GE Digital Energy

Product Description

PowerJUMP DataShield

Protection Software Package
for JAVA™ supporting platforms

DataShield   *Technology for the Digital World.*   *ver 0205 - GB*

Contents:

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1 - Functional Explanation

A UPS is designed to protect your IT structure from system damage and data loss caused by power failures or unstabilities. Since a UPS can supply backup power to a computer for only a limited period of battery run-time, UPS software completes and automates your protection solution.

It is important to understand how **DataShield** works in order to make a suitable plan for your particular operating environment.

What *DataShield* Provides

- **DataShield** enhances the value of your power protection by providing many complementary features to your UPS. It is the safest UPS software which provides operating system protection, file saving protection and entire network protection.
- **DataShield** is a high value UPS management solution supporting both WAN and LAN UPS management (SNMP).
- **DataShield** is a JAVA application and supports remote management via internet or any other TCP/IP network.
- Because of its JAVA nature **DataShield** runs on all Operating Systems supporting JAVA.
- In addition, **DataShield** provides power history analysis and different functional views of the UPS and its operating environment.

1.1 Protection

Since a UPS can supply backup power to a computer for only a limited period of battery run-time, protection software completes and automates your protection in three ways:

Operating System Protection
Almost all advanced operating systems need a user to shutdown before turning off the power. If not, the system might be damaged or data might be lost. Protection software can automate this shutdown before the UPS runs out of battery power. **DataShield** provides users with a very complete alarm notification feature which includes *network broadcast*, *sound*, *paging* and *e-mail*, in case power fails, the UPS fails or the power becomes dangerously unstable.

In addition **DataShield** increases system reliability and uptime by providing *File* and *Network protection*.

File Protection
Before shutting down the operating system, **DataShield** tries to close all open files and save them when the Operating System supports this. This advanced feature can prevent your work from losing data.

Network Protection
In a network environment, some computers might need to be shut down in the correct order. For example, a Windows 95 workstation is using data from its Windows NT Server. In this case, the workstation needs to perform its shut down before the NT to avoid data loss in the network. **DataShield** provides complete network protection. The system manager can define the safety relations so **DataShield** will perform orderly shutdown procedures on several computers when a critical event occurs anywhere in the corporate network.

1.2 Management

Nowadays, network management plays an increasingly important role. In addition to the fundamental protection function, **DataShield** provides a UPS management function.

Single UPS management
In short, management includes view (getting information) and control (changing settings) functions.

Management via your standard browser
DataShield can be remotely accessed by use of any standard network browser because of its built-in Web-server. This allows you to look at the *DataShield* documentation, logfiles and realtime UPS measurement values from anywhere in the world.
Also management of the UPS from your standard browser becomes possible after you have successfully passed the authorisation procedure.

SNMP Management
In addition to managing a single UPS, *DataShield* allows the user to manage any UPS in the network from one point:

- *DataShield* itself can manage a large number of UPSs in a network and configured actions can be performed in case of all possible events. All of this features can be managed via your standard browser.
- Integration into existing Network Management software is easy because *DataShield* is compliant to the industry Simple Network Management Protocol (SNMP). *DataShields* graphical interface JumpView snaps in to standard SNMP platform such as HP OpenView and Novell ManageWise.

1.3 Analysis

A system manager needs to receive valuable power history data information in order to increase the reliability of the power management. For this reason, *DataShield* provides two kinds of tools to help optimize mains management:

- *Event analysis.* This tool sums up and analyzes power events providing: date, time, location and event information (power failures, battery low conditions, etc...).

- *Data analysis.* This tool shows a history log of power data (input voltage, output voltage, input frequency and output frequency) on the screen to let you analyze the power quality.

1.4 Compatibility

DataShield is compatible with all intelligent and contact interface UPS systems from *General Electric Digital Energy* as well as on most 3rd party contact interface UPSs. Thus respecting both future and prior network investments to a maximum extent.

2 - General Design

Our UPS software solutions are completely based on the SNMP protocol. Therefore a small introduction of SNMP is provided in section 2.1.

DataShield itself is a modular program consisting of two separate programs: An invisible protection program 'DataShield' (section 2.2) and a graphical interface program called 'JumpView' (section 2.3).

2.1   SNMP Agent, Client and Manager

There are three elements related to SNMP. This short overview briefly explains their function in a SNMP environment.

Agent The agent makes the UPS information available on the network, using the SNMP communication protocol. When power fails locally, the agent provides all the alarm details onto the network, were it will be triggered by the clients throughout the network.

There are two physical types of agents with identical functionality:
1. *Software Agent*   This is a program (eg. *DataShield*) which runs on a server.
2. *Hardware Agent*   A SNMP interface box or SNMP interface card.

Client This is a non visible element of *DataShield*. Clients are dependent machines, somewhere in the network. When power problems occur on the UPS connected to the Agent, it is triggered by the clients which set their protective functionality into action. Clients can reside on any operating system (UNIX, Novell, Windows, OS/2, MacOS and all other JAVA supporting platforms).

