

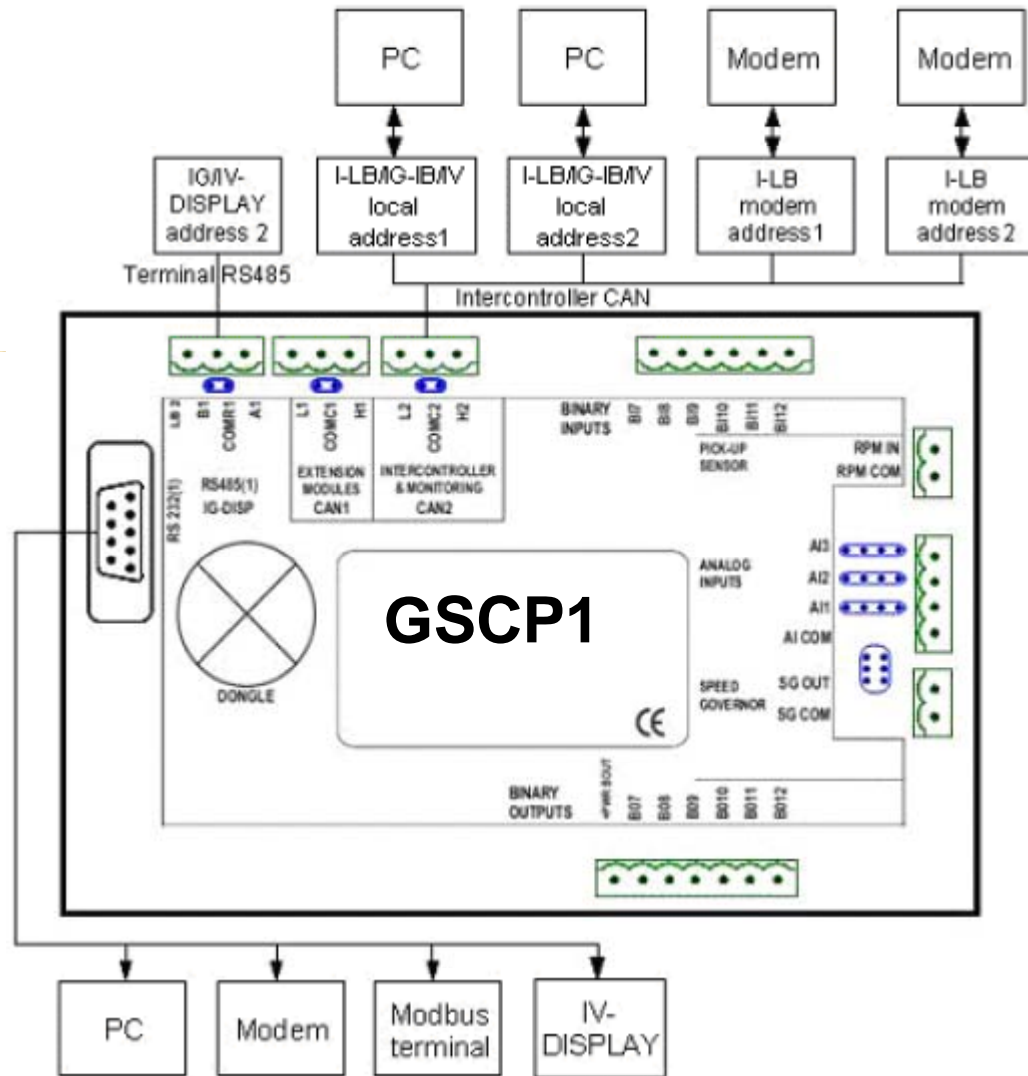
# Paralleling The Clarke Way



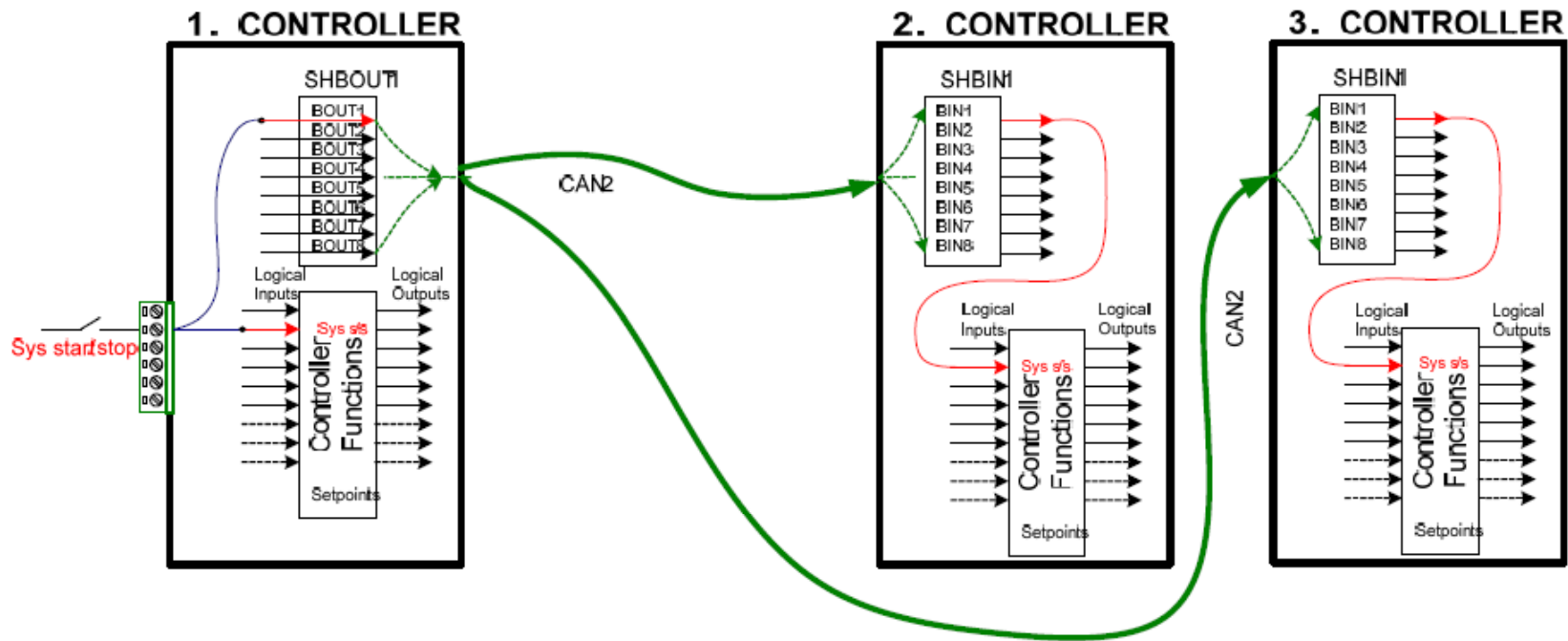
# Paralleling The Clarke Way

- Our systems utilize a compact modular design to reduce wiring requirements
- The GSCP1 is a very powerful controller for its size, and it is expandable.
- All switching gear and controls are locally mounted at the genset with only power cables to run to the distribution switchgear.

