

DASH-ANALOG WORKBENCH

THE HIGH-PERFORMANCE CAE TOOL FOR ANALOG ENGINEERS.

Now you can accomplish in hours what would take days or weeks using traditional analog design methods. The DASH™-Analog Workbench™ from FutureNet® is a stand-alone PC workstation for all your analog design needs. With it, you'll be able to design your circuit and do breadboarding in software, before you build a hard prototype. You'll interact with the simulator using interfaces that are as familiar to you as test instruments — an oscilloscope, network analyzer, function generator and frequency sweeper. Optional modules add advanced capabilities such as parametric plotting, statistical analysis and more. Comprehensive device libraries are also available to provide highly accurate modeling and free you to concentrate on circuit design.

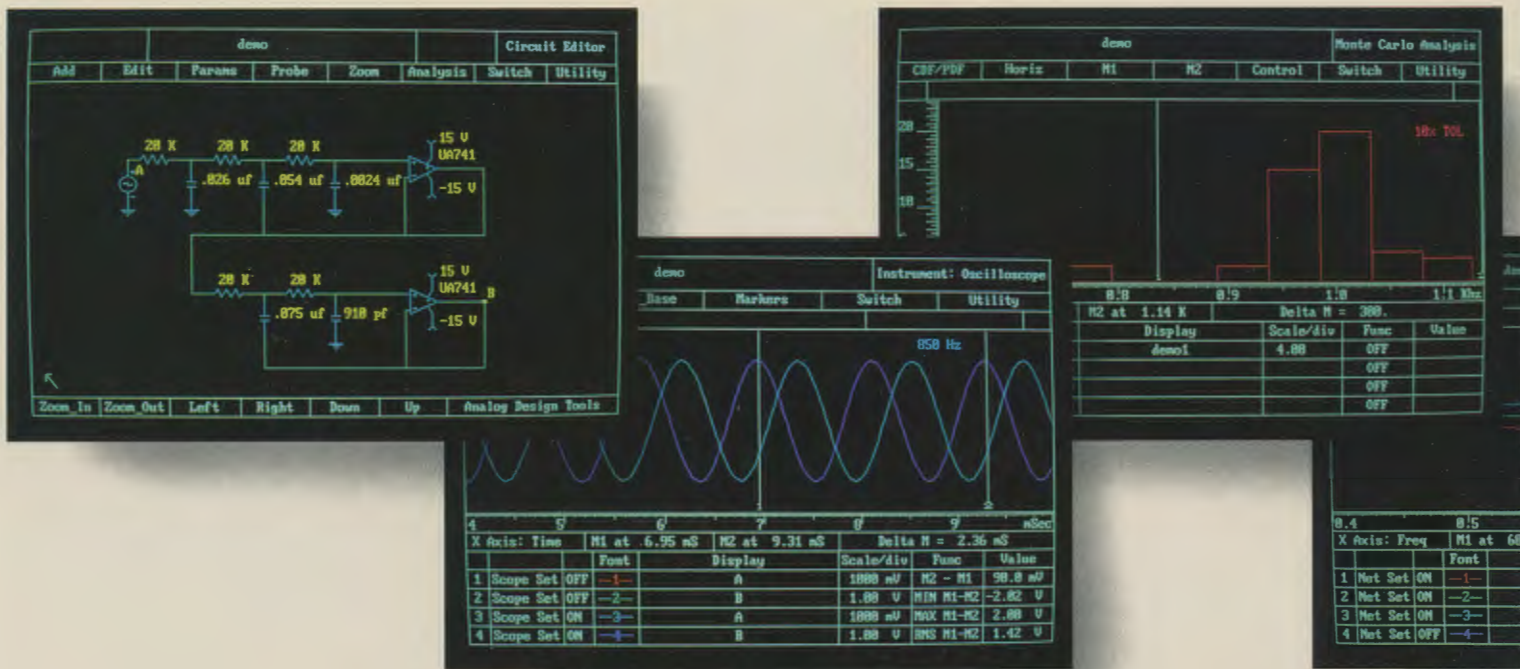
BUILT TO WORK THE WAY ANALOG DESIGNERS DO. Design your circuit using DASH Schematic Designer, the most popular schematic capture software package available today. Then simulate the circuit with software instruments just as if you were breadboarding in the lab. Now optimize your design with advanced simulation techniques. DASH-Analog Workbench gives you the tools to improve