Manager This is the management station to which SNMP traps should be sent in case of alarms. Traps are small information packages, send out by the Agent, with information about an activated (or deactivated) alarm. SNMP Management software will catch the trap and visualise this on the console in the way of a flashing icon or pop-up message. Most management software have a large scale of customisable actions which can be performed at arrival of traps.
A SNMP Manager is a powerfull tool for centralized management of all networked devices. Examples of these managers are HP-OpenView, IBM Tivoli and CA Unicenter TNG.

2.2   *DataShield* Protection Module

DataShield is resident on the system. It monitors and handles signals sent by:
  a)   An intelligent UPS that protects it (directly via computer RS 232 port).
  b)   A contact closure UPS that protects it (directly via computer RS 232 port)
  c)   Any UPS in a TCP/IP network (Via an SNMP (Proxy) Agent)
  These interfacing options are described in detail in the next paragraphs.

The protection program runs as an automatic background process:

- *as a UPS protection program (SNMP Client)*: It communicates with the UPS via the serial cable or via the network to receive vital information and to control the UPS. In addition, it broadcasts event messages, logs events and data, shuts down the operating system and the UPS when necessary.

- *as an SNMP agent program*: It answers requests for information or commands from any central SNMP management station or other monitoring software. When a critical power or UPS event occurs, it sends alarms to a predefined network management station. Thus the SNMP agent makes the attached UPS available on the network.

- *as a WWW-server program*: It answers requests for information or commands from any standard browser in the world pointing to it. Because of this flexible and easy way to access the UPS information, there is a built-in authorisation procedure to ensure that only authorised persons have access to it.

2.3   *DataShield* Management Module (JumpView)

This is a user interface program which displays the UPS information and allows the user to control the UPS:

- *as a local or remote management program*: It is a bridge between the protection program and the user. It displays the UPS information on the screen and provides an interface for you to change settings and control the UPS.
- *as a central management program*: It manages and displays all networked UPSs from one workstation and passes commands to any UPS when the system operator wants to change settings or control the UPS.
- *from anywhere in the world*: The complete functionality is both local and remote available because the software runs as a JAVA applet in any standard browser from any place in the world.

Network Management

Network management means that people want to monitor and manage all network devices from a central location. This is getting more and more important as the network expands. Without network management, system administrators have to go on site a lot to check and control the devices on the network one by one.

The big advantage of *DataShield* is its ability to manage all UPSs on one central point, but access to this central point is not limited in any way. From all over the internet/network you can access your management station and work with it the same way like you are at the management console.
This gives you the possibility to act immediately when there is an emergency going on, there is no time wasted anymore to go to either the UPS itself or to the Network management station.

Network management consists of two elements: a management system (manager) and a managed system (UPS agent). They use a standard protocol to communicate with each other, called SNMP. The UPS industry has defined the specific UPS parameters in the UPS-MIB (described in RFC1628).

3 - Hardware Configurations of DataShield

This chapter shows how the UPS and computer are connected to get the full functionality of the *DataShield* software. Several configurations are possible depending on the type of UPS and computer or network configuration.

3.1 Stand Alone UPS Connections using *DataShield* (One system per UPS)

There are two ways to connect a single UPS and single system using *DataShield*: using an intelligent interface cable or using a contact interface cable.

a) Intelligent Interface (RS 232)
An Intelligent UPS can be connected directly to a stand alone system, via a free serial RS 232 (DTE) Port on that system (e.g. a free printer or modem port).
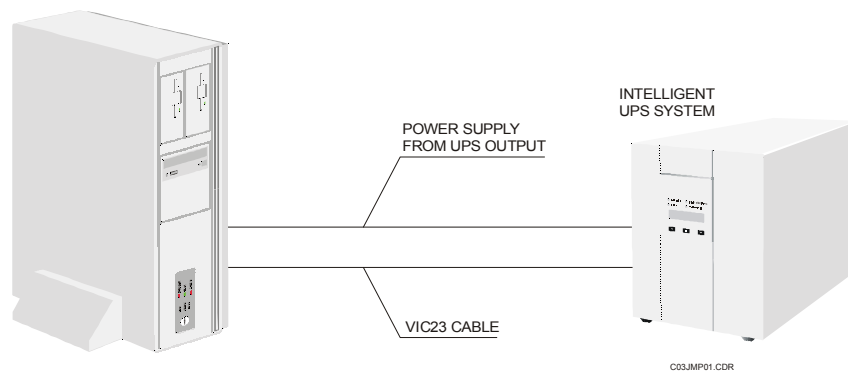

