DGP DIGITAL GENERATOR PROTECTION SYSTEM

TECHNICAL DATA

Ratings

Voltage - Nominal	• 140 VAC (phase-to-phase)
Frequency - Nominal	• 50 or 60 Hz
Current - Nominal	• I_N = 5 amperes
DC Current Voltage	• 48 VDC (38.5 to 60 volts) • 125 VDC (88 to 150 volts) • 220/250 VDC (176 to 300 volts)

Maximum Permissible Currents

Continuous	• 2 x I_N
Three Seconds	• 50 x I_N
One Second	• 100 x I_N

Maximum Permissible AC Voltage

Continuous	• 2 x Rated
One Minute (One per hour)	• 3.5 x Rated

Insulation Test Voltage	• 2 kV 50/60 Hz, one minute
Impulse Voltage Withstand	• 5 kV peak, 1.2/50 millisecond, 0.5 joules
Interference Test Withstand	• SWC per ANSI C37.90.1
Trip Output Contacts	• Continuous 3 amperes, make and carry for tripping duty = 30 amperes (per ANSI C37.90) • Break 180 VA resistive @ 125/250 VDC • Break 60 VA inductive @125/250 VDC
Auxiliary Contacts (Including Alarms)	• Continuous 3 amperes • Make and carry for 30 seconds = 5 amperes • Break 25 watts inductive @ 125/250 VDC; maximum 250 volts or 0.5 amperes
Ambient Temperature Range	• Storage: –30°C to +70°C • Operation: –20°C to +55 °C
Humidity	• 95% without condensing
Weight	• 51 pounds (23 kilograms)

Dimensions

Height	• 14 inches (352 millimeters) 8 rack units
Width	• 19 inches (484 millimeters) standard 19 inch rack
Depth	• 14 inches (356 millimeters)

Burdens

Current Circuits	• 0.022 / 5° ohms, I_N = 5 amps
Voltage Circuits	• 0.30 VA, 60 Hz • 0.40 VA, 50 Hz
DC Battery	• Contact converters = 2.5 milliamperes at rated DC input voltage • Power supply = 19 watts

Output Contacts

Trip Output Contacts - Form A
- 4 Programmable Relays with 2 Contacts Each

Alarm Output Contacts - Form C
- 4 Programmable Relays with 1 Contact Each
- 1 for Critical Self-test Alarm
- 1 for Non-critical Self-test Alarm
- 1 for VT Fuse Failure
- 1 for Loss of each Power Supply

System Interface
- IRIG-B for Time Synchronization
- RS232 port - rear panel
- RS232 port - front panel
- Printer Interface - rear panel

NOMENCLATURE SELECTION GUIDE

DGP Model Numbers

DGP * * * * * * *

5	5 AMP rated
0	Vps = 48 VDC
1	Vps = 110/125
2	Vps = 220/250 VDC
3	48 VDC with backup
4	110/125 VDC with backup
5	220/250 VDC with backup
AAA	STD. Model
A	Revision Levels

Examples: DGP54AAAA-DGP rated 5 amperes, 50/60 hz, 110/125 VDC redundant power supplies, no options, revision A.

GE TECHNOLOGY. TOUGH TO BEAT.