circuit reliability, predict manufacturing yield and determine safe operating conditions before you've built any hardware. Typically, the breadboard circuit you do build will be very close to your final production design.

EASY TO USE AND LEARN. The DASH-Analog Workbench is not only powerful — it's very easy to use. Simple menu guide you through the steps of circuit design. You'll see familiar test instrument-like interfaces when you're analyzing circuit performance. It's like the real world of breadboards and instruments, only easier.

FutureNet
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PART OF FUTURENET'S INTEGRATED CAE ENVIRONMENT FOR PCs. The DASH-Analog Workbench is based on what has become industry standards in CAE:

Berkeley SPICE simulation software (versions 2G6 and 3) and DASH-4 Schematic Designer for fast and easy schematic capture, both running on the IBM® PC AT.

Like all of our CAE software, this new workstation offers engineers the performance of a mainframe at a fraction of the cost. Using a 32-bit co-processor board with the PC AT for high-speed calculation, the system performs simulations at speeds comparable to mainframe computers.

DESIGN PERFECT SCHEMATICS AT YOUR PC IN A FRACTION OF THE TIME IT TAKES TO DRAW THEM BY HAND. With the DASH-Analog Workbench, you'll draw the circuit diagram using DASH-4 Schematic Designer. DASH-4 frees you from the tedious and time-consuming drafting and documentation chores associated with schematics. The software handles it automatically. No matter how many times your drawing is revised, the documentation is always current.

Use the mouse to instantly move, copy, draw and erase any schematic element. With dozens of sophisticated drawing features you can create schematics at lightning speed. And change them just as easily.

Analog circuits designed with DASH-4 and simulated with DASH-Analog Workbench are fully compatible with DASH-PCB for printed circuit board layout on

the same workstation. DASH-PCB gives you the results of an experienced PCB designer in a fraction of the time.

For board layout on other systems, a wide range of translators are also available to convert the DASH database to the appropriate format for most popular CAD systems. Many of these translators offer back annotation capabilities which automatically update the original schematic when location designators or pin numbers change.

TEST YOUR SOFTWARE CIRCUIT WITH FAMILIAR INSTRUMENTS. Once the circuit drawing is complete, select the appropriate software test instruments to perform the simulation you want. Connect the instrument to specific sources or probe locations in your schematic by moving and clicking the mouse. Set values and ranges from menus that correspond to the front panel function knobs of real instruments. After simulation is complete, the results will be displayed on the screen.

TIME DOMAIN ANALYSIS. Use the four-channel *function generator* in concert with the *oscilloscope* to make comprehensive time domain measurements. The function generator produces square waves, sine waves, pulse, step or sawtooth waves. Specify the duration of the waveform, rise and fall time, dc offset and amplitude for each signal source channel. You can also define your own waveforms.

The oscilloscope displays the simulated

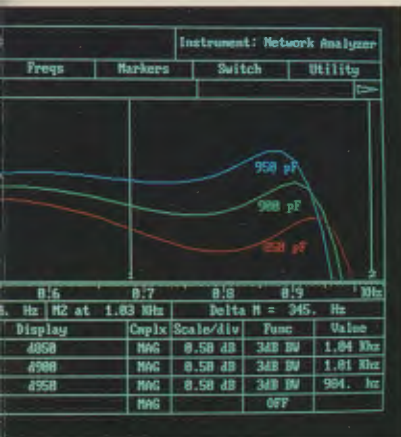
circuit output. It automatically measures overshoot, 10% and 90% time, peak value, RMS value and average value. A *dc multimeter* is also provided for voltage measurements.