Figure 1: Intelligent UPS connected directly to computer system

b) Contact Interface
A contact closure UPS can be connected directly to the RS 232 Port of a stand-alone system. Any UPS brand can thus be connected to the *DataShield* program, using its contact interface, thus not harming any prior network investments.
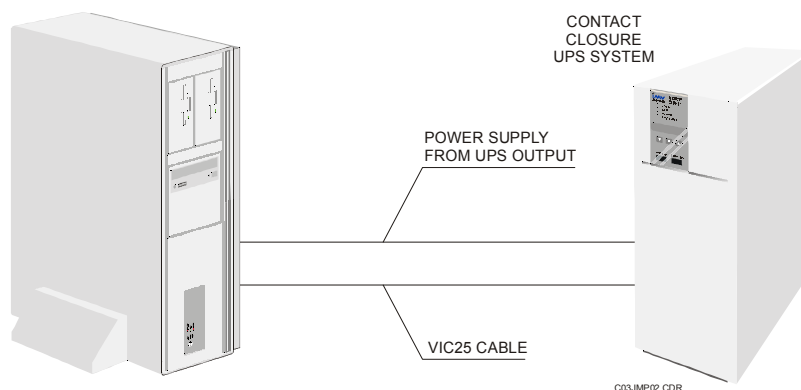

Figure 2: Contact Interface UPS connected directly to computer system

Note: *When using this hardware setup only the Power Failure and Battery Low alarms are monitored.*

3.2 Networked UPS Connections using *DataShield* (Several systems per UPS)

There are two ways to connect multiple systems with one UPS using the network as communication link: via a *General Electric Digital Energy* SNMP Interface Box/Card (Agent) or via a Server and *General Electric Digital Energy* Software (Proxy Agent). Both types of agents support intelligent, as well as contact interface UPSs.

c)   Using a *General Electric Digital Energy* SNMP/Web Interface card or box
Any UPS connected to a *General Electric Digital Energy* SNMP/Web Interface can communicate with a number of systems or workstations (Clients) via a TCP/IP network. The SNMP/Web Interface communicates directly with the network (Ethernet or Token Ring). Protected systems can (re)act as a client to alarms from that UPS.
This solution is prefered, above the one mentioned at point d., because the SNMP/Web Interface has a guaranteed 100% uptime, while proxy agents are depending on the uptime of the server on which they run.
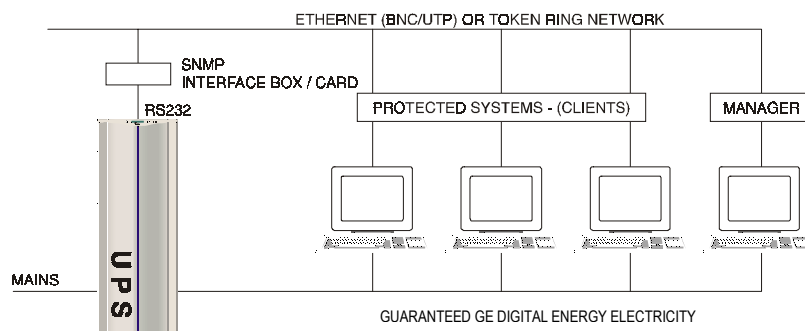

Figure 3: Any UPS using an SNMP Interface Box/Card and Clients

d)   Using the *DataShield* (Proxy) Agent
Any UPS connected serially to a System running the *DataShield* agent can communicate with a number of other systems or workstations (Clients) via a TCP/IP network. The *DataShield* Proxy Agent (an AGENT) communicates directly with the network. Protected systems can (re)act as a client to alarms from that UPS. This solution is often more cost efficient than using the SNMP/Web Interface.
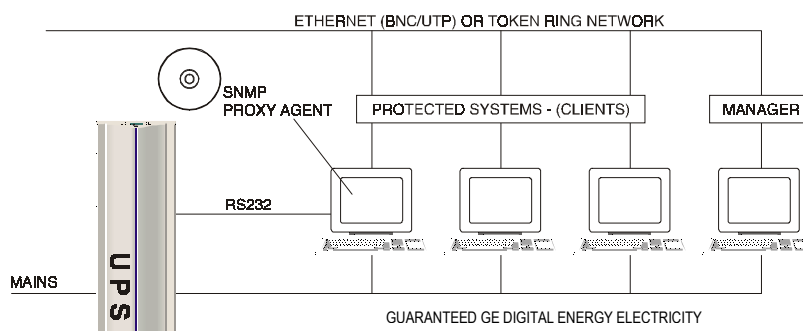

Figure 4: Any UPS using the AGENT and network.

* NOTE: ***General Electric Digital Energy*** *offers SNMP/Web Interface boxes and cards for Ethernet. Proxy Agents and Protection Clients for UNIX, Novell, OS/2 and Windows and all JAVA supporting platforms.*

4 - Alarms Monitored by DataShield

A modern UPS provides power back-up & protection plus the capability to inform someone about his operating status. That means that the UPS offers a communication interface to the outer world, and this interface can be used by specially designed programs to read/write UPS parameters. More than that, the UPS has the ability to signal abnormal conditions by generating a set of asynchronous events on the interface. These events are commonly named alarms. The typical set of UPS generated alarms consists of three categories of alarms:

1. The first category informs about error conditions that just occurred in the normal operation of the UPS.
2. The second one informs about the UPS being in some a special mode of operation.
3. The last category of alarms are dangerous alarms as UPS On Battery, Low Battery and Shutdown Imminent. If **DataShield** detects such alarm condition it will shutdown your computer immediately to prevent file-system crashes, or other potential causes of data loss.

