

CASED HOLE SYSTEMS

The **Warrior Well Logging System** employs advanced software and widely available hardware to provide a cost-effective solution to well logging requirements for both open and cased hole applications. Its main features include:

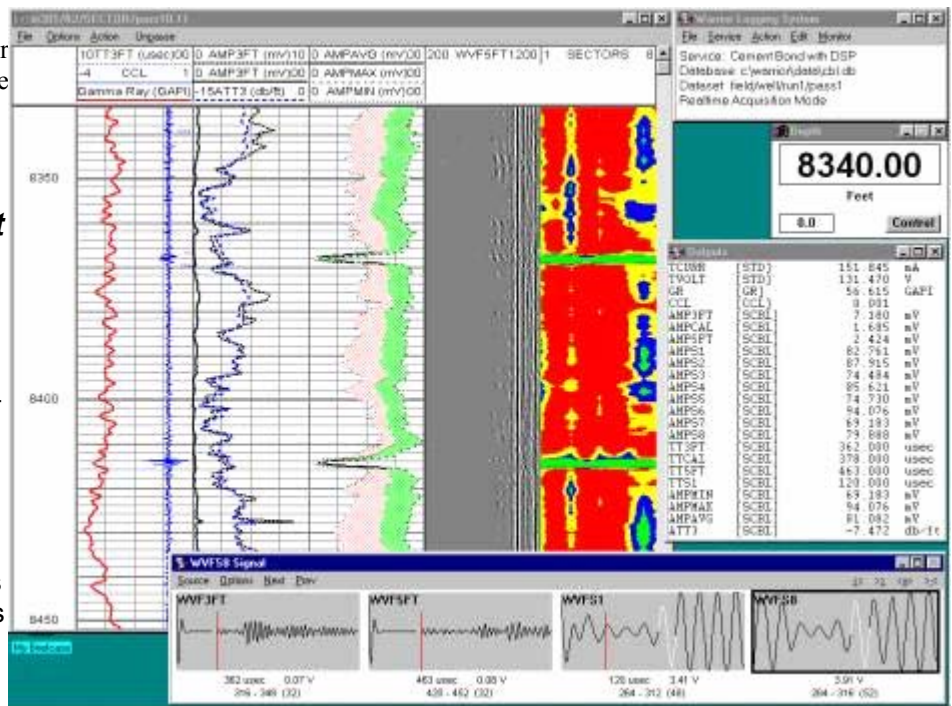
Multitasking System Using Microsoft Windows ME,2000,or XP

The real time logging operation may be conducted at the same time as other tasks, such as data/fax transmission, plotting, log heading, job ticket preparation etc. The use of MS Windows ensures longevity, future enhancement and support for the system.

Graphical User Interface

The system is easy to use and the interface conforms to the popular MS Windows standard. Data monitoring is available in windows, which may be resized and repositioned as the user wishes. A typical user screen with scrolling log display and data monitors is shown below.

A sample screenshot of Warrior Logging Software



Plotter Support: Veritas, Printrex
Printer Support: DeskJet Color, Epson Stylus Color

Generation of the final log print with heading, annotated log sections, calibrations, tool string diagrams, etc., is easily achieved. The system supports most well log plotter types currently in use, including color and the generation of multiple copies using fanfold paper. Two plotters may be driven concurrently and independently. The system also supports a fax format file as a plot output, which may then be transmitted, to a remote fax machine using a conventional fax modem.

Typical Cased Hole Specification:

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CASED HOLE SYSTEMS, (CONT'D)

Multitasking under MS Windows ME, 2000 or XP

System services include:

Calibrations, Filtering, Graphical Tool String Configuration, Tool String Diagrams, Real Time Data Monitors, High Speed Multi-Well Log Database.

Acquisition Modules include the following services:

Cement Bond including:

Single and Dual Receiver Tools, Compensated Bond Sector Tools, Radial Bond Tools, SIE Cement Bond, Computalog Sector Bond, CSSM 1 11/16" Radial Cement Bond (Multiplex) CSS Radial Cement Bond Multiplex, TEKCO Sector Bond Log, Probe Bond 1x2 CNT,

Gamma Ray:

Gravel Pack, Natural Spectral Gamma Ray, Chlorine Tool, Pulsed Neutron, Collar, Locator, Tracer Collars, Gamma-Collars, Gamma-Neutron-Collars, Natural Gamma Ray NGST, Chlorine Tool CGST, with Real Time Interpretation, Multi-arm Calipers with Pipe Tally, Casing Inspection, Temperature, Noise, and Freepoint Applied.

Production Logging includes support : CBG, Sondex, Flex Stack, Madden Systems, Maxim, Panex, Gearhart MUX / Sequential, Digital Surveys, and Analog.

User Defined Tools and Services: Recalculation (Relog) from raw data, Log Heading Editor, System Setup Control, Depth Unit, Data Unit, User Interface Language, Display Parameter, Graphical Log Format Editor, Well Sketch, Real Time XY Plot, Merge, Splice and TVD Correction, Directional Survey Calculation, Log Annotations and Curve Labeling, Log Presentation Editor, LAS ASCII Writer and Reader, and LIS Read/Write. PC ATX Based Computer

The system uses familiar and inexpensive IBM PC/ATX™ compatible components to reduce cost and provide world-wide availability of parts etc. The tool interface connects to the computer through the industry standard Universal Serial Bus (USB). The performance of the systems may be upgraded easily, as more powerful CPUs and other components become available. Configurations are available for rack mount, or notebook and other portable computers

Tool Interface and Power Supply

A compact tool interface and power supply may be provided which is suitable for the most downhole tools. The latest Digital Signal Processing (DSP) technology is employed to minimize hardware complexity and maximize flexibility. The interface may be configured for open and / or cased hole services, and incorporates expansion slots for development and upgrade.

The example shown at the left the operator is able to monitor the real time scrolling log, view any or all of the acoustic signals generated by a bond tool, and also monitor all the log outputs, including depth and line speed. Optionally raw sensor data may be displayed.

Multiple log plot windows may be opened for comparison of, for example, main and repeat log sections. Log plots may be paused and scrolled to any depth and annotations added, while data acquisition continues.

Depth correlation is achieved while logging, with the screen plot and system depth updated until correct depth is attained.

Log curve scales and other presentation parameters may be adjusted while logging and the screen plot redrawn until the desired output is obtained. The hardcopy plotter may be stopped and started at any time, presenting any interval with any desired presentation format.

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Hardware Specification:

Rack Mount Version:

Computer: 1.8 GHz Pentium 4 processor / ATX
256 MByte PC 2100 DDR Memory
Dual 80 GByte ATA 100 (7200 RPM)
32 MB DDR Memory AGP Dual Display
2 Serial / 1 Parallel I/O Ports / USB1.1/ USB2.0
1.44 MByte Floppy Drive
48x12x 40 CD RW Drive (DAT optional)
PCI Buffered Plotter Interface
18 inch color rack mount LCD monitor
Rack mount 101 keyboard with trackball
Tool Interface and Power Supply
Digital Signal Processor (DSP) 1.6 MSPS ADC
Integrated USB Hub
16 Channel, 16 bit ADC
6 Channel Counter/Timer
Pulse Detection
Collar Logging
Cement Bond Logging
Telemetries
Noise

Portable and Open Hole Configurations are available upon request.

Support is available for a wide variety of open hole tools, for both oil field, water wells and other well log applications. Various options for portable systems are also available, please contact SDS for details.

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