HAWAII ARCHITECT

journal of the hawaii society/ american institute of architects

April, 1984

Computers—Tools for Today's Architect

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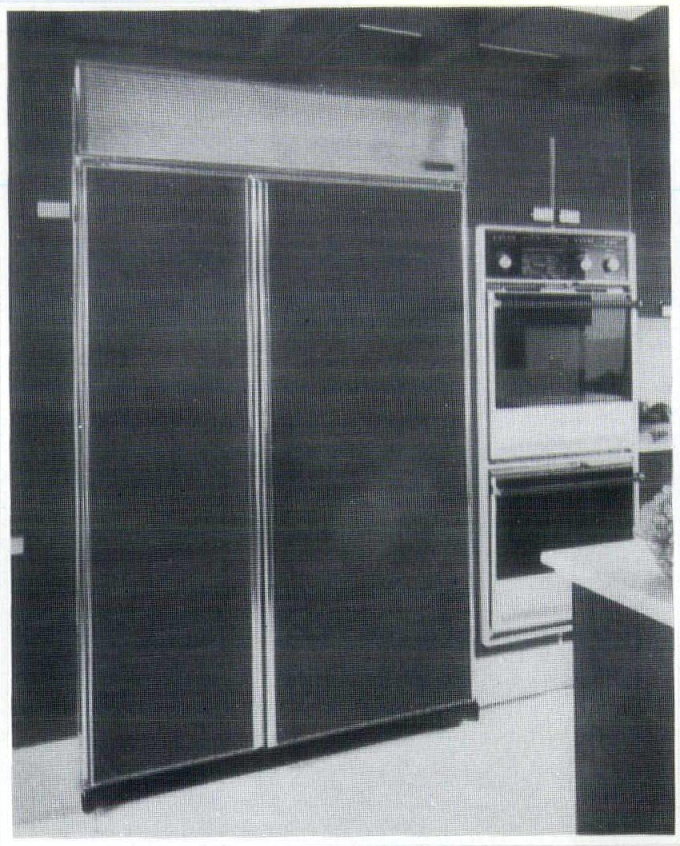

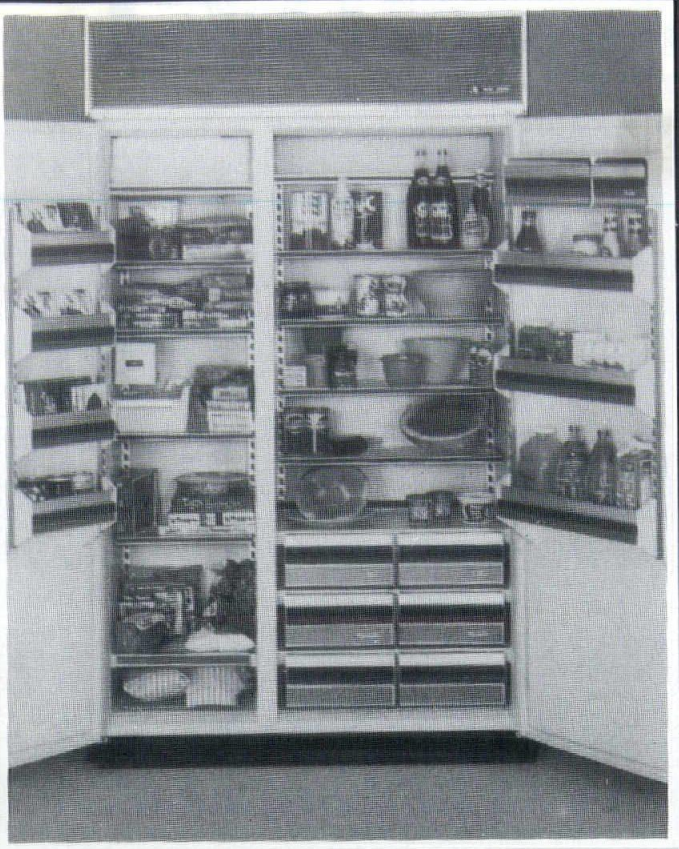

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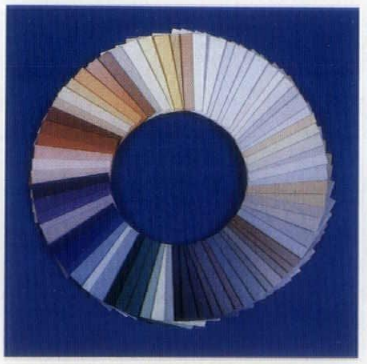
Stateline's traditional cabinets are still a popular choice of Hawaii home owners and designers. The beautiful cabinet styling of our "Makamae" design in rich oiled Koa is shown in the smaller kitchen photo at bottom left. Remember, Stateline also offers top-name appliances for total remodeling.



