

Reference: **Paralleling Generators with Different Pitches**

Form No: **ACI-002** Rev: **01 – 3/20/20** (Original date: 2/18/2020)

Applicable Models: **3516B-RM** (written for this model but would apply to all packages capable of parallel operation)

SAFETY NOTE: ENSURE THAT ALL SAFETY INFORMATION, WARNINGS, AND INSTRUCTIONS ARE READ AND UNDERSTOOD THOROUGHLY, BEFORE ANY OPERATION, MAINTENANCE AND/OR REPAIR PROCEDURES ARE PERFORMED.

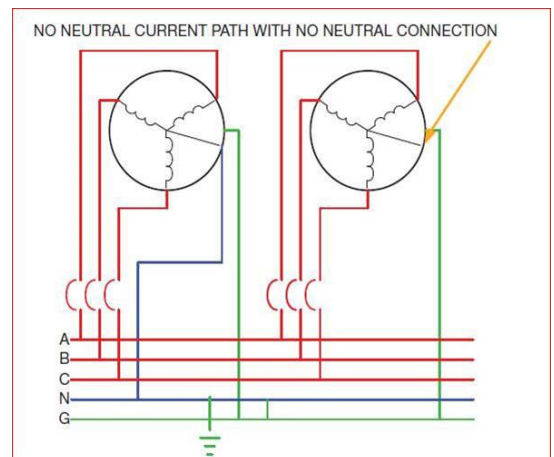
Instructions for our customer that purchased different pitch power modules from us:

1. If the site is expected to have line to neutral loads or imbalanced loads, then one of the generators can be connected as a normal 3 phase plus neutral connection while the paralleling unit with a different pitch can be paralleled to the first unit as a 3 phase but do **not** connect the neutrals of both generators together.
2. If the site does **not** have any line to neutral loads or the load is balanced, then **don't** connect the neutrals of either package together.

Note: This is how we perform our production parallel load test.

3. If the site has a large imbalance of load or large line to neutral load (in excess of the capability of a single power module), then an engineering firm should be contacted to size a neutral reactor so that the neutrals of both packages can be tied together to supply power for the site.

As the units we receive to refurbish were originally packaged by Cat with different generator pitches, in turn, we are constrained in that regard as to what we can offer as a refurbished package to our customers. With that being said, all the packages we offer can be paralleled together, but there are caveats that the end-user must be aware of, and the generator pitch is one, as is configuring for base loading, and conversion to MGDG paralleling.



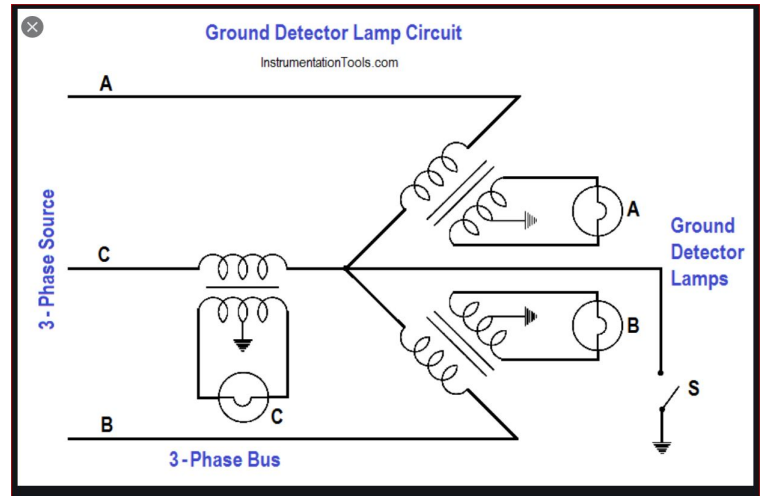
Connection diagram as a reference

Question: Should neutral be bonded to ground if on a boat or dredge?

Answer: On board ships with a metallic hull the neutral should **not** be grounded. If a neutral is required it should be run on an Isolated bus from the ground. See Ground Detector Lamp Circuit diagram demonstrating the easiest way for on-board ship ground fault detection. This is done so charged particles and barnacles don't attach to the hull as quickly.

Concerning this diagram, if it is a 3 or 4-wire WYE connected system then the connection as shown in the drawing is acceptable. The lights can be something like ABB or Schneider oil tight lights that have a built-in transformer; thus, no grounding of the secondary of the lights is required.

Even more simplified, the design can be 480V or 240V incandescent sync light bulbs (depending on the Gen voltage) connected to each phase (with fuses) and use the same circuit with the switch(s). The switch should be momentary oil tight pushbutton **not** a maintained switch.



Concerning multiple generators with different pitches where some generator's neutral floats and the neutral of the other generators is bonded to ground. The neutral of the bonded generators must be isolated from the ground per the above description.

The press to test circuit would be moved from the line side of the generators to the common load bus to detect the fault. There are more sophisticated systems for ground detection which can be researched by an electrical engineering firm. It is always a good idea that all parties concerned are aware of pitch differences.

In application, since the neutral is isolated from the hull of the ship. Under normal conditions, all 3 lights glow with the same brilliance. If a phase goes to ground nothing happens. The ship is still operational. Note, the below example this is checked frequently.

As an example, phase A falls to ground all 3 lights still glow at the same brilliance. The seamen now push(es) the switch(s) connecting the lights to ground. At this point, the A phase light goes dark because there is no potential difference between phase A and Ground; however phase B and C lights double in brilliance as they are now seeing the phase to phase voltage of A phase which is being impressed onto the neutral point of the generator. This indicates somewhere on the ship that the A phase is Grounded. Releasing the pushbutton causes the neutral once again to be isolated from the ground.

Please contact Altorfer's Packaging Division with any questions regarding this conversion procedure.

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