It must be noted that these operations are performed by a back ground process. It is not required to have the graphical viewer running in order to have your computer protected.

The complete list of alarms detected by *DataShield* :

Battery Bad	One or more batteries have been determined to require replacement.
On Battery	UPS is drawing power from the batteries.
Low Battery	The remaining battery run-time is dangerously low.
Depleted Battery	UPS is unable to sustain the present load when and if mains is lost.
Temperature Bad	A temperature is out of tolerance.
Input Bad	An input condition is out of tolerance.
Output Bad	An output condition (other than OutputOverload) is out of tolerance.
Output Overload	The output load exceeds the UPS output capacity.
On Bypass	The Bypass is presently engaged on the UPS.
Bypass Bad	The Bypass is out of tolerance.
Output Off As Requested	UPS has shutdown as requested, i.e., the output is off.
Ups Off As Requested	The entire UPS has shutdown as commanded.
Charger Failed	An uncorrected problem has been detected in the UPS charger.
Ups Output Off	The output of the UPS is in the off state.
Ups System Off	The UPS system is in the off state.
Fan Failure	The failure of one or more fans in the UPS has been detected.
Fuse Failure	The failure of one or more fuses has been detected.
General Fault	A general fault in the UPS has been detected.
Test Failed	The result of the last diagnostic test indicates a failure.
Communication Lost	A problem has been encountered in the communications between the UPS and computer/SNMP box/card.
Awaiting Power	The UPS output is off and the UPS is awaiting the return of input power.
Shutdown Pending	A shutdown countdown is underway.
Shutdown Imminent	The UPS will turn off power to the load in less than 5 seconds; this may be either a timed shutdown or a low battery shutdown.
Test In Progress	A test is in progress.
Lost Agent	A problem has been encountered in the communications between the *DataShield* and SNMP/Web Interface / Proxy-AGENT.

Note: *Availability of above alarms depends on the UPS type. Please check the UPS manual for more information.*

How *DataShield* handles alarms

DataShield handles alarms coming from a UPS to shut down affected systems or workstations. In this section, the example of a PowerFailure alarm will be illustrated.

When *DataShield* detects an alarm signal (e.g. Powerfailure) it immediately checks to see if a predelay (i.e. an alarm filter) has been set and then logs the event to a log-file. During the period of the predelay *DataShield* will not take any other action.

If the predelay is passed *DataShield* starts counting down the runtime. During the runtime, depending upon user defined settings, *DataShield* will broadcast the alarm messages on the system and take other user defined actions when defined. Execution of these user defined actions is logged.

If the situation that triggered the alarm returns to normal before the expiration of the runtime, *DataShield* logs this fact and, depending on the user defined settings, a message is broadcast on the system.

When the alarm is active and the runtime period expires, *DataShield* will check to see if the system shutdown has been set. If the system shutdown option is set *DataShield* will execute the shutdown script. Depending on user defined settings, this will also shutting down the UPS, and/or take other action which the user can define within this shutdown scriptfile. When the system is restarted (*DataShield* will normally be set up to start automatically) *DataShield* starts up monitoring for alarms again.

DataShield SCRIPT Files

The way *DataShield* was designed to execute scripts (or batch/command files) gives users a very powerful and flexible method to customize the actions of the program. As delivered, the *DataShield* scripts can be modified to broadcast messages and initiate a system shutdown. Should the user wish to add custom calls in the *DataShield* scripts, the system text editor can be used for this purpose (for instance alarms via modems or paging systems). However, it is recommended users become thoroughly familiar with how *DataShield* functions before customizing. It is possible to have multiple scripts started at different times after activation or deactivation of an alarm.

5 - DataShield Screens and Settings

There are many screens available in *DataShield*. The main screens are shown with an explanantion of their purpose and function.