FREQUENCY DOMAIN ANALYSIS. Use the *frequency sweeper* and *network analyzer* to make frequency domain measurements. You can specify amplitude and phase information about the sweep signal, as well as start/stop point, number of steps and linear or logarithmic frequency scales.

The *network analyzer* generates plots of the magnitude and phase of selected outputs (real or imaginary), including Bode and Nyquist plots. Integral measurement functions include gain-bandwidth products and 3dB and 10dB points.

The *spectrum analyzer* automatically receives data from the four corresponding oscilloscope channels and performs a discrete Fourier transform of the data to determine component frequencies in the signal. You can select the portion of the waveform to be analyzed, the frequency resolution, and the data interpretation and extrapolation methods you want.

OPTIMIZE PERFORMANCE WITH PARAMETRIC PLOTTING. Use the optional *Parametric Plotting Module* to optimize the performance of your analog circuit, without hours of tedious calculation. This all-purpose X-Y plotting tool allows you to vary circuit parameters and graph their effect on the performance of a specific device or your entire circuit. Explore and



document how the behavior of a circuit is affected by important parameters such as temperature, or by changing component values.

The *Parametric Plotting Module* simulates sophisticated laboratory tests of circuit performance. For example, it can plot gain versus temperature for different load resistors, determine the overshoot for a variety of compensation capacitor values, or graph the output voltages of a voltage regulator for different output load values.

You can make "what if" analyses effortlessly, without endless calculations or time-consuming sequential runs. The module provides a full set of menus to guide you in defining the parameters and values.

USE ADVANCED TECHNIQUES TO PREDICT PRODUCTION YIELDS AND ASSESS CIRCUIT SENSITIVITY.

Predicting how components selected in breadboard design will perform in the production environment is now possible with the optional *Statistical Analysis Module*. It not only allows you to predict manufacturing yield,

but also estimate component sensitivities that may adversely affect circuit performance. With this module you can now statistically model your circuit before committing to manufacturing.

Begin by assigning tolerances to the components in the circuit. Specify a global tolerance or a unique tolerance to selected components. Now run the Monte Carlo analysis to predict how the circuit would perform in an actual production run. Test results can be displayed as a cumulative distribution function, or a probable density function.

If yields are unacceptable, you can now use the sensitivity/worst case analysis to determine which elements of the circuit are causing the problem. The software varies each component to examine its effect on the circuit. After you have identified which components have the greatest sensitivity, you can modify the tolerances and rerun the Monte Carlo analysis to check yield changes.

Inter-related component problems are often not discovered until manufacturing. Production may be delayed weeks as failures are analyzed and boards are reworked, or even re-designed. By using this statistical tool to correct component problems during design, you can eliminate costly re-engineering and get better products to market faster.

DEVICE LIBRARIES SAVE VALUABLE TIME IN RESEARCH AND MODEL DEVELOPMENT.

Two device libraries are available for the DASH-Analog Workbench: the *General Device Library* for complete device support, and the *Basic Device Library* of the most commonly used devices. Both provide highly accurate modeling of real components, so critical for realistic design. (Many CAE systems use only idealized models of components.) Any model can be modified as required for special applications.

