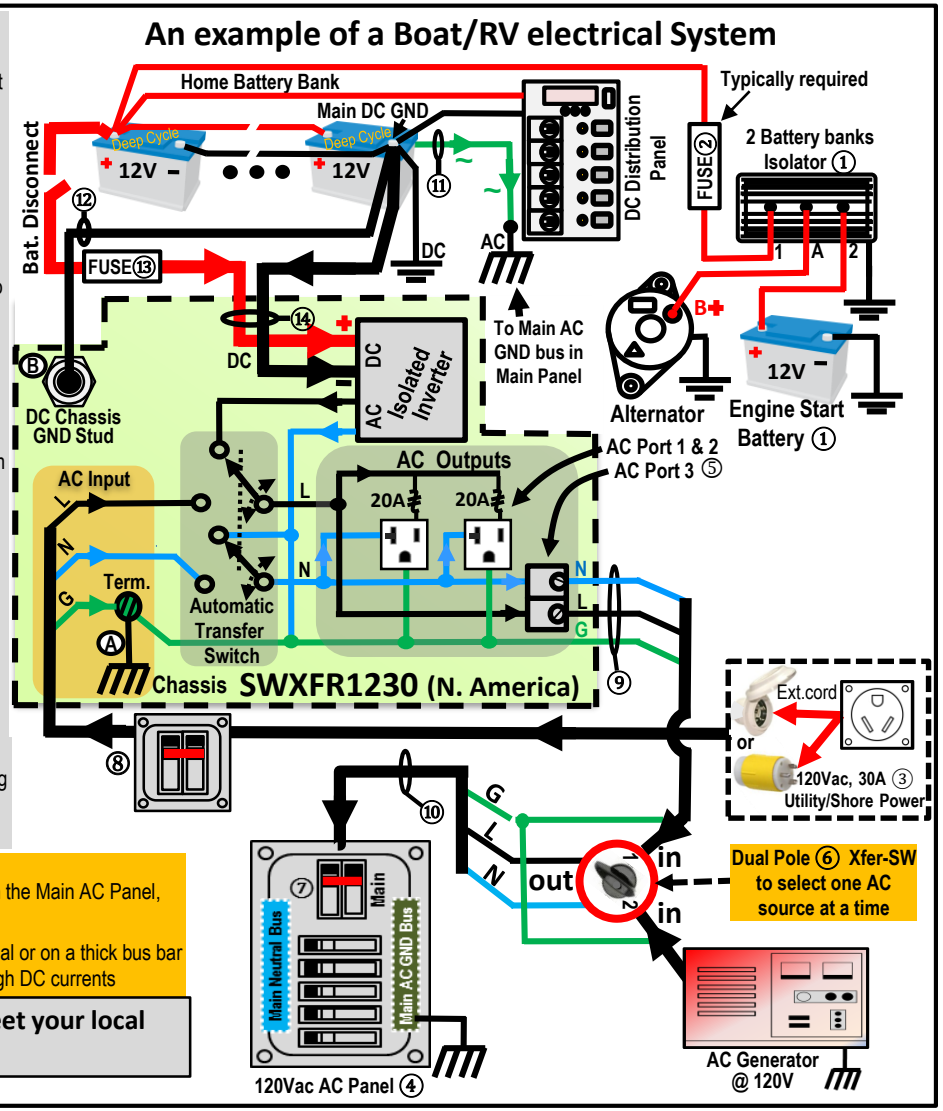

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