DataShield will provide you with the current values of the UPS parameters, so you can find what is the actual status of your UPS.
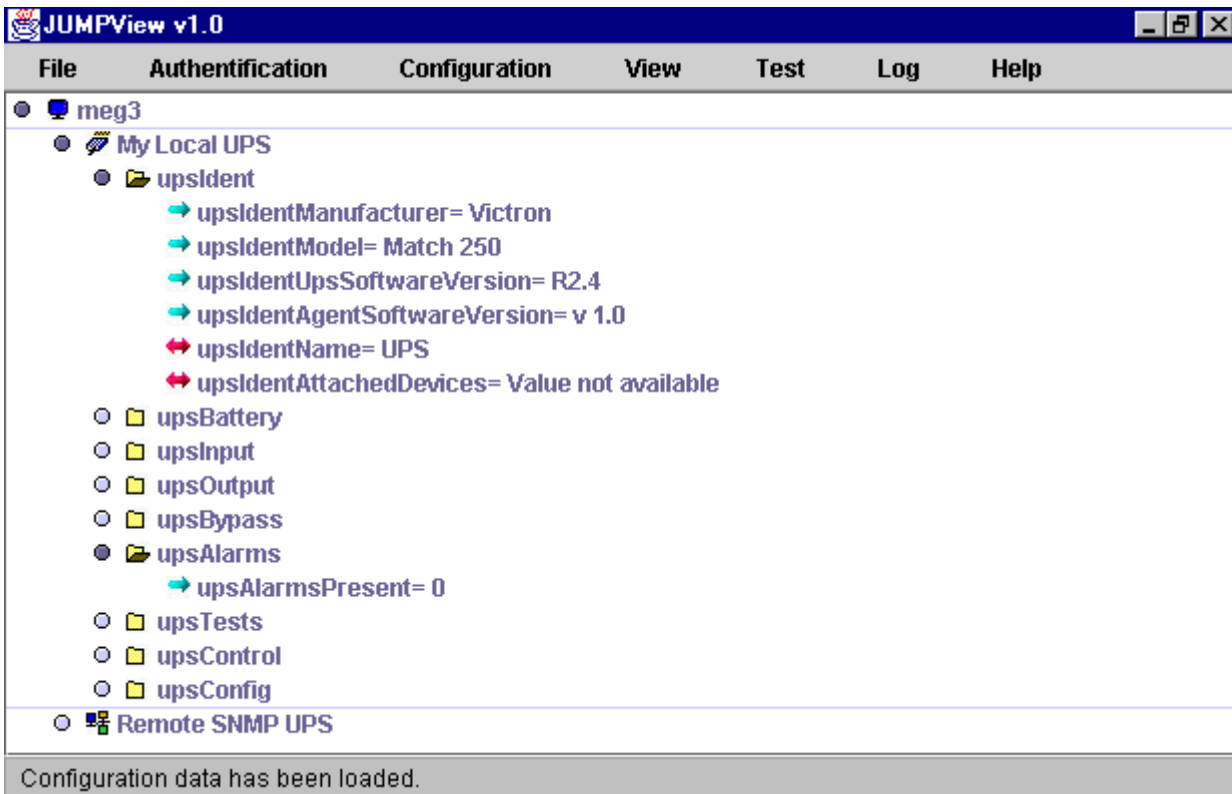

*Figure 5: Management screen, Intelligent **General Electric Digital Energy** UPS*

The most important (user definable) parameters can be displayed as meters with clear visual indication of valid-invalid range of values. This feature offers the possibility to estimate the status of the UPS at a glance.
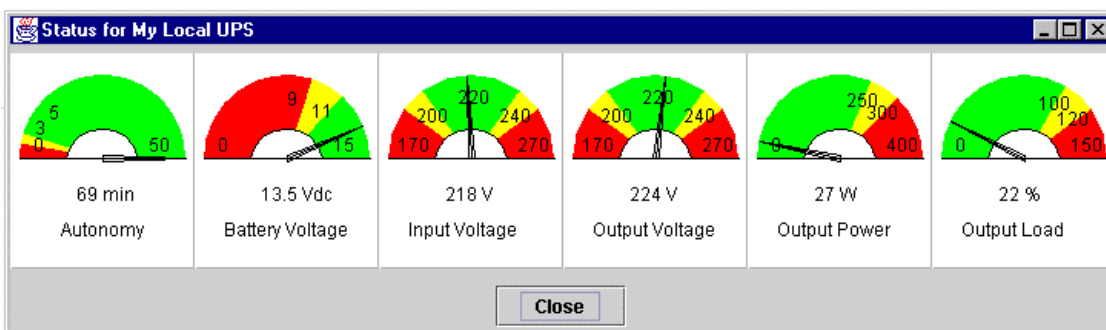

*Figure 6: Graphical viewer screen, Intelligent **General Electric Digital Energy** UPS*

