

Paralleling Switchgear.....19-2
Energy Commander..... 19-3
System Applications..... 19-5
Ordering Information..... 19-6

Paralleling Switchgear

Paralleling is an operation in which multiple power sources, usually two or more generator sets, are connected and synchronized to a common bus (same parameters with respect to frequency, phase angle, etc.).

Why Paralleling Switchgear?

There are several advantages to be realized when employing paralleling switchgear in an electrical design such as increased reliability, flexibility, ease of uninterruptible maintenance and application/operation cost savings. It is because of these advantages that paralleling switchgear has become one of the best choices for meeting today's power requirements.

Reliability

Systems in which part of the load is very critical may be best served by paralleling one or more generator sets. Under parallel operation all the generator sets are started at once. The first set to reach the proper parameters will assume the most critical portion of the load, with the remaining sets picking up lower priority loads. In addition, by using a load shedding application, the failure of one generator set will not interrupt power to the critical loads, as lower priority loads can be dropped offline.

Flexibility

Paralleling power sources allows for a wide variety of choices in the generation, distribution and utilization of the system's power.

Uninterruptible Maintenance

When one engine - generator set is out of service for maintenance or repair, having others synchronized on the same bus can provide the necessary back-up power, should an outage occur.

Cost Savings

Savings can be realized on the application when a number of smaller sets would be less expensive than one large set or when the load makes it impractical to divide into several sections, each with its own generator. Savings can also occur on the operation side when generator set life is extended from being used only when needed to support the load. Also, when it is anticipated that the load will grow significantly in the future, the capital investment can be reduced by starting with small sets and paralleling additional units as load increases dictate.

Why Energy Commander?

Energy Commander™ paralleling switchgear has been providing customer facilities with reliable power switching systems for many years and continues its excellence into the 21st century. Since the inception of paralleling switchgear, many successful Energy Commander installations have been supplied with a focus on providing reliability.

Energy Commander has become the leader in supplying solutions to simple and very complex systems due to its design reliability, flexibility, uninterruptible maintenance, and operative cost savings.

Energy Commander has evolved and adapted to the changing technologies in engine generator design, switchgear controls and monitoring systems. It reflects GE's continuing commitment to reliable solutions for critical power applications.

Designed to your specifications in a team effort

Complex switchgear systems is where GE excels. With over 30 years experience in all types of paralleling applications, our team of systems engineers will work with you to design a system that conforms to your exact facility needs. Whether low or medium voltage, GE provides you with expert system layout, device selection, construction, programming, monitoring, control, startup, training, and preventative maintenance services. We will work with you from project inception through commissioning and training to make certain that your project goes smoothly.

Available for all types of systems including emergency power, peak shave/utility rate incentive, cogeneration and prime power and utilizing diesel or natural gas reciprocating engines, turbines, fuel cells, multiple utility sources and other prime movers, Energy Commander is truly versatile. In all applications, the systems use the latest technology in programmable control, high-speed networks, data acquisition and operator interface software and hardware.

Energy Commander products offer designers and owners an almost unlimited number of configurations and operational parameters.

- Designed to meet your requirements
- Operator interface panel with touch screen for system control
UL 891, UL 1558 and UL Medium Voltage switchgear listings available
- GE Intelligent Platforms PLC control and full range of GE components including protective relays, breakers, metering and monitoring devices, etc.
- Complete project design and approval drawings coordinated by our experienced project engineers
- Final instruction manuals including a drawing package that shows part numbers on all devices, making it easier to order spare parts and replacements
- To/from numbering on the wire ends for easy verification and debugging
- Field startup and training of site personnel
- Project management from pre-quote services to final acceptance
- Preventative maintenance services

System Reliability

The Energy Commander Paralleling Switchgear product has several hardwired features which ensures trouble-free operation and maximum reliability. Annunciator panels, load control switches and meters are all hardwired components. Upon the unlikely failure of the master control, a back-up engine start operation is hardwired into the system. Also the programmable logic controller (PLC) which runs automatic operations is backed up with a true hardwired manual control.

Finally, as a leader of paralleling switchgear technology, Energy Commander has an extensive array of successful, trouble-free installations around the globe. The breadth of experience and system complexity all make Energy Commander second to none in the industry.

Ease of Use and Operations

A Master HMI panel can be useful to paralleling switchgear systems for user access and monitoring. The key control and monitoring functions in these systems include metering, annunciation, controlling breakers and engine generators in automatic operations as well as manual.