Our new European look is available in a wide range of colorful plastic laminates (pictured above) or in fine woods such as Oak and Koa, with natural, stained, semi-gloss, flat lacquer or hand-rubbed oil finish.

Two handsome bathroom vanity treatments by Stateline. The left in striking black lacquer on Birch with white lacquer molding. The right features quarter-inch CORIAN® inserts framed in solid Teak. Examples of the many unique custom looks available.

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CERTIFIED CABINET

NKCA KITCHENS

Headlines

Computers and Other Marvels

by Chris Smith
President, HS/AIA

Never having been one to achieve instant familiarity with all the conveniences that modern science provides, I have only just effected a truce (of sorts) with our microwave. I still jump aside, though, when pushing the "start" button to avoid being zapped by gamma rays.

But my main complaint is that the aroma of dinner cooking that used to tantalize for 2½ hours lasts only a brief 2½ minutes—hardly enough time to start salivating. You might ask why we're talking about microwaves when the real topic is computers. . . Well, as I see it, computers and microwaves are part of a vast conspiracy to take all the fun out of life. Did you know you can now type a rough letter (without your dictionary and thesaurus), place it on a copy machine hooked up to a computer and it will spit out a perfect letter—no misspellings, no wrong words, fully punctuated? Well, it just so happens I enjoy chewing my pencil to the nub while I agonize over dangling modifiers. I want to be able to start a letter with a "Howzit, Brah" and know my computer won't think I'm talking about underwear.

I must admit, however, it's hard not to be impressed by the new systems they're making for architecture. A top-of-the-line CAD system can take a written program, pull up component parts that represent a type of building such as "block-wall midrise office building not to exceed $54/sq. ft." and make it look like Michael Graves's latest creation. At the same time it's beginning to lay out the construction documents. You can decide at any time to move a door or a window and the computer will make all the corresponding changes on all elevations, sections, details and construction documents. The only component that seems to be lacking in the computer family is that all-important factor . . . charisma.

However, to stay competitive, architects will have to embrace these contemporary tools. It's just getting over the learning period that's tough. A quote I saw in my son's school the other day that seems to sum up the whole computer issue: "If you think education is expensive, you ought to try ignorance."

journal of the hawaii society/ american institute of architects

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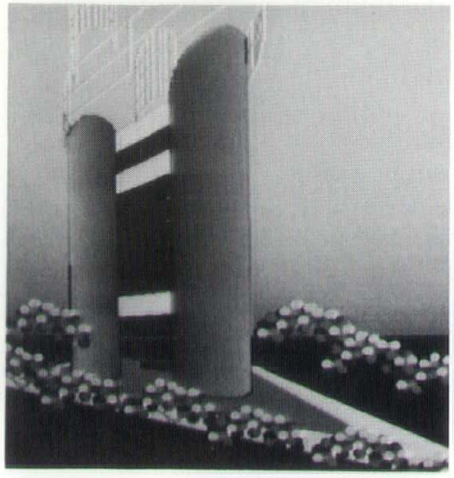
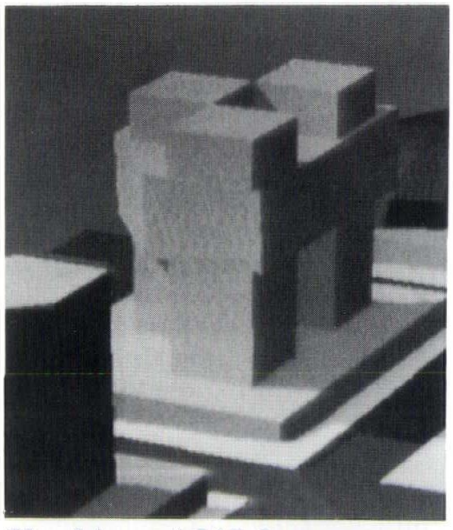
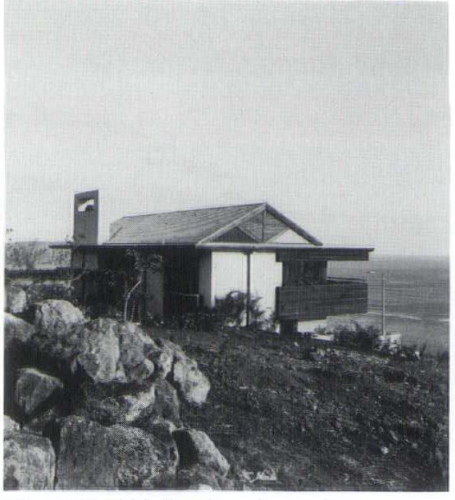


