

NeuraLog

Automated Log Digitizing and Preparation of Log Data



NeuraLog is the most widely-used application for well log digitizing and data preparation in the oil and gas industry. E&P projects require a variety of data to develop a proper understanding of rock and fluid properties and reservoir characterization. Whether you are working with curve, periodic or text data, *NeuraLog* provides automated tools for transforming paper or digital log files into quality data ready for display and analysis.

Quality digital data is a key element of successful E&P operations. Working with legacy logs can pose many problems for you and your organization; such as quality degradation, lack of digital data coverage and possible data loss. *NeuraLog* addresses these problems through the use of automated tools which enable intuitive digitizing to ensure data is preserved for use with current and future projects.

While organizations already have vast amounts of digital logs, the difficulty is determining if data is accurate and ready for use. Data quality can vary widely from project to project, log to log and foot to foot. Unique tools for data quality analysis and preparation in *NeuraLog* help check for accuracy and prompt the user for immediate on-screen corrective action to ensure the most accurate data available is used for project analysis.

Digitizing

Automated Curve Tracing

Neural Network Speed and Accuracy drive tracing algorithms for better-than-human tracing.

- Immediate feedback highlighting traced curve
- Line style curve tracers to account for curve crossings
- Built-in grid model to enhance curve recognition
- Auto-stop error detection
- Interactive curve editing with immediate resume tracing

Lithology Data Capture

Utilize data from mud logs and lithology logs for complete analysis.

- Capture lithology and descriptions from hand-drawn mud logs with ease
- Unique step curve (ie. ROP, Gas...) capture by sample rate
- Log annotation to mark important data such as zones, faults and reservoirs

Image Warp and Stretch Correction

NeuraLog automatically corrects for distortion in log images by using defined depth grids to produce quality log images and digital data.

Interactive Log Display

NeuraLog displays the log image and traced curves directly on your monitor, providing immediate feedback.

- Point and click interaction and auto-scrolling with tracing tool
- Error correction at any point in the tracing process

Unlimited Backup Scales

Neuralog's automated tracing functions process unlimited backup scales, automatically patching together the different sections of curves for streamlined curve output.

Preparation

Data Quality Improvement

Neuralog includes comprehensive tools to improve and ensure log data quality. The Log Quality Index (LQI) Report provides an overall measure of quality on in-house or vendor data. The *Neuralog* Quality Improvement tools include checks for pixel overlay, spikes, gaps, and depth gridding.

For verification of LAS files, the Virtual Light Table shows the match between the log image and digital data overlay quickly and visually. The LAS report summarizes your data to check for norms.

Multiple Runs/Curve Splicing

Neuralog provides the option of merging multiple runs of the same curve within a log into one LAS file. In addition, curves from multiple files may be merged into a single LAS output.

Digital Log Editing

- Customizable LAS Curve Template
- Curve Arithmetic
- Depth Shift
- LAS Curve Edit
- Baseline Shift
- LAS File Merge

Curve Calculator

Neuralog comes pre-loaded with various methods to calculate v-shale, porosity, water saturation as well as other standard conversions. Custom equations can be saved and edited.

Data Input

Scanned Images

Neuralog accepts any standard color, grayscale or b/w TIFF, JPEG, PDF or BMP image as input.

Data Files

- Depth-calibrated rasters from industry data vendors or other applications
- Standard LAS files

Well Header Files

- PI Dwigths Fixed 197 • IHS Energy Well Fixed 297 • GeoGraphix WellBase V2 • LAS Headers
- Generic ASCII or Excel

Data Output

Vector Files

- LAS 1.2 • LAS 2.0 • AutoCAD DXF • PETRA ASCII Well Data • Tab Delimited ASCII

Raster Calibration Output

- *Neuralog* Calibrated Rasters • PETRA ASCII Log Image Calibration (LIC)
- GeoGraphix Depth Registration ASCII (DRA)

Neuralog System Requirements

Pentium 4 Processor • Min. 100 MB Disk Space • 256 MB RAM • Graphics - 800 x 600 (or higher) with 16 bit high color recommended • Windows 2000/XP/Vista/7

NeuraJet17

Quality Well Log Prints up to 17" Wide



NeuraJet17 is a next generation high quality well log printing solution. The combination of flexibility and ease of use separates the *NeuraJet17* from other inkjets on the market. Whether you need presentation quality show logs or immediate prints, the *NeuraJet17* delivers the crisp detail needed to make your work look its best.