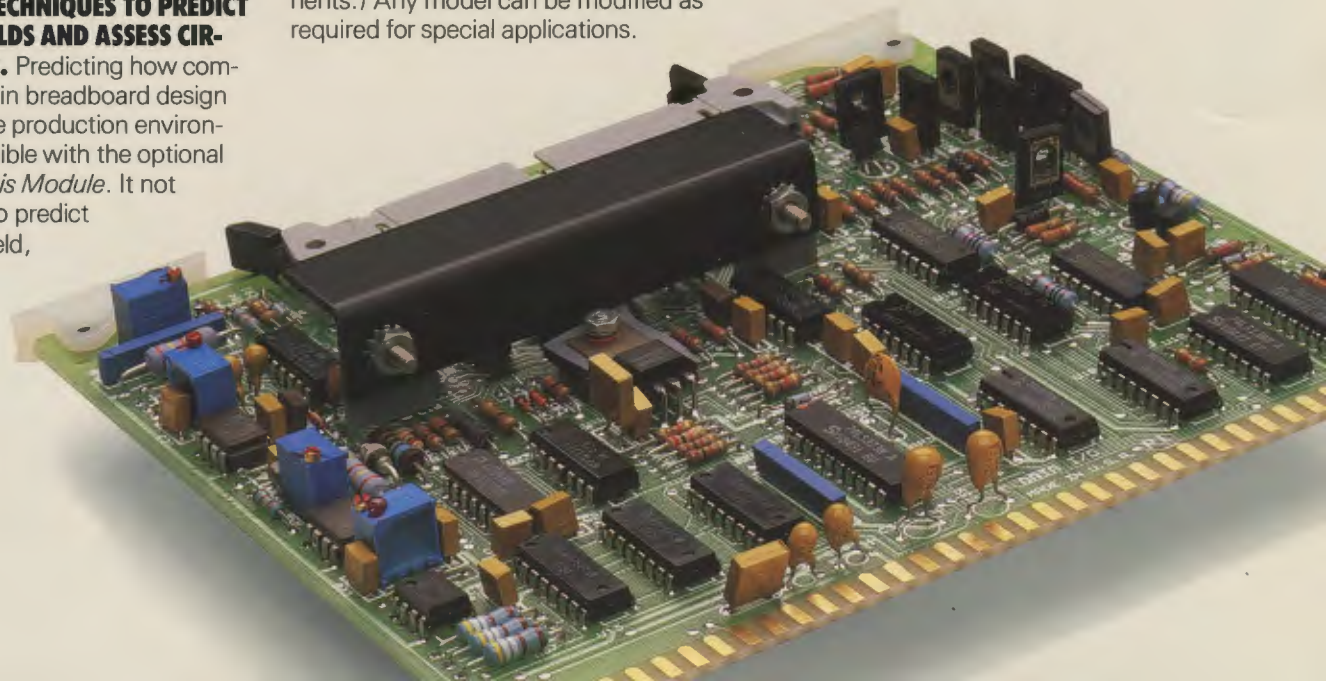
MODELS FOR VIRTUALLY EVERY ANALOG DEVICE YOU NEED.

The *General Device Library Module* is a comprehensive set of semiconductor and integrated circuit models most widely used by analog design engineers. It's the largest SPICE library available from any CAE supplier, with models for more than 1000 semiconductor and integrated circuit devices including:

- Bipolar Junction Transistors
- Junction Field Effect Transistors
- Small Signal and Zener Diodes
- Op-amps-Bipolar, JFET and MOSFET Front End
- Comparators
- Analog Switches
- Sample-and-hold Amplifiers

The *General Device Library* also includes standard ideal semiconductor and function blocks such as summers, multipliers, gain blocks, integrators and differentiators. The device models reflect the most advanced simulation equations available to analog engineers. Typically, SPICE parameters are not available from device manufacturers data sheets. So we have a staff of engineers devoted exclusively to modeling devices for the library. They'll add about 50 new devices each quarter.

The *Basic Device Library Module* gives you a balanced selection of the most popular analog devices. It includes 50 discrete and IC devices in 14 categories from the *General Device Library Module*. Each offers the same high-accuracy modeling that saves you valuable time researching parameters of the idealized models used in other CAE simulators.



COMPREHENSIVE SUPPORT AFTER THE SALE.

Every purchase of DASH-Analog Workbench includes an extensive 90-day warranty covering hardware and a one-year software update agreement. You are also entitled to unlimited applications assistance.

Just call FutureNet, and you'll be in immediate touch with a full staff of applications engineers dedicated to helping you get the most from your system.

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