Cover:
A two-dimensional plan was combined with a two-dimensional elevation to automatically generate a three dimensional computerized perspective wire-frame plot. Color was added electronically. The plot was obtained from Dennis Hirota's Digital Equipment Vax 11/780 with a Jupiter 7 display.



25. *Advanced CAD Systems*



36. *HS/AIA Design Awards*

HAWAII ARCHITECT

April, 1984 **Volume 13, No. 4**

FEATURES

LAURELS

DEPARTMENTS

NOTES

June 4-7 Set for A/E Systems '84 Exhibition in Baltimore

The largest gathering of designers in the world.

A/E SYSTEMS '84, the fifth annual conference on automation and reprographics for design professionals, has announced a wide range of programs geared specially to the needs and interests of architects. The programs are part of the A/E SYSTEMS '84 exhibition at the Baltimore Convention Center, June 4-7, 1984, the largest gathering of designers in the world.

Basic and advanced computer graphics, computerized project management, marketing and the management of architectural CAD systems are among the subjects to be covered in a series of three-hour, in-depth tutorials. In addition, more than 60, one-hour seminars will be held to address specific issues, including purchasing software, maximizing the efficiency of systems, applying computers in small offices, and the executive's role in automation. Speakers will include architects, management experts, facilities managers and representatives from the computer industry.

"The programs were planned to offer valuable information to firms of every size and level of computer experience," says George Borkovich, A/E SYSTEMS '84 conference director.

In addition, Thursday, June 7, is officially designated Architects' Day at A/E SYSTEMS '84, and will feature a day-long program on "Computers in Architecture," sponsored by the Maryland Society/AIA. The AIA Committee on Computers is also expected to hold a committee meeting during the show.

On the exhibition hall floor, more than 600 booths will house the displays of the full range of manufacturers, suppliers, organizations, and consultants from around the world who serve the design professions.

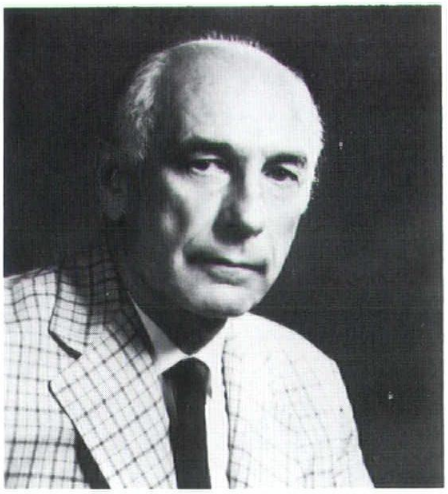
A/E SYSTEMS '84 is sponsored by A/E SYSTEMS REPORT, a monthly newsletter on automation and reprographics in professional design firms. For information on the show, contact Carol Gosselin, A/E SYSTEMS '84, P.O. Box 11318, Newington, CT 06111, (203) 666-1326.

Whisenand Receives Posthumous Award

Architect George V. Whisenand has received posthumous advancement to the College of Fellows of The American Institute of Architects.

Whisenand's medal will be awarded at the 1984 AIA National Convention in Phoenix, Arizona, May 6, at which time other Fellows will be invested.

Fellowship is bestowed for notable contributions to the advancement of the profession of architecture. It is the highest honor the AIA awards any member with the exception of the Gold Medal, which may be presented to an architect from any nation.



George V. Whisenand, FAIA

New HA Editor Karen St. John.

New Publisher For Hawaii Architect

Over the last few months, *Hawaii Architect* has been going through a period of transition changing editors and publishers. In February, PMP Company, Ltd. assumed editorial responsibility naming Karen St. John the new editor, and this month, PMP Company became the new publishing company with Peggi Murchison, president of PMP Company, the new publisher.

We thank Karen Gates, previous editor, for her guidance and help in making the transition a smooth one, various employees of Crossroads Press for their cooperation and particularly the Hawaii Society AIA Board of Directors for their confidence in PMP Company, Ltd.