The key to successful exploration and production involves clear analysis of critical data. With *NeuraJet17* prints, you can distinguish even the finest log features. For times when economics and speed are a high priority, economy

draft printing is available to illustrate your work quickly and cost effectively. Regardless of specific printing needs, the *NeuraJet17* delivers desirable results for any operation.

NeuraJet17 uses continuous fanfold paper to create log prints up to 17 inches wide and unlimited length. Feeding, folding and cutting of individual prints occurs automatically and ensures your log header is printed on the proper paper fold. This printer is designed for the professional that does not have time to deal with difficult office equipment or unruly stacks of paper.

NeuraJet17 includes state of the art, imaging and LAS software, *NeuraViewPE*. Specifically designed for well log viewing, editing and printing, *NeuraViewPE* eliminates the need for multiple log viewers by supporting industry standard formats. While *NeuraJet17* will work with any Windows-based geological software, *NeuraViewPE* is included to offer a complete log printing solution.

Engineered by Neuralog, the *NeuraJet17* was designed and developed to print well logs. Unlike traditional inkjet printers, *NeuraJet17* seamlessly handles your log prints without user interaction. Neuralog is committed to providing you with a reliable printing solution backed by a dedicated support staff. *NeuraJet17* is not just another printer, but a total solution for well log printing.

Neuralog
Turning Paper Into Petroleum

NeuraJet17

NeuraJet17

Specifications

Printing Speed	1.7 ips, maximum
Print Resolution	300 dpi / 600 dpi / 1200 dpi
Ink Cartridges	130 mL, 6 tanks
Paper Size	Up to 17 inches wide
Media Capacity	Unlimited length
Unit Weight	86 pounds
Unit Dimensions	33"W x 20"D x 38"H (includes stand)

Electrical

110V or 220V - Specify on order

Interface

Network Ethernet and USB 2.0

Important NeuraJet17 Features

- Highest quality color well log prints up to 17" width
- Reliable and easy to operate
- Designed for continuous fanfold paper
- Fastest printing speeds on the market for 17" width
- High quality, standard and draft print modes
- Built-in feeder, cutter and paper stacker
- Rolling stand included
- Low total cost of ownership
- Includes unlimited NeuraViewPE

NeuraViewPE

NeuraViewPE is included with your *NeuraJet17*. This is the one-stop application to view, edit and print logs. NeuraView supports industry standard formats such as: LAS, TIF, PDF, PDS, CGM, EMF, BMP, and JPG.

NeuraViewPE is the solution for quickly printing well logs of any size. Features such as cropping, stitching, and text/graphical annotations make image manipulation and preparation simple. These features create a total log preparation tool for today's E&P workflow.

Support: Warranty and Service

Neuralog provides support to ensure you have the best solution for your printing needs. The *NeuraJet17* support includes technical advice as well as driver, firmware and software updates. Warranty service is included for the first year with extended warranty available for subsequent years.

NeuraJet17/NeuraViewPE System Requirements

Ethernet or USB • Pentium 4 Processor • Minimum 6 GB Disk Space • Minimum 1 GB RAM • Graphics - 800 x 600 minimum with 16 bit color video • Windows 2000/XP/Vista/Windows 7 • 32 bit or 64 bit

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NeuraLaserColor II

High-Speed Color Laser Log Printing



The NeuraLaserColor II is a high-speed, high quality laser printing solution for well logs. Featuring the fastest color laser print speeds in the industry combined with the latest enhanced imaging technology, superior quality log prints are efficiently produced for immediate presentation and preservation. The NeuraLaserColor II supports a variety of industry standard well log file formats, including TIFF and Adobe PDF. Along with continuous form printing, NeuraLaserColor II prints well reports and other standard-sized documents, making the NeuraLaserColor II a complete and flexible printing solution for you and your E&P team.

