Battery Simulator

A Battery Simulator is aimed to simulate the behaviour and the power of an adaptable number of rechargeable or non rechargeable batteries, each of them having an adaptable and independent power. It is used during AIT / AIV phases of a spacecraft for representative powering of the spacecraft PCDU.

It can simulate several type of flight batteries like Ni/Cd or Li/Ion batteries, in charge and in discharge situation.

The BS is based on COTS items (power supplies, electronic loads, PC etc.) enhanced by Clemessy's SyCTRL products. It is designed as a self standing equipment with its own local GUI. It is fitted with self test and safety loop, embedded in standard 19inch rack and container.

As a baseline, it provides standard over voltage and over current protection based on COTS equipment.

As options, it can be fitted with:

- Dynamic battery resistance simulation, thermal simulation, state of charge simulation
- Second level over voltage / over current protection per battery
- Mains insulation transformer unit
- String voltage simulation
- Thermistor simulation
- Reusable container
- Mini rack
- Remote control via TCP/IP interface (CCSDS, FEECP, EDEN, PUS Services etc.)
- Interface harness:
  - Ambient harness for ISO8 clean rooms
  - Thermal vacuum harness for TVAC chambers
  - Bulk head to vacuum chambers
  - Bio-burden harness for ISO7 clean rooms
  - Savers

Battery Simulator   TECHNICAL DATA
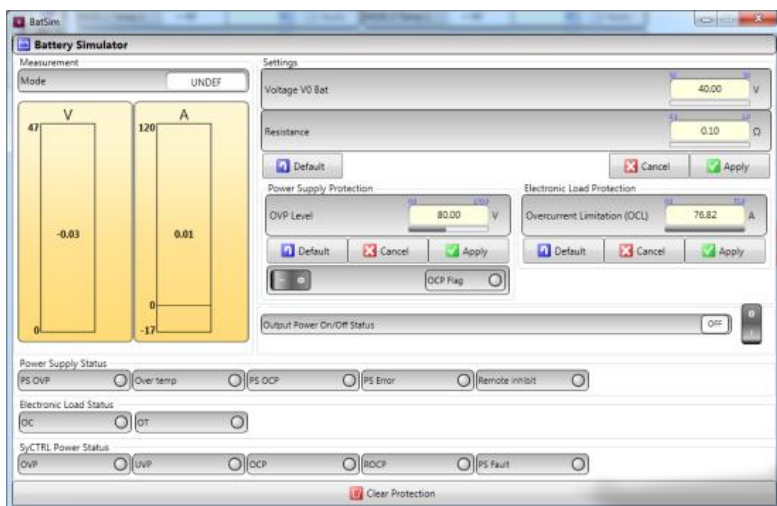
Function

- Simulation of battery discharge and charge current at various battery voltage
- Over-voltage, over-current, under-voltage, reverse-over-current protection
- Dynamic battery resistance simulation
- Thermistor simulation (full range or fixed values)
- Heater simulation
- Battery intermediate cell / string voltage simulation
- Dynamic state of charge simulation
- User defined script features
- Remote and local control mode
- Self test capability
- Safety loop signal management (Inhibit input & Fault output signals)
- Interface cable to spacecraft

Implementation

- Battery discharge current simulated by DC power supplies
- Battery charge current simulated by electronic loads
- Battery intermediate cell voltages simulation by ohmic network
- Independent protection features based on SyCTRL
- Ethernet TCP/IP interface for remote control
- Windows man machine interface for local control
- 19'' rack integrated

Performance

- Simulation of up to 4 battery per 19'' rack
- Typical voltage   up to 200V (other on request)
- Typical discharge current   up to 300A (other on request)
- Typical charge current   up to 300A (other on request)
- Protection reaction time   down to 30 μsec

Used technology

- Keysight power supplies
- Keysight or H&H electronic loads
- Clemessy's SyCTRL Second Level Protection and TM/TC features
- LXI interface with power supplies and electronic loads
- Python script language