We have begun this exciting new venture with a larger issue, use of four colors and lots of interesting articles on computers. Over the next few months we plan to cover such topics as historic preservation, airport design, art in architecture, lighting design, affordable housing, landscape architecture, and much more. Our goal is to provide interesting, informative articles on subjects that are of interest to you our readers.

If you have ideas to share or articles, preferably with photos or graphics, to contribute, you can contact Karen through the AIA office or PMP Company at 621-8200.

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Established as a professional school in 1980, the School of Architecture at UH Manoa seeks to provide Hawaii's future design and construction professionals with a quality education in architectural principles, with emphasis on their application to Hawaii's unique physical and cultural environment. The School is also deeply committed to research, particularly with regard to architecture for the tropics, and to continuing education for professionals in the community.

The supporters listed above made contributions to the University of Hawaii Foundation in conjunction with the Great Hawaiian Pumpkin Party. The funds will serve to enhance the Architecture Program at UH Manoa by providing for facilities upgrading, new equipment and library acquisitions, honoraria for distinguished visiting educators, support for students and faculty attending conferences and continuing education for the community professional.

Great Expectations

Looking at the benefit/cost ratio of computer systems.

by Eric Schreuder

Computer systems are introduced into architectural offices in the expectation that certain benefits will result, that the benefits will outweigh the costs, and that the benefit/cost ratio achieved will lead to an acceptable return on the investment that is made. The expected costs and how they are structured will be the topic of a future article. This article focuses on how to assess the benefits your firm can expect from computerization.

Increased Productivity

Productivity benefits are achieved essentially by replacing labor with capital. These benefits usually accrue in the form of reduced costs as a result of: reduction in total professional, technical and clerical person-hours required; reduction in the time taken to complete the project; savings in space required for personnel, desks, files, etc.; faster detection of problems before they become costly; and reduction of the routine, clerical tasks in professional and technical staff jobs, and possible replacement of some high-level jobs with lower-level jobs.

Reduced Response Time on Projects

A major benefit of computer use is the ability to complete a project in significantly reduced time. This may result in: the capacity to accept tight-schedule projects that otherwise could not be taken on; substantial reduction in eventual construction cost in an inflationary economy; the ability to redesign on short notice to take advantage of fluctuating costs of construction methods (e.g., steel versus poured-in-place concrete); the capability to make rapid emergency design revisions, minimizing losses resulting from such emergencies; and faster billing to clients, and reduction of carrying costs of unbilled work-in-progress.

Enhanced Design Quality

The design decisions with the largest impact on building costs and quality are usually made early in the design process. As the process continues, it involves detailed refinement of an increasingly "frozen" concept, with decreasing impact on building cost and quality. Most of the design quality benefits of computer use will follow from software applied in the early stages of the design process. Looking at a variety of computer-generated design alternatives and specifications at the beginning of the design process allows you to choose the most cost-effective solution, and reduces the possibility of costly surprises during later phases of design development or construction.

Design quality benefits are considerably less tangible, and less easily measured, than productivity and elapsed time benefits. But they do accrue in the form of a higher level of client satisfaction, and a better competitive position.

Reduction in Errors

Design and documentation of a building involves making a large number of individual decisions, coordinating the work of many different people, and producing a great deal of detailed information. Errors will occur with statistical regularity, in even the best-run design firms. The result is client dissatisfaction, re-doing work, lawsuits, diverted management time, and high errors and omissions insurance rates. So reduction in errors is an important potential benefit of computer application.

Computer use requires a systematic approach to the design process. The machine requires specific data, so your thinking is forced to be logical and precise, rather than general and vague. The computer helps you discover errors before you are on-site, and reduces the possibility of error due to incomplete or outdated information. Effective coordination among many disiplines is enhanced by having a central, correct repository of accurate information.

Enhanced Management Effectiveness

Computer systems can increase the effectiveness of firm and project management by: providing a more structured, controlled information flow; better monitoring of expenditures (for

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 Eric Schreuder is an associate at The Computer-Aided Design Group in Santa Monica, California, where he is a consultant in selection and application of computer systems and a principal systems analyst and software developer. Schreuder is a registered architect in South Africa.

example, by automatically keeping records of time spent in different design development phases or in tracking how much time is spent in structural analysis); closer control of data access and security, which keeps project information separate and accessible only to authorized personnel; achieving greater budget and schedule predictibility by replacing relatively unpredictable human performance with precisely predictable machine performance.

Business Development Benefits

With increasing frequency, sophisticated