NeuraLaserColor II makes printing logs quick and easy. A user friendly touchscreen operator panel with audible feedback and easy access to paper and printer cartridges add to its ergonomic design. The Continuous Form Attachment (CFA) streamlines paper handling, requiring minimal user assistance as it automatically loads, feeds, cuts and reloads to allow for multiple prints and copies. Once complete, the logs fold neatly into the provided stacker. The results are consistent and reliable.

NeuraLaserColor II produces the highest quality laser prints available in the industry today. Utilizing advanced color laser technology the NeuraLaserColor II prints well logs with exceptionally crisp images and robust color with no streaking, running or fading. Pantone color calibration ensures consistent optimized color quality and color matching. For black and white logs, a special mode uses only the black cartridge while conserving the other cartridges. Eco-friendly features such as the Sleep button, Hibernate Mode and Eco-Mode allow you to save energy and reduce paper and toner consumption.

The NeuraLaserColor II utilizes "all-in-one" extra high yield toner cartridges to minimize maintenance, ensure high quality printing and reduce waste. These cartridges are also recyclable with free return shipping. The NeuraLaserColor II uses custom continuous-length paper specifically designed for high speed continuous printing and durability. All NeuraLaserColor II consumables are engineered to minimize maintenance time and reduce operating costs.

NeuraLaserColor II will print from your existing Windows-based applications, and NeuraLog includes NeuraViewPE software to provide a complete log printing solution. Designed for well log viewing, editing and printing, NeuraViewPE eliminates the need for multiple log viewers by supporting industry standard formats. With the NeuraLaserColor II you will be printing logs from your favorite well log applications in a matter of minutes.

NeuraLog

The Best Data Into Print



NeuraLaserColor II

	<u>Well Logs</u>	<u>Cut Sheets</u>
Color and B&W Printing	Up to 11 ips	Up to 50 ppm
Print Resolution	Up to 2400 dpi	Up to 2400 dpi
Cartridges	35,000 pages	20,000 standard pages
Fuser	260,000 pages	150,000 standard pages
Transfer Unit	350,000 pages	200,000 standard pages
Paper Size	8.5" wide x unlim. length	Letter, Legal, A4
Media Capacity	Unlimited length	550 Sheet Tray

Specifications

Print Engine - 110 pounds - 20.3"W x 22.3"H x 20.2" D
Continuous Form Attachment (CFA) - 4 pounds - 12"W x 2"H x 5"D
Processor/Memory - 1.2 GHz – 1.5 GB on board RAM

Electrical

110V or 220V - Specify on order

Interface

Network Ethernet and USB



Important NeuraLaserColor II Features

- Highest quality well log printing with enhanced imaging for greater accuracy
- Reliable and easy to operate
- Fastest laser print speeds on the market for both Color and B&W printing
- All-in-one extra high yield toner/drum cartridges with recycle program
- Includes unlimited NeuraViewPE
- Low total cost of ownership
- On-site warranty included, 1 year

NeuraViewPE

NeuraViewPE is included with your NeuraLaserColor II printer. This is the one-stop application to view, edit and print industry standard log formats such as: LAS, TIF, PDF, PDS, CGM, EMF, BMP, AND JPG.

NeuraViewPE is the solution for quickly printing raster and LAS files. Features such as cropping, stitching, and text/graphical annotations make image manipulation and preparation simple. These features create a total log preparation tool for today's E&P workflow.

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Neuralog provides consistent and reliable support to ensure you have the best solution for your printing needs. The NeuraLaserColor II support includes technical advice as well as driver, firmware and software updates. On-site warranty service is included for the first year with extended on-site warranty available for subsequent years.