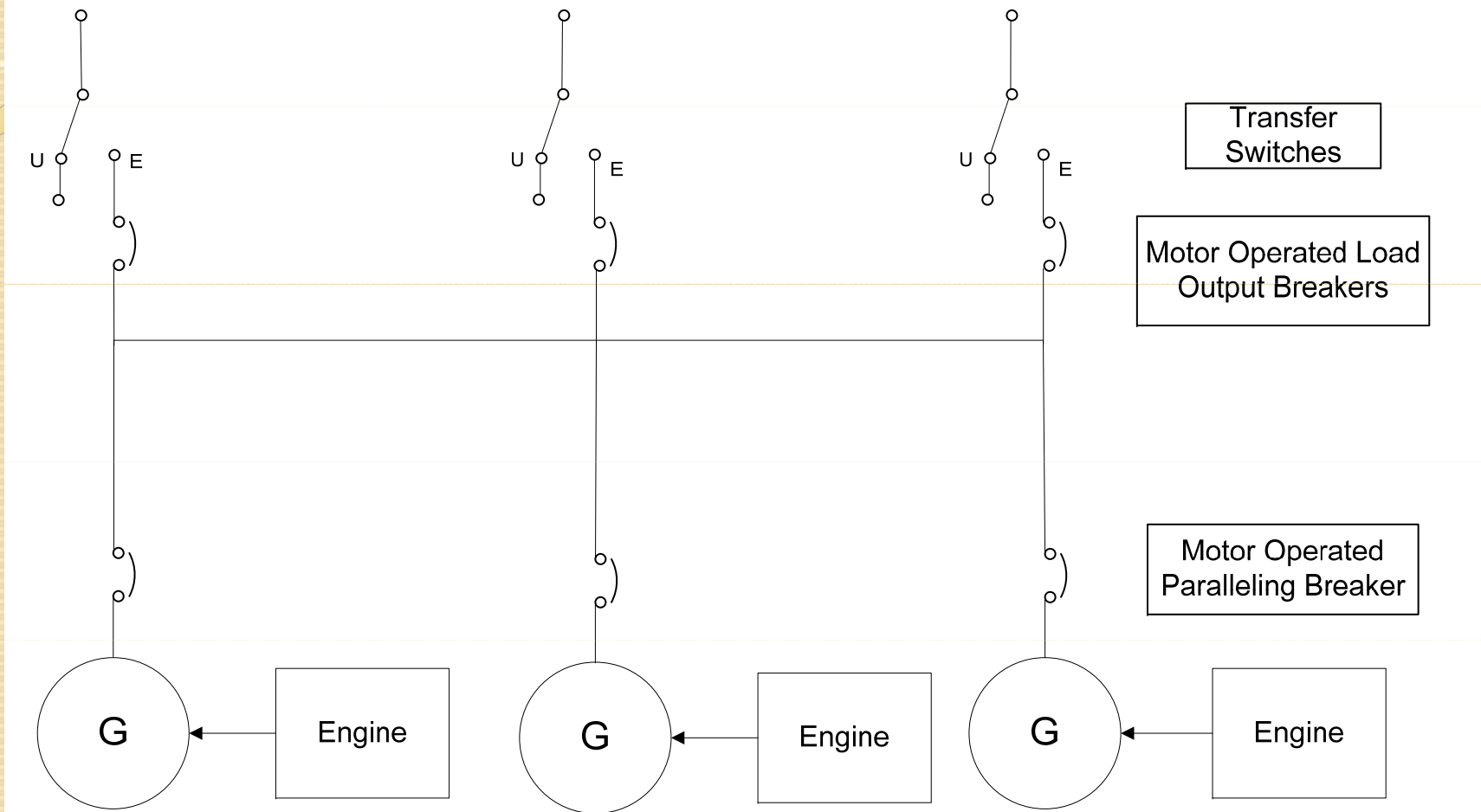
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# Virtual Sharing of I/O