If your UPS supports tests, *DataShield* offers you a screen to activate them. You can abort the test in progress if you wish, or let it complete. In either situation these actions will be logged. If the test completes, a short description of the result will also be logged.
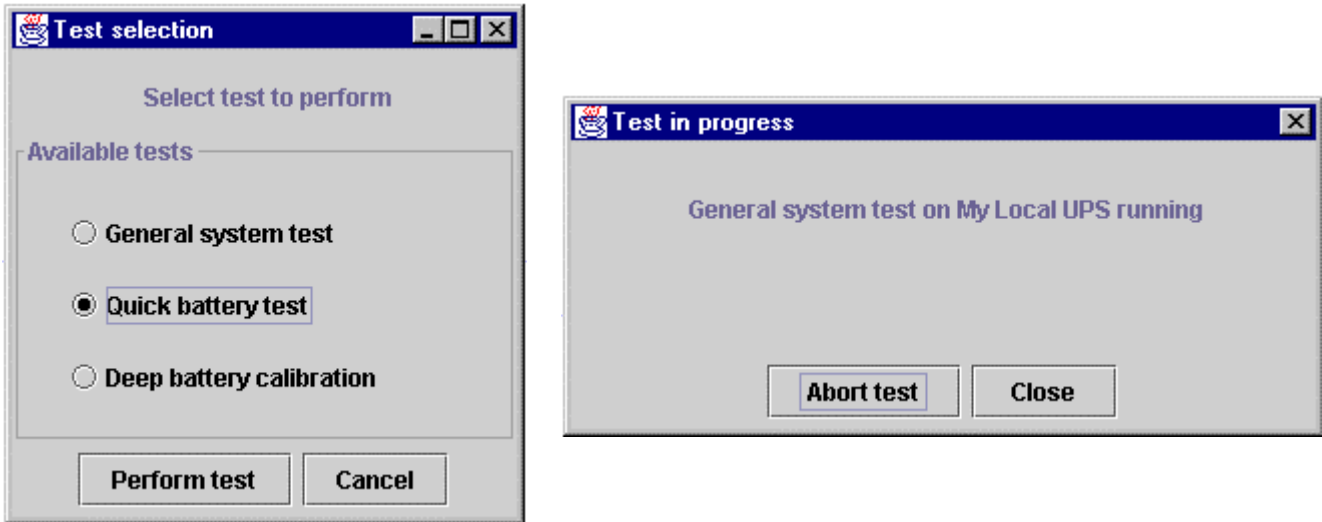
Figure 7: Test selection screen

If any alarm is pending **DataShield** will inform you about this fact by displaying the most recent alarms:
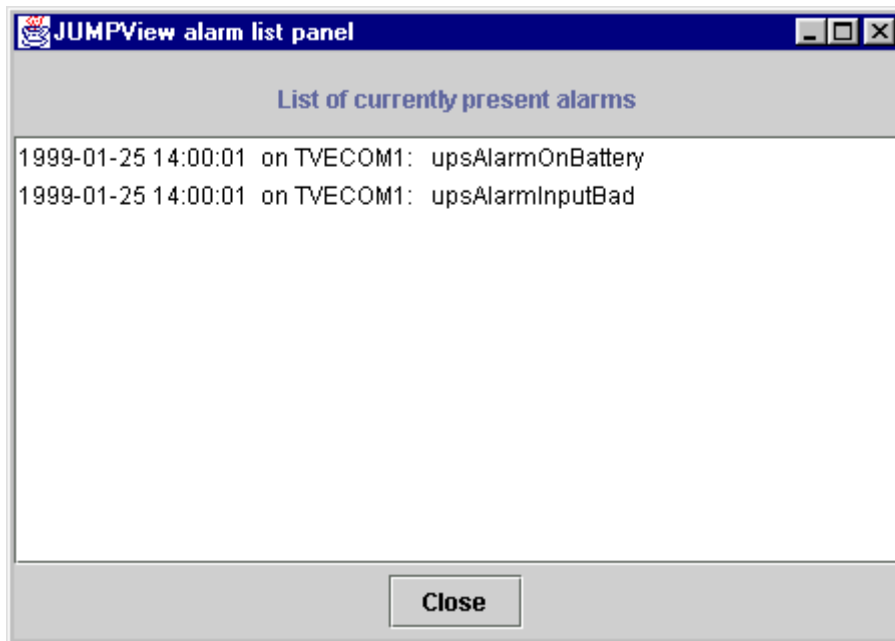

Figure 8: Alarm list panel

DataShield will remove this list when no alarms are active anymore. However, restored alarms will be displayed in a separate list, so you will always be informed about the alarms, also when they are already restored.

Configuring actions which needs to performed upon receiving events is easy because of the clear tree structure used to define these actions
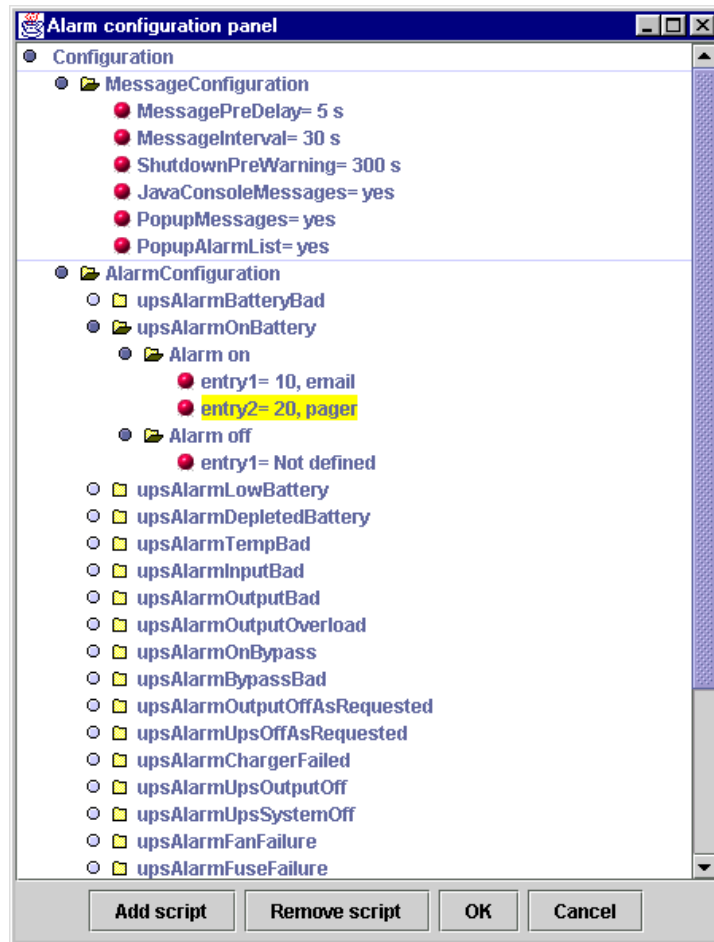