NeuraLaserColor II/NeuraViewPE System Requirements

Ethernet • Pentium 4 Processor • Minimum 100 MB Disk Space • Minimum 1 GB RAM • Graphics - 800 x 600 minimum with 16 bit color video • Windows XP/Vista/Windows 7/Windows 8 • 32 bit or 64 bit

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Well Header Files

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- Generic ASCII or Excel

Data Output

Vector Files

- LAS 1.2 • LAS 2.0 • AutoCAD DXF • PETRA ASCII Well Data • Tab Delimited ASCII

Raster Calibration Output

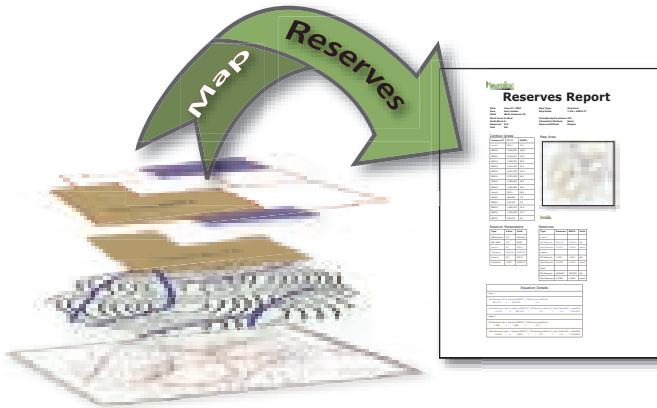
- *Neuralog* Calibrated Rasters • PETRA ASCII Log Image Calibration (LIC)
- GeoGraphix Depth Registration ASCII (DRA)

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NeuraMap

Volumetrics, Reserves and Map Digitizing



NeuraMap is the industry accepted application for calculating volumetrics and reserves. Any scanned, hand-drawn or computer created map can be used. Basic and modified methods are included as well as nine standard equations to generate accurate areas, volumes and reserves. These results can be exported for further evaluation or presented in a customizable report that includes calculation methods used in obtaining your results.

NeuraMap is also the oil and gas industry's leading application for the data capture of contour and basemap data. Valuable information is brought directly into your workflow from maps, cross plots, interpreted seismic and other types of data, new or legacy. Data capture is made simple with accurate and rapid auto-tracing and symbol recognition.

NeuraMap converts raster images into industry digital data. Line, curve and point data overlay original image for immediate QC. Editing is WYSIWYG and workflows are wizard driven. The Raster maps can also be directly georeferenced and reprojected, without digitizing. Unlimited calibration points are used to automatically eliminate the effects of image skew and stretch. A calibration grid provides visual and quantitative error analysis.

NeuraMap provides the ultimate flexibility for volumetrics, reserves and map digitizing. Once data and other information are assembled, they can be imported directly to *NeuraSection* or converted into any industry standard format for E&P workstations.

Volumetrics and Reserves

- Work with a range of reservoir maps (structure, net thickness, net pore volume, and net hydrocarbon pore volume) in either relative scale or absolute coordinates.
- Calculate distances, areas, volumes and reserves including gas-in-place, oil-in-place, recoverable oil and recoverable gas.
- Volumes are calculated using digitized contours contained by faults, leases and other cultural boundaries.
- Volumetric methods include standard and modified algorithms: Trapezoid, Pyramid, Trap/Pyramid, Quadratic, Step, Ratio, Simpson, and 3/8 Rule.
- Present your results with text or HTML reports with composite displays including maps and other graphics as well as your company logo.

Automated Digitizing

- Auto-tracing digitizes solid and dashed curves, as well as the perimeter of basemap objects.
- Auto-symbol search locates and digitizes wells, shotpoints and other point data.

Display and Merge Multiple Data Sources

- Raster images and digital data can be loaded from a variety of sources and combined into a single file. Multiple images and digital data sets, even in different projections, can be merged.

On-Screen Quality Control, Interactive Editing

- Accuracy is quickly verified while digitizing. The trace overlays the image in an offset color.
- Digital data, such as seismic lines or contour maps from other workstations, can be overlaid on the original image for QC and editing.
- Point and click interaction with auto-tracing and editing tools enable edits to be made immediately.

