



Background

Backup battery failures can be catastrophic. Central Offices, Switching Systems, Radio installations, etc., that require a battery backup power source, generally do not have real-time health checking of batteries. Under normal operating conditions, systems are powered from a commercial AC supply; backup batteries are only used when commercial AC power is lost. A charger is set to supply system power and keep batteries in trickle or float charge mode. Chargers do not provide any information about the health of individual batteries; they do not have this capability. The batteries are checked only during a periodic maintenance; most often on a 6 month or 1 year schedule. If a battery degrades or goes bad between maintenance schedules (plates short or open, partially or fully) it can not be detected. A bad battery can not deliver necessary power during critical AC power failures. Vital communications may be lost or a system may just shut itself down. A situation like this at an air traffic control center, at a radio site or an airport may cause a serious safety problem. Communications with the airplanes and other facilities may be lost.

DSP, Inc. has built a Battery Monitoring system that constantly and un-invasively checks the health of each battery and reports its status every 10 seconds. If a battery degrades or fails both audio and visual alarms are provided to the maintenance staff. You do not have to find a bad battery in your backup system the hard way, at the time when you need it the most. With the DSP, Inc.'s Battery Monitor in your installation, battery degradations are reported quickly before a failure occurs, eliminating costly failures and costly periodic maintenance checks.

Operation

DSP's Battery Monitor is a digital signal processor based unit that performs a real time analysis of individual batteries. The processor calculates voltage levels of each battery. It checks for opens, shorts, degraded battery (terminal voltage above or below min/max limits), undercharge and overcharge conditions. In addition, the unit will run a load test on batteries at a pre-designated time on a regular basis. If a battery voltage does not meet the profile or template of a "Healthy" battery, the unit declares a failure and provides an audible and visual alarm. A 12 bit A/D circuit combined with a floating point DSP algorithm provides a voltage accuracy of better than 50mV. An individual LED indicates health of each battery (Green, Yellow or Red for Healthy, Partial and Bad battery, respectively). The Load Test feature allows a user to test batteries under load on a daily, weekly, bi-weekly, monthly or at any other pre-programmed intervals. Using a RS-232 terminal the unit can be interrogated remotely to provide detailed voltage and health status on demand. A summary alarm relay contact and an RS-232 data port combined with DSP, Inc.'s unique design provides a comprehensive and reliable monitoring system that can foretell backup power problems before they happen.

Typically, a unit monitors up to eight 6 Volt or four 12 Volt batteries in a Negative or Positive battery system. Different models are available to monitor other battery voltages and number of batteries. The unit operates from a small AC Brick and occupies only 1.75-inch (1U) rack space in a 19 or 23-inch rack.

Battery Monitor Specifications

Configuration: The Battery Monitor unit is designed for a 19 or 23-inch rack mounting, and occupies only 1.75 inch rack space. The DSP design employs a very high input impedance circuitry (> 50K Ohms) that draws less than 1ma current from each battery. It uses a state of the art TI Signal Processor running at 100 MIPS. Each unit contains circuitry necessary to provide an interface for up to eight batteries. A jumper selects 4 or 8 battery monitoring option. The unit is powered from a small AC Brick unit and draws less than 100 ma AC current. A RS-232 serial data link provides a text message regarding health of each battery. Detailed information about the health of each battery can be obtained by entering user friendly commands from an operator terminal connected to the unit via the serial port. A jumper option programs the UART to transmit and receive at 9.6 or 19.2 KBits/sec data rate. When the unit detects a failure, actual voltage of the failed battery is transmitted on the serial data port. The serial data link reporting capability makes the Battery Monitor unit an excellent choice for applications at unmanned/remote system installations. An output summary alarm relay contact (NO and NC) is provided for integrating the Battery Monitor into an existing Fault Monitoring system. All inputs and outputs of the unit are uniquely connectorized for quick, easy and error free installation. A watch-dog circuitry continuously monitors the health of the unit. Continuous health check combined with a high reliability design, insures a trouble free operation in critical systems that utilize back up batteries. Connections to the batteries are provided using open-ended lugs which can be easily slipped between battery terminals and the interconnecting cables, further reducing installation time.

Specifications: Input Impedance: Greater than 50K Ohms
Battery Voltage Range: 0-8 Volts for 6V battery systems or 0-16 Volts for 12 V battery systems (Push on Jumper Selection)
Voltage Measurement Accuracy: +/- 50mV Typical (Voltage reporting down to 3 decimal places)
Load Testing: Regular Basis (Daily, Weekly or Monthly, as configured by the customer) at reduced rate load
Battery Systems: Negative or Positive battery systems (solder wire selection)
Failure Response Time: Approx. 1 second (Audio and Visual Alarms)
Serial Data Rate: 9.6 or 19.2 KBits/sec, Data Structure: US ASCII (Start, 8 Bit Data, Odd Parity and 1 Stop Bit)
Repetitive/intermittent Failure Rejection Time (Failure Hysteresis): 15 sec, Remote Alarm: Normally Open or Normally Closed Contacts
(Information about units with monitoring capability to measure different voltages or monitoring of more than 8 batteries available upon request)

Other Products Available from DSP, Inc.

Digital Voice and Data Recorder: – Digital Signal Products, Inc.'s Voice/Data Recorder Model 2025 is specially designed for demanding applications. It uses a state of the art carrier grade server with DSP Inc.'s 16-channel Line Interface cards to provide the necessary functionality. Up to six such Line Interface cards can be directly plugged into the server providing 96-channel recorder system. For larger systems the 16-channel Line Interface cards can be plugged into a separate chassis. DSP, Inc. has received a 5-year contract for supplying these recorder for US Navy ships and Coast Guard cutters.

Tone Notching and Automatic Gain Control (AGC) – Air Traffic Controllers have identified two significant problems in many current voice switches: High frequency tones accidentally induced into their headsets and improper balancing of volume of incoming calls. DSP builds a Signal Processor that can remove two extraneous tones simultaneously in less than 70 msec without degrading the quality of the incoming signal. The unit also adjusts all incoming calls to a volume that is selected by the ATC controller.

Radio Control Equipment (RCE) – DSP builds a digital RCE that provides full duplex voice and data communications between a control site and a remote site over unconditioned telephone lines and satellite links. The control end modem trains the remote end modem to achieve the highest possible data transmission rate. The use of a digital modem scheme allows for voice bandwidth of 300-3400 Hz end-to-end.

Best Signal Selection or Radio Voting System (CE Certified) – In some radio communication systems, there are more than one receiver for a given frequency. This occurs for reasons such as too great a distance or terrain interference with only one receiver. Under some circumstances, multiple receivers will have a signal that exceeds an audible threshold, but the strength and quality may be significantly different. The Best Signal Selection monitors all receivers and within 70 msec selects and routes the best audio to the switching system or operators using the highest quality signal.

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