Figure 9: Alarm Management configuration tree

6 - Data Logging

DataShield offers an integrated event logging functionality to help you keep a history of your system. *DataShield* maintains two log files: an event log file and a history log file. The event log file contains all UPS-related events since last startup of the program, including power failures, shut downs, power recoveries, etc. The history log file is a collection of all the UPS events since installation of *DataShield*. Ofcourse there is a limitation for the size of this log-file, which is configurable.

DataShield **events:**
- Incoming alarms
- Communication problems
- Scheduling of a test
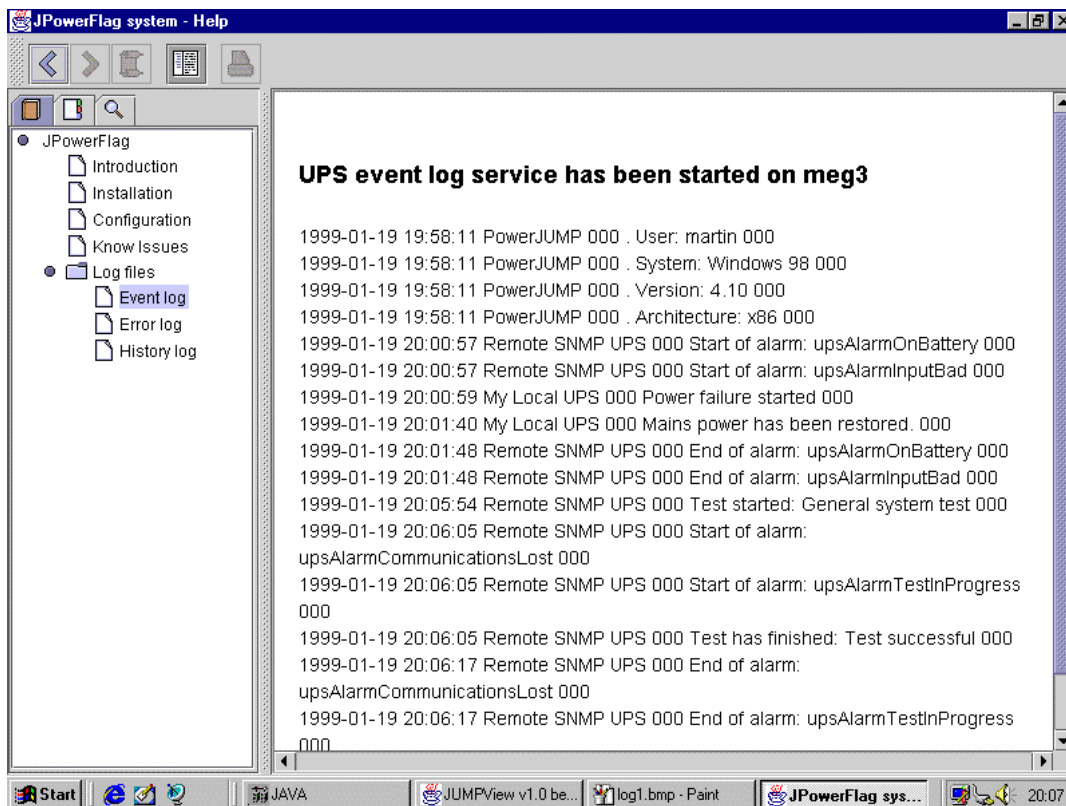- Completion of a test
- Abortion of a test

*Figure 10: **DataShield** log file*

Information logged for each event:
- The date and time when this event occurred
- The exact type of event (for alarms and tests)

DataShield will always log special events during functioning. These events are Alarm, Test Initiation, Test Aborted or Test Completed. If you have a ***General Electric Digital Energy*** UPS, along with the event information, *DataShield* will log the UPS status.

All of this logging information is available in HTML format which makes it easy to read logfile in your standard browser from any location.

7 - Scheduling UPS Operation and Tests

With **DataShield** you have the option to automatically shutdown, reboot and test all configured UPSs. No manual intervention is required at all since these functions will take place at settable intervals.
There are several input windows for UPS shutdown/reboot and for UPS testing. Some of the functions are detailed below.

