

WARRIOR SURFACE SYSTEM INTRODUCTION

Cased Hole Logging System

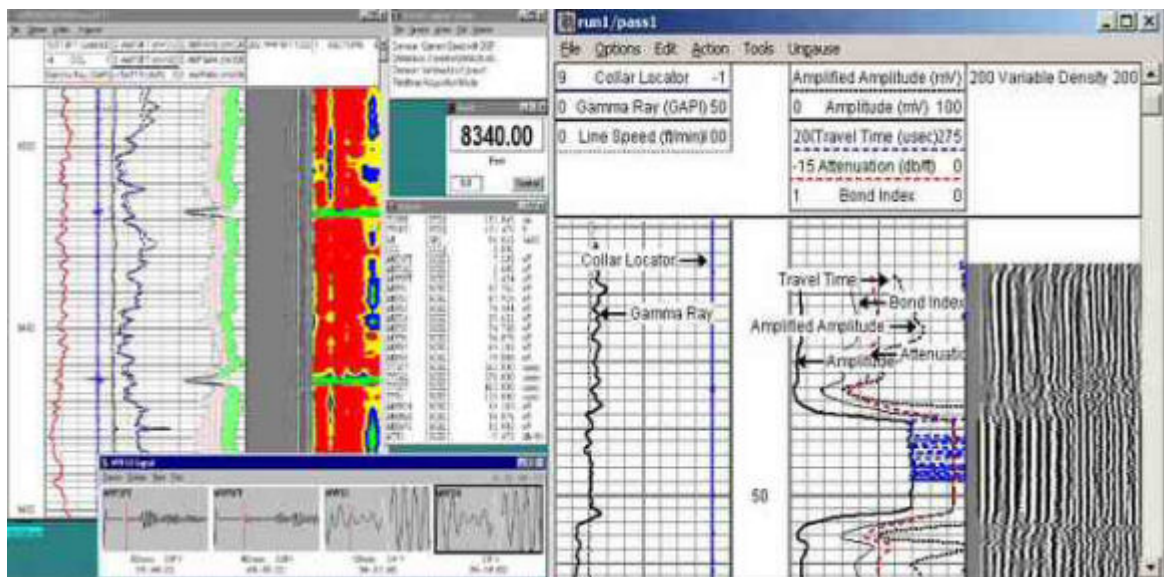
The **Warrior Well Logging System** employs advanced software and widely available hardware to provide a cost-effective solution to well logging requirements for both open and cased hole applications. Its main features include:

Multitasking System Using Microsoft Windows 2000, XP, or Vista.

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 extensive hardware 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.



The example shown above, 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.

PC ATX Based Computer

The system uses familiar and inexpensive IBM PC/ATX™ compatible components to reduce cost and provide worldwide 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 future developments and upgrades.

Hardcopy Support

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. Multiple plotters may be driven concurrently and independently. The system also supports PDF and fax format as a plot output, which may then be transmitted to a remote fax machine using a conventional fax modem.

Typical Cased Hole Specification:

Operating System

Windows 2000, XP, or Vista

System Services include:

Calibrations; linear, logarithmic, multi-point curve fit, tool specific, hardcopy output
Filtering; box car, gaussian weighted, triangular weighted
Graphical Tool String Configuration, Tool String Diagrams,
Graphical Log Format Editor; setup tracks, grids, curve types, colors, coding
Log Annotations and Curve Labeling
Real Time Data Monitors: sensors, outputs, devices, waveforms, nuclear spectra
High Speed Multi-Well Log Database; stores raw and computed data, service data, log heading information
Recalculation (Relog) from raw data,
Log Heading Editor
System Setup Control, Depth Unit, Data Unit, User Interface Language, Display Parameter,
Well Sketch, Real Time XY Plot, Merge, Splice and TVD Correction, Directional Survey Calculation
Graphical Curve Editor
Data Import and Export; LAS ASCII Read/Write, and LIS Read/Write.
Hoist Operators Display on second monitor

Acquisition Modules include the following service types

Cement Bond

Single and Dual Receiver Tools (SIE, CSS, Computalog, Probe, Tekco, Bell, Gearhart, Titan)

Compensated Bond Sector Tools (PMC, Greenspan, Aries)

Radial Bond / Sector Bond Tools (CSS, Probe, Greenspan, Tekco)

Nuclear

Natural Gamma Ray, Gravel Pack, Natural Spectral Gamma Ray, Chlorine Tool, Neutron, Compensated Neutron, Pulsed Neutron, Radioactive Tracer

Pipe Recovery

Freepoint (SIE, Homco, Gearhart, Titan, Applied)

Stuck Pipe Indicator (Sonic)

Misc

Collar Locator, Multi-Arm Caliper, Casing Thickness, Temperature, Noise

Production Logging

CBG, Sondex, Computalog Flex Stack, Madden Systems, Maxim, Panex, Gearhart MUX / Sequential, Lee, and Analog

User Defined Tools and Services

Telemetry System Support

Gearhart MUXB, Halliburton TTTC, Probe, CBG, MicroSmart, Panex, Hotwell, Titan

Hardware Specification:

Rack Mount Version:

Computer

2.8 GHz Pentium 4 processor / ATX

512 MByte PC 2100 DDR Memory

Dual 120 GByte SATA (7200 RPM) HD

32 MB DDR Memory AGP Dual Display Video Adaptor

2 Serial / 1 Parallel I/O Ports / USB1.1/ USB2.0

1.44 MByte Floppy Drive

48x12x 40 CD RW Drive (DAT optional)

19 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

Digitally Controlled Input Filters and Line Equalisation

Downlink Line Driver

Freepoint Board

PWM Casing Inspection Board

Noise Filter and Gain Board

0-400 VDC, 500 ma Manual/Programmable Tool Power Supply

Portable and Open Hole Configurations are available upon request.