Worldwide Map Systems

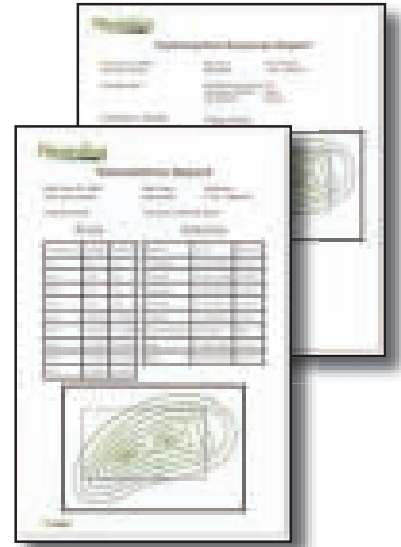
NeuraMap, with Blue Marble Geographics, supports 12,000+ mapping systems and user-defined systems.

GeoTIFF Export (ArcView World Image File)

ArcView World Image Files can be created from scanned images for most E&P workstations.

Map and Chart Printing

Digital map and graphic data can be viewed on the screen in WYSIWYG format or plotted with any Windows standard printer.



Data Input

Scanned Images

NeuraMap accepts any standard TIFF, JPEG, PDF or BMP image as input. Color, grayscale or b/w images supported (200 dpi recommended). Neuralog recommends the *NeuraScanner* for small or foldable maps and has available wide-format scanners from 36" to 54" width.

Data Files

AutoCAD DXF, ESRI ArcView Shape, Generic ASCII or Existing *NeuraMap* NDS file.

Seismic Location Data

UKOOA and SEG P1 formats. Import as Lat/Lon or Grid values.

Data Output

NeuraMap works with *NeuraSection* plus industry formats including:

- AutoCAD DXF • AutoCAD 3d DXF • ArcView Shape • ArcView World Image Affine (GeoTIFF)
- ArcView World Image Exact • DGI EarthVision • GeoGraphix WellBase V2.0 • GeoGraphix Landnet CDF V1.0 • GeoQuest CPS3 • GeoQuest Finder • Landmark Graphics ZMAP+ ASCII
- Landmark SeisWorks • PetroSys Mapping • SEG P1 Seismic • Tobin Base Map • UK00A Seismic
- QuickPlot - immediate display of captured data • Formatted ASCII and HTML

NeuraMap System Requirements

Pentium 4 Processor • Minimum 100 MB Disk Space • Minimum 256 MB RAM • Graphics - 800 x 600 Minimum with 16 bit color video • Windows 2000/XP/Vista/7



Turning Paper Into Petroleum

NeuraJet Warranty Renewal Information for International clients

Dear NeuraJet Customer,

Thank you for your continued use of the NeuraJet! We hope throughout this past year the ability to print quality well logs has proven to be beneficial to your business. The intent of this letter is to inform you that your annual support has, or is about to expire.

A full one-year Platinum warranty was provided with your NeuraJet. Platinum warranty includes printer updates and on-site service, as well as unlimited phone and email support. Also included are updates for NeuraView, software that loads and prints large well logs and maps. The most recent NeuraView release doubled its internal memory, increasing the number of documents that could be loaded at one time. NeuraJet users should visit our website and download the latest NeuraView.

International Warranty Agreement

The International Warranty includes unlimited phone and email support, a printer core exchange if required by Neuralog plus the latest **NeuraView** software. The agreement does not cover replacement of consumable items and service calls.

- ✓ All parts (excluding consumables)
- ✓ Response by phone or email by next business day (9AM-5PM Central Time)
- ✓ Printer core exchange if required by Neuralog

Warranty must be paid prior to the expiration date for continuous warranty service. If payment is received after the warranty has expired, Neuralog reserves the right to require payment from the customer for the first repair after warranty reinstatement.

Please renew your printer warranty listed on the enclosed invoice so that we may continue to give you the highest quality support and provide you with future printer and software updates. If you have any questions about your NeuraJet, contact Neuralog at 1-281-240-2525 or support@neuralog.com.

With Kindest Regards,

Pamela Fleming
Client Relations Manager