7.1 Scheduled UPS shutdown and reboot

The shutdown can be set for immediate action, daily, weekly and monthly at a specific day and time.
You can shut down and start up your UPS via **DataShield**, whether it is a local UPS or remote UPS. In addition to shutting down the UPS immediately, you can set a work schedule for the UPS and the system attached to it. You can use this function to shut down and arrange a work schedule for any systems and UPS's in the network.
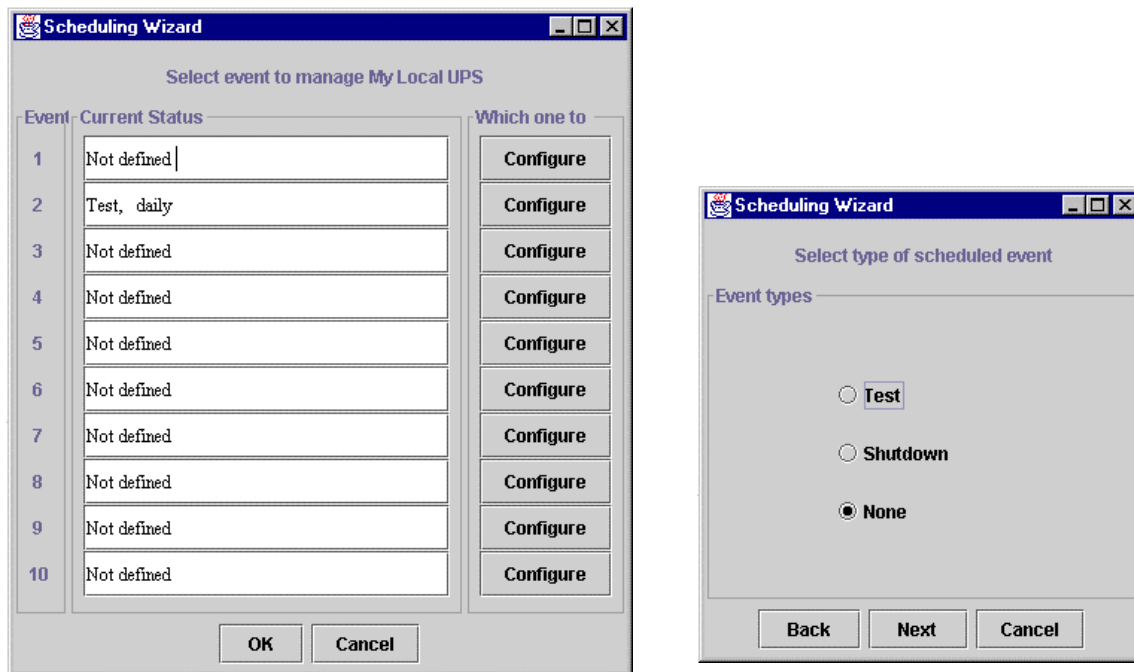

Figure 11: Scheduling UPS Operation

7.2 Scheduled UPS testing

Most intelligent UPS's can be tested for preventive maintenance or trouble shooting. Tests can be issued instantly or scheduled from one central location. Thus minimising the cost of going on site.

Tests available:

General System Test	The manufacturer's standard test of UPS device systems
Quick Battery Test	A test that is sufficient to determine if the battery needs replacement.
Deep Battery Calibration	The system is placed on battery to a discharge level, set by the manufacturer, sufficient to determine battery replacement and battery run-time with a high degree of confidence.

Testing options depend on the type of UPS, please consult your reseller or the manual

You can initiate a UPS test via **DataShield**, regardless of a local UPS or a remote UPS. In addition to testing the UPS immediately, you can set a test schedule for the UPS. You can use this function to test and to arrange test schedule for any UPS in the network.

8 - Functionality and Cable Requirements per UPS Model

The main functionality of alarming a Power Failure and Battery Low to connected systems, clients and network managers, is transparent across all UPSs. However, more detailed functionality of *DataShield* depends on the UPS type connected. The most important functions per UPS type are provided below:

Protection	MATCH NetPro LanPro 11/31T	SitePro Image LanPro 33
PowerFailure & BatteryLow Alarm	X	X
Detailed UPS alarms	X	X
UPS Shutdown	X	
Protection Client	X	X
Monitoring		
Alarm Status	X	X
Detailed UPS Parameters	X	X
Management		
Scheduled UPS testing	X	
Scheduled shutdown / reboot	X	
Proxy Agent	X	X

The following cables are available:

	Match NetPro LanPro 11/31T	SitePro Image LanPro 33
Required Cable	VIC23	1:1 serial cable

9 - Product Description

Package contents

1   CD ROM (delivered with the UPS)
1   cable (delivered with the UPS)

System requirements

Platform supporting JAVA 1.2 or higher
Approx. 5Mb hard disk space
Min. 4Mb RAM
1 free RS232 port or network connection with TCP/IP installed

Performance Note

Running as a normal background task, *DataShield* will consume a fraction of the available CPU-time (often below 1%, depending on your hardware and the number of servers).

Compatibility

General Electric Digital Energy provides support and regular upgrading for the following platforms:
All platforms which support JAVA 1.2 or higher.

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