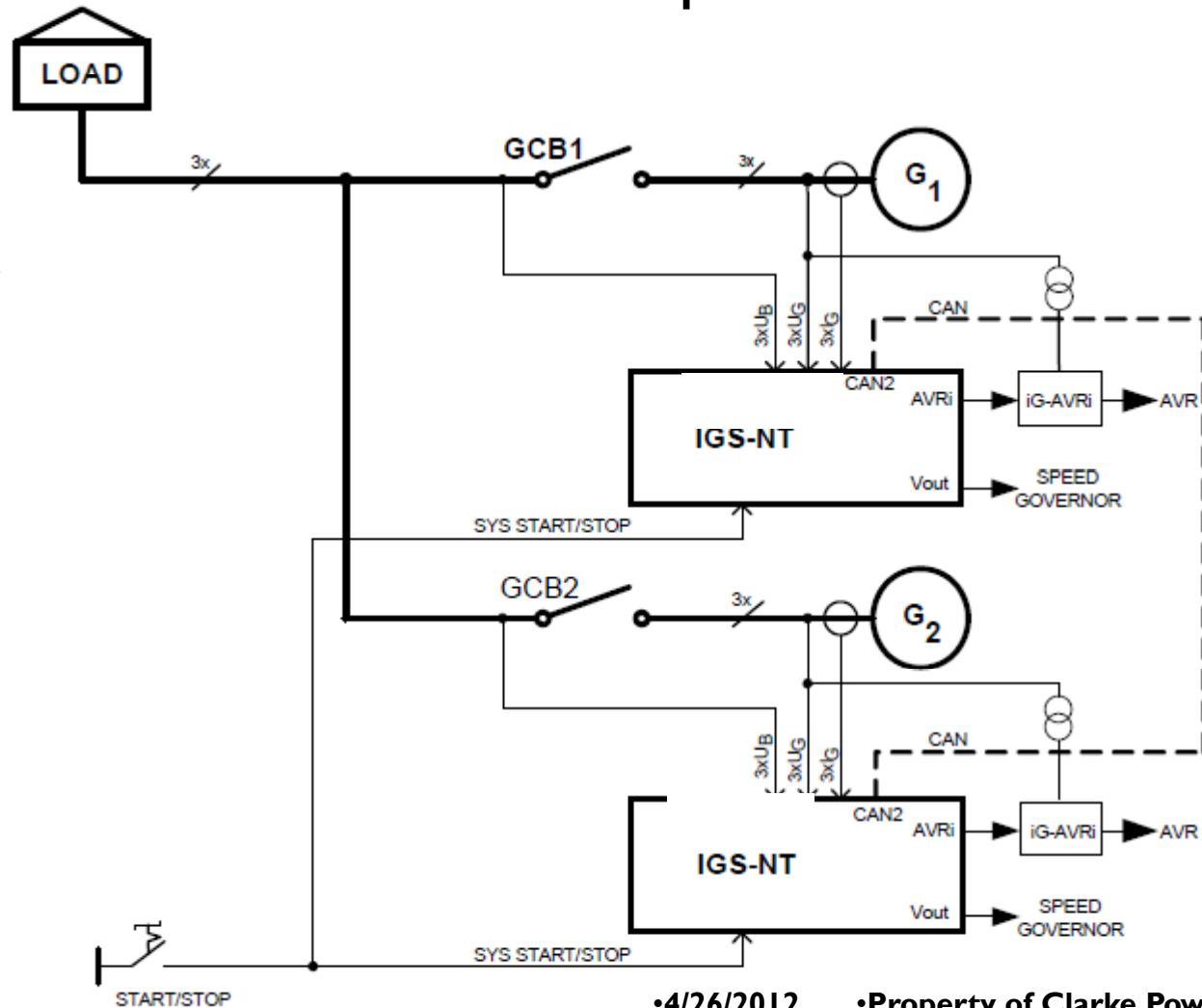


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## Island Operation



# Electrical Installation Breakdown

## Clarke supplied Items/Components

- Generator sets with motorized breakers on each unit
- Distribution Switchgear (Bus) with motorized breakers on output side
- GSCPI paralleling generator controller

# Electrical Installation Breakdown

## Customer supplied wiring

- Cables between motorized breakers on the generators and the distribution switchgear
- Cables between distribution switchgear motorized breakers and the ATS's
- Twisted shielded pair from each genset controller to the extension module
- Twisted shielded pair between generator controllers
- Battery positive and negative wires from each generator to the extension module



# Power Management

- The power management system shares the load between gensets based on the given parameters.
- The setpoints in the controller for power management can be entered as absolute values (fixed on/off points) or relative values (percentage values of kW or kVA).
- Engine hour optimization is done by swapping each genset's priority level to keep all engines within a set range of operating hours.
- Load demand can be used on genset of different sizes to swap the genset's priority to keep the genset with the closest matched power to the applied load set to the master.

# Power Management

- Load reserves can be set for up to four levels.
  - These reserves can be set in kW or kVA and determine when each level should be started or stopped.
- Each group of gensets can be assigned a minimum power requirement to keep engines online.
- Gensets of Different Output Ratings:
  - The controllers can be configured to do a load demand swap to apply the load to the genset with the closest matching output rating.
  - Gensets can be configured to run in up to 4 “Power Bands”. The different bands are configured to utilize a certain combination of power ranges to give a nominal kW rating for that band.

# Power Management

For example:

- Genset#1 = 30 kW
- Genset#2 = 50 kW
- Genset#3 = 100 kW
- Power Band 1= 1 (active if load is under 30 kW and in range of load reserve)
- Power Band 2= 1+2 (active if load is between 30 kW and 80 kW, and in range of load reserve)
- Power Band 3= 3 (active if load is between 80 kW and 100 kW, and in range of load reserve)
- Power Band 4= 2+3 (active if load is between 100 kW and 150 kW and in range of load reserve)
- Above the highest power band, all of the gensets will be online.

## Load Shedding

- Prioritized loads will be shed (distribution breaker opened) to prevent overloading the system.
- These loads are prioritized with the highest numeric value being the last to disconnect and the first to reconnect.

### Benefits:

- Minimizes chance of emergency power supply failure
- Increases reliability of emergency power system with multiple units online supplying power (especially to critical high priority loads).

## Added Benefits of Our Paralleling System

- No external paralleling switchgear needed! All of the switchgear components are mounted on the genset.
- Fewer wires to run to the distribution switchgear cabinet for the paralleling sensing wires.
- The ability to shed loads increases the reliability of the system by keeping the critical loads powered up.
- The power management system can automate your system to bring gensets online when needed or shut them down when loads are low.

## Added Benefits of Our Paralleling System

- The power management system allows for greater fuel economy by sharing the load evenly, and only running the engines that are necessary.
- The engine life can be extended by using the engine hour optimization feature.
- Sharing inputs and outputs virtually over the CAN bus helps reduce the amount of required cabling between units.
- With a modular style genset, our generators can be deployed to a customer's site and use an existing switchgear system, or we can provide a custom solution.