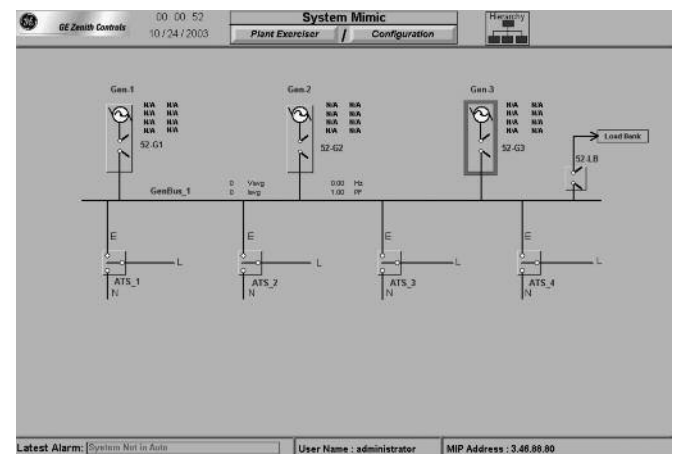
This monitoring and control should be carefully considered when selecting which type of HMI is best suited for the operator and his facility. The greatest reliability in monitoring and control functions is realized with hard-wired analog meters, switches, and annunciation indicators, with very limited HMI access needs by the operator.

In some cases, critical facilities may be suitable for additional system monitoring, trouble-shooting, and remote access ability. Operators in this case will require a more advanced Master HMI in addition to the system hard-wired meters, switches, and annunciation. The Energy Commander ACS "Advanced Control System" is recommended for these cases.

The Energy Commander Operator Interface Panel (OIP) is ideal for simpler systems. Since status of the system can be viewed in front of the line-up including all source metering, alarm, shutdown, and status annunciation, the operator is not required to utilize the OIP to cycle through any screens for the system control and monitoring. The user is only required to use the touch panel for system testing purposes, non-critical settings and timing adjustments, and limited manual control redundant to the hard-wired switches.

Standard Operator Interface Panel (OIP)

- Intuitive interface makes operation simple. Little or no learning curve required to operate system.
- Main screen with navigation buttons and non-system critical button/switches.
- System testing screen allowing the operator to manually initiate automatic system testing operations.
- Generator interface settings latched into the PLC control system upon entry.
- System load add/shed manual control redundant to hard-wired manual control switches in master control.
- Generator optimization settings latched into PLC control system upon entry.



Optional Advanced Control System (ACS) for Special Applications

- Full functions of OIP with the addition of SCADA capabilities.
- Optionally Internet capable - allows remote access via web.
- Online controllable / programmable (behind customer's own firewall).
- Advanced Event Logging and Source Trending allows statistical root cause analysis.
- Duplicates System and Generator Annunciation.
- Remote system diagnostics.
- Alarm and maintenance messaging, including predictive maintenance.
- Graphical User interface. Intuitive and user friendly. Requires NO computer experience.
- Password protection. Capable of hundreds of levels of authority.

System Applications

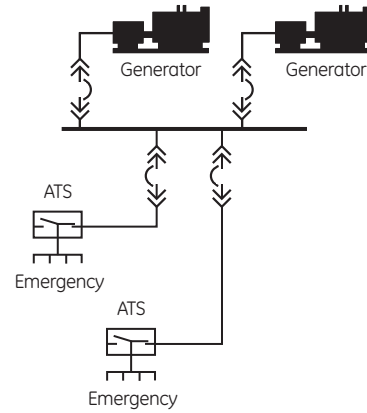
Emergency or Standby Power

Features

- The emergency system is used to supply power to building loads during a power failure.
- Paralleling switchgear controls the system transfer to generators and return back to normal sequences of operations.
- Paralleling switchgear controls the addition of load on/off generators (load add/shed).
- Transfers between utilities and generators occur in open transition or passive momentary closed transition (no active synchronization of sources).

Components

- System typically consists of paralleling switchgear product and automatic transfer switches of which GE has a wide variety for many applications.



Emergency/Standby Configuration Example

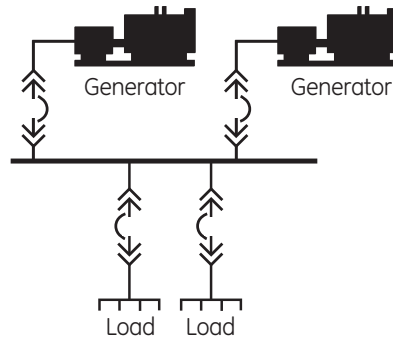
Prime Power

Features

- On-site prime power systems are most often used where there is no utility source available.
- The required electricity is generated entirely on-site, typically at facilities such as island resorts, mines, mills or other remote locations.
- Since utility is not available in prime power systems, ATS's/ATO's and utility/tie breakers are not required.

Components

- Generators are the only source of power. The system typically consists of PSG product with no ATS/ATO products.



Prime Power Configuration Example

System Applications

Parallel with Utility

Features

- Parallel with utility systems are utilized whenever generators are to be actively synchronized and paralleled with utility sources for short or long durations.
- These systems are often also used for standby use as well.
- PSG controls the generators transfer operations with the utility source(s) as well as the power management (loading controls) to direct power the appropriate direction.
- Transfers may occur in short duration (momentary closed transition), a somewhat longer duration (softload/unload closed transition), or a sustained duration (maintained parallel with utility).
- Power management in maintained parallel situations includes controlling import levels from utility, export levels to utility, or base load levels where generators are loaded to set amount disregarding the import and export contribution from utility
- “Co-generation” is often used for maximizing generator efficiency with heat recovery systems.
- Complies to interconnection requirements of each utility and IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems.

Components

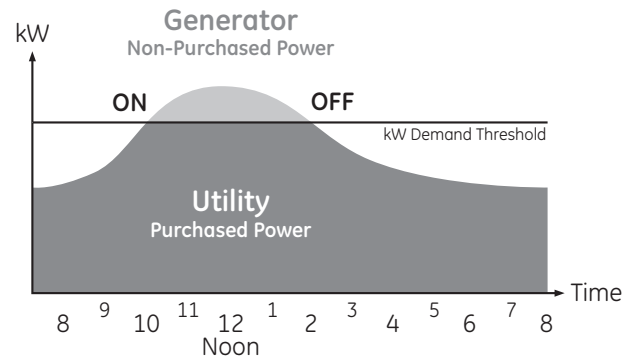
- System combines generators with utility sources. It typically consists of PSG product which handles the ATS/ATO operations.

Configuration Example

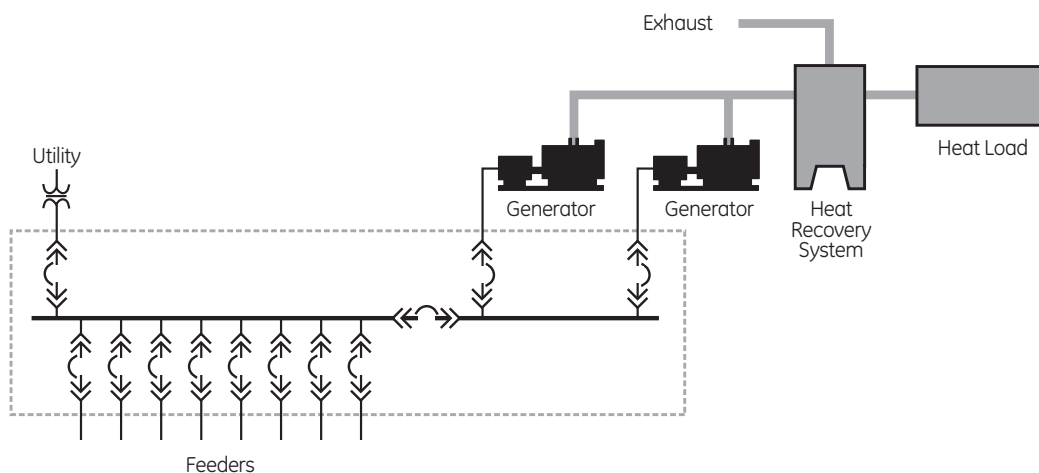
- Parallel with Utility application with “Co-Generation” heat recovery system.

Peak Shave Example

- A “Peak Shaving” application is sometimes used to transfer non-critical loads onto generators during peak utility demand hours.



Peak Shave Example



Co-Generation Configuration Example

Paralleling Switchgear Critical Power Products Ordering Information

Section 19

Please supply the details below to our Request for Quotation
E-mail inbox @PSGQuotes@ge.com or call 800-637-1738.

Include this form on all paralleling switchgear projects you send
in for quotes along with:

1. Paralleling Switchgear System Specification
2. One-line Drawings
3. Electrical Room Layout

Today's Date _____ Required Quote Date _____
Closing Date _____ Required Ship Date _____
Customer Name _____ Location _____
Nat. Account or Partnership _____ Industry Field _____
Sales Engineer _____ Project Name _____
District _____ Phone # _____ Fax # _____

Paralleling Switchgear

Utility Transfer Control Type ATS Only
 Open Transfer
 Momentary Closed Transition
 Softload Closed Transition
 Maintained Parallel with Utility

Number of Generators
+ any future required Generators _____

List Generator kW Ratings _____

Automatic Transfer Switch (if applicable)

Product Number (Section 14.) _____