

New IBM CAD package transforms PCB design

A new CAD package for PCB design being marketed by IBM for use on a wide range of its computers (including the RT/PC) is claimed to allow a dramatic reduction in the time needed to design complex boards.

In the mid seventies, design of a complex printed circuit board with 70 integrated circuits took about three weeks. Today that same board can take less than a week.

Making this possible is a new package combining CBDS (Circuit Board Design System), developed by Bell-Northern Research of Canada, and CIEDS (Computer Integrated Electrical Design Series Simulators). Marketed internationally by IBM, the recently released CIEDS/CBDS package Version 4 provides powerful, easy to use schematic capture and design entry capabilities plus an object-driven man-machine interface (MMI) for circuit simulation, board layout and routing with on-line documentation and design violation checking.

According to IBM systems engineer Dino Calapai, "With MMI, the user selects the object to be acted upon and then the operation is performed. This leaves the user with the same environment to perform other related functions. More frequently used commands are available through predefined programmed function keys, via IBM's Lighted Programmable Function Keyboard".

Mr Calapai said CIEDS/CBDS Version 4 eliminated the traditional circuit prototyping process. Schematics can be drawn on CIEDS Design Capture, which has a selected component library supporting Texas Instruments, Signetics and National Semiconductor devices.

The CIEDS Analog-Digital Simulator allows for simultaneous simulation of analog sampled data circuits with their digital control logic. Simulation times are minimised through use of piecewise

linear models for all non-linear devices and event driven digital primitives. Results can be evaluated with a display utility provided in CIEDS/Simulation Base.

The CIEDS Design Simulation Base provides a comprehensive and interactive multi-window output display for the designer to view the results of a simulation. Highlights include an easy-to-learn command menu using a mouse to eliminate the need to memorise complex keystroke entry, and the ability to display a chosen portion of a schematic. This allows nets to be selected for viewing in the waveform and tabular display windows.

According to Mr Calapai, "CIEDS re-

places many of the sophisticated instruments used by engineers in the traditional circuit prototyping process. A circuit schematic may be displayed in the CIEDS schematic window, input waveforms are then defined for each input to the schematic. The mouse is used to select circuit nodes to be displayed in the waveform and tabular display windows. Circuit data may be displayed in the time and frequency domain, where node values can be represented in decimal, mnemonic and boolean formats. This feature may functionally replace instruments such as 'scopes, spectrum analysers, logic analysers, phase meters and various development systems."

After a top-down design is completed using approximate delay values, a utility is available for circuit re-verification using actual delay values for the parts that have been selected in the final design.

Another feature is the CIEDS Beha-



IBM systems engineer Dino Calapai uses a mouse to help him review the schematic of a printed circuit board he is designing on CIEDS/CBDS.

vioural Simulator, which allows the designer to start with the design definition of an integrated circuit or printed circuit board, and begin testing parameters at the architectural, register and gate system level.

The CIEDS Logic Simulator is a complementary simulator to the CIEDS Behavioural Simulator. While the latter is used during the "what if" stage of the design process, CIEDS Logic Simulator is used to refine the design and fill in the details.

Switched capacitor networks can be simulated in the time and frequency domains using the CIEDS Switched Capacitor Simulator. This frequency analysis computes amplitude and phase response including sample and hold effects and continuous input/output coupling. In addition it accurately simulates sensitivities to component tolerances and parasitic capacitances, group delay, amplitude slope distortion due to non-linear components and noise density. Time and frequency responses can be evaluated with the display utility provided in the CIEDS Design Simulation Base.

CBDS is basically an interactive graphic design tool that can speed the design and manufacture of printed cir-

cuit boards and thick film hybrid chips. It has a great many available functions, including capability for schematic entry and generation of manufacturing data.

The CBDS system is composed of four modules: a Component Database, a schematic entry module (LOKI), a physical layout subsystem (SPRIG) and a manufacturing data generator (CAM).

Mr Calapai said that designs can be entered through the LOKI schematic capture program or alternatively via the CIEDS/CBDS interface. LOKI can be used as a stand-alone subsystem. Circuit components and their symbols are called up from the predefined component database. Using the IBM 5080 Graphics System as a principal design workstation, CBDS utilises advanced function graphics combined with the MMI to enhance end user productivity.

CBDS offers a starter component database of approximately 10,000 devices. All component data and associated symbols may be centrally created and controlled, for standardisation. Additional components may be defined easily as the need arises.

The SPRIG physical layout subsystem is capable of automatic placement and routing of advanced multilayer PCBs, with high density surface mounted com-

ponents and hybrid packages. SPRIG also offers various optimisation routines and online violation checking for reduction of PCB vias, track length and optimisation of routing to multi-gate IC packages.

CBDS also supports full back-annotation facilities, so that modifications to PCB data are transferred back to the circuit schematic. Design integrity is therefore maintained.

CBDS also offers the CAM module for generation of manufacturing data. CAM is capable of producing all PCB/hybrid artwork including overglaze and silk screen legends, in Gerber photoplotter format and standard pen-plotter format. NC drill tapes and auto-insertion reports are automatically generated, along with a bill of materials report comprising supplier and costing data.

Mr Calapai said that CIEDS/CBDS greatly reduces long lead times usually associated with circuit design, and virtually eliminates traditional prototyping procedures.

CIEDS/CBDS runs under the VM operating system on a range of machines, from the 9370 to the 3090. CBDS is also available on the RT/PC personal computer, under the AIX operating system. EA

IBM 2077 Gateway Place, San Jose, CA 95110 (408) 288-4100				Circle 297	
Computer-Integrated Electrical Design Series (CIEDS)	IBM PC/AT, PS/2 (model 50 and above): DOS; RT PC: AIX-System/370: VM	CIEDS/CBDS	2,500+: TTL comp. — and discrete dev.	interface to CIEDS/behavioral, logic, A/D, and switched capacitor simulators, Hilo3, Spice 2G, CIEDS/CBDS	\$2,900 sw (PC and PS/2) \$8,000 sw (RT PC) \$75,000 sw (S/370)