GE Protection and Control

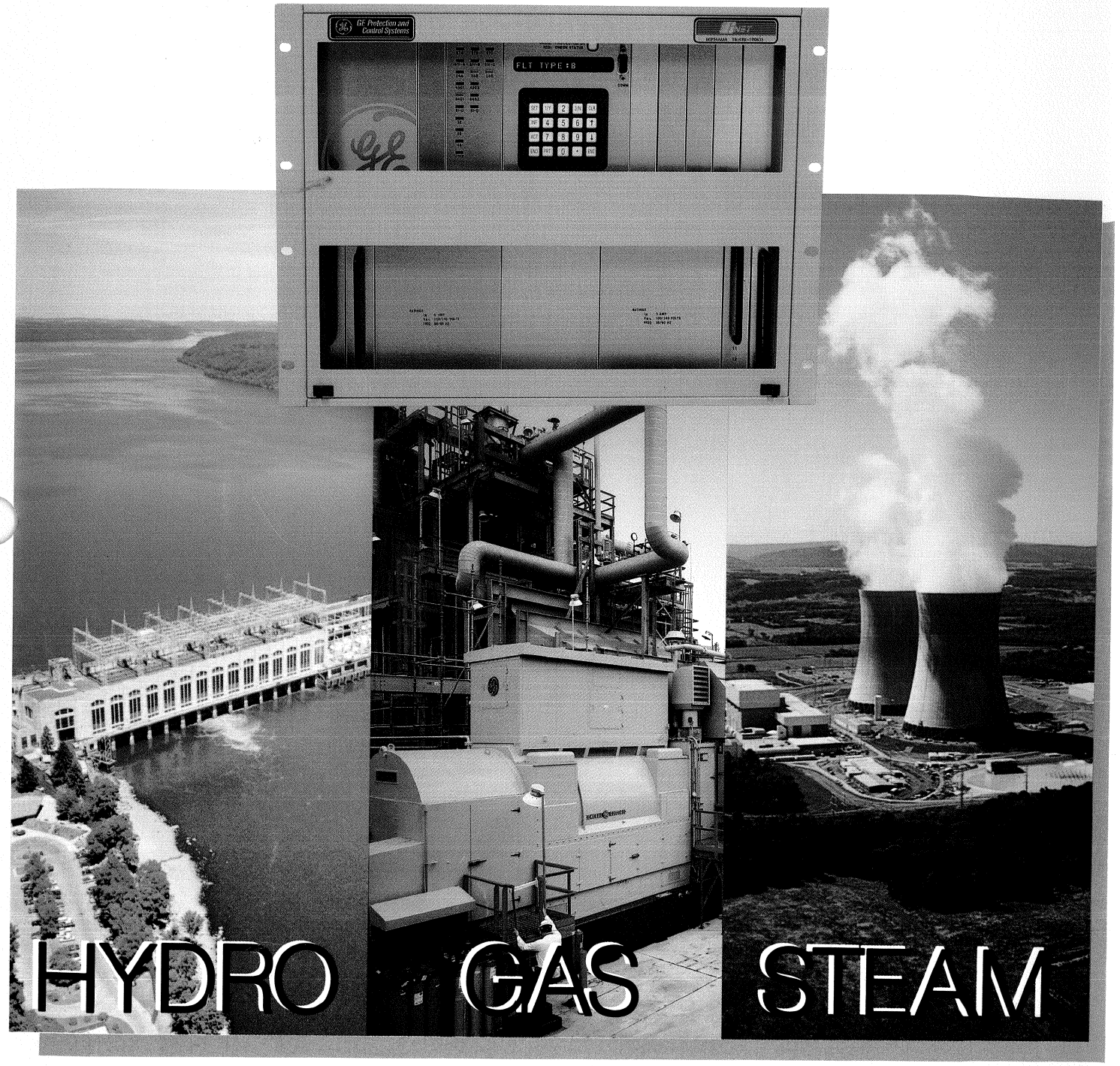
205 Great Valley Parkway
Malvern, PA 19355-1337
Telephone (215) 251-7000 / 8-247-7000

GEA-12122B

QG-7/93-5000

DGP DIGITAL GENERATOR PROTECTION SYSTEM

A Microprocessor-based Waveform-sampled Relay System



GE TECHNOLOGY. TOUGH TO BEAT.

GE Protection and Control

GE's DGP for all applications: Hydro, Gas and Steam Turbine Generators

The DGP Digital Generator Protection System uses microprocessor technology to obtain a numerical relay system with a wide range of protection, monitoring, control, and recording functions. User-friendly Man-Machine Interface and standard communication ports allow for easy operation and maintenance.

Distributed processing and optional redundant power supply in concert with diagnostics and self-test routines provide a high degree of dependability while retaining maximum system security.

The integral Man-Machine Interface (MMI) allows the operator to enter settings, access data, and test outputs. The key board and the LED display associated with it are all that is required to program and interrogate the DGP locally. Present values of selected parameters can be displayed.

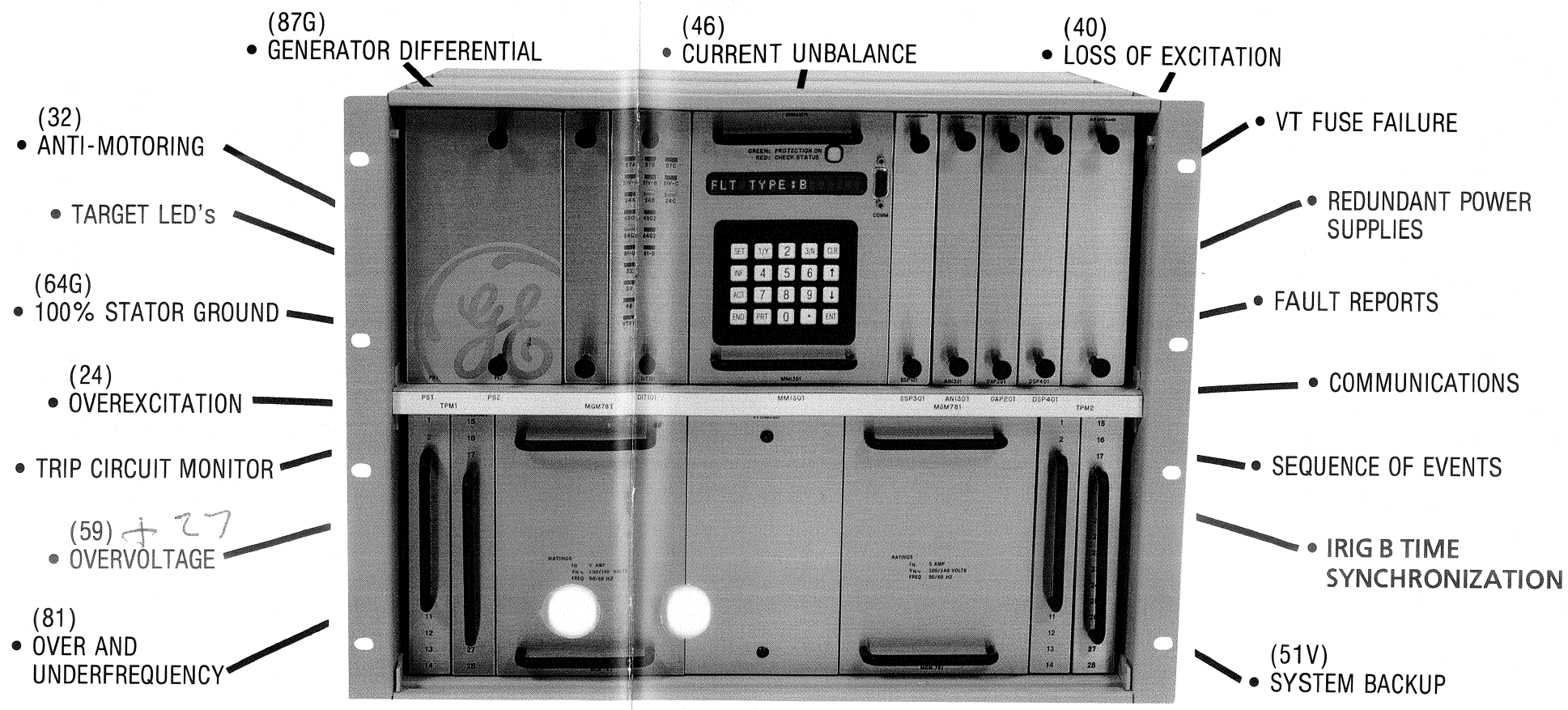
The display consists of 16 LED alphanumeric positions arranged side-by-side horizontally. Remote programming and data acquisition is possible through a dedicated RS 232 interface front and rear.

PROTECTION FUNCTIONS AND SETTINGS

Generator Differential (7G)	
Differential Current Pickup . . .	0.2-1.0 Amp
Current Unbalance (46)	
Negative Sequence	
Current Pickup	.05-2.99 Amps
Machine Constant -K2	1.0-50
Loss of Excitation (40) *(Two independent Zones)*	
Zone 1 & Zone 2 Center	2.5-60 ohms
Zone 1 & Zone 2 Radius	2.5-60 ohms
Zone 1 & Zone 2 Timer	0 – 9.99 sec
Anti-Motoring (32) *(Two independent Steps)*	
Reverse Power No. 1 & 2	0.5-99.9 watts
Time Delay	1-60 sec
100% Stator Ground (64G)	
Zone 1 Neutral OV Pickup	4-40 volts
Zone 1 Timer (Fund	0.1-9.9 sec
Zone 2 Timer (3rd Harm)*	0.1-9.9 sec
Overexcitation (24)	
V/Hz Pickup (Inverse)	1-1.99 per unit
Time Factor (Inverse)	0.1-99.99 sec
V/Hz Pickup (Instantaneous) . .	1-1.99 per unit
Timer (Instantaneous)	0-9.9 sec
Rate of Reset Timer	0-9.9 sec/%
Overvoltage (59)	
Voltage Pickup	100-200 volts
Time Factor	0.10-99.99 sec
Over and Underfrequency (81) *(Four independent Steps)*	
O/F Set Point (Each Step)	45.0-79.9 Hz
U/F Set Point (Each Step)	40.0-65.0 Hz
Timer (Each Step)	.05-99.99 sec
System Backup (51V)	
Phase Time OC Pickup	0.5-16 Amps
Time Factor	0.1-99.99 sec

*64G Zone 2 requires wye-connected VT's

SYSTEM FEATURES WITH PROTECTION AND ALARM FUNCTIONS



Small Machines • Medium Machines • Large Machines

ALARM FUNCTIONS AND SETTINGS

Current Unbalance (46)	
Negative Sequence	
Current Pickup	.05-2.99 Amps
Time Delay	1-5 sec
Overexcitation (24)	
V/Hz Pickup	1-1.99 PU
Timer	0-9.9 sec
Self-Test	
Critical	
Non-critical	
VT Fuse Failure	
Loss of Power Supply	
Power Supply No. 1	
Power Supply No. 2	

ADDITIONAL FEATURES

PROTECTION:
- Selectable for ABC or ACB phase sequence;
- Suitable for delta-* or wye-connected VT's;
- Includes logic to detect Accidental Energization of the generator while on turning gear;
- Algorithm tracks over a frequency range of 30.5-79.5 Hz;
- User configurable to four trip output relays and four alarm output relays;
- Differential function operates in 1 to 1¼ cycles.

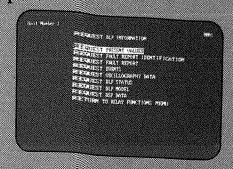
INTERFACE:
- Compatible with G-NET, GE's substation protection and control integration system;
- Printer port provided on the rear;
- User configurable oscillography allows the capture of up to 120 cycles of the fault data with 1 to 20 prefault cycles selectable, triggered internally and externally.

CONSTRUCTION:
- Lift-off front cover with built-in reset button;
- Draw-out modules for ease in replacement;
- Standard modular test and connection plugs allow current/voltage injection testing;
- 19 inch wide rack mount case;
- Screw terminals on barrier terminal blocks provide external wiring termination.

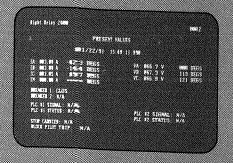
REMOTE MONITORING

GE's DGP-LINK software allows a user with a personal computer to interface with the DGP remotely. After appropriate password is given, commands to DGP can:

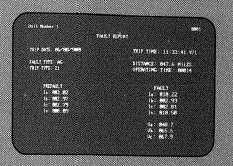
- Request settings from DGP
  - Download new settings to DGP
  - Enable/disable outputs
  - Perform manual operation of outputs



- Request present values of sampled, as well as calculated, parameters
  - RMS currents, RMS voltages, input statuses
  - Megawatts, megavars, generator frequency
  - Negative sequence current, % third harmonic (neutral and phase volts).



- Request fault report (last 3 faults)
  - Prefault values of currents, voltages MW, MVAR, frequency
  - Fault currents and voltages
  - Protection elements that operated, operating times, and trip outputs that were energized (ON/OFF).



- Request event report for last 100 events to display
  - Protection function operations and output relay ON/OFF
  - Change in status of digital inputs, VT fuse, trip circuit
  - Changes made to password settings, output ENABLE/DISABLE
  - Self-check status failure/warning/cold start.

OSCILLOGRAPHY

The DGP offers the user the capability to analyze and evaluate fault data in graphical format using GE's DGP-DATA software. Analog values are represented in waveforms. Digital inputs/outputs and protection responses are shown in bar graphs. DGP-DATA obtains such oscillography data from a file created by GE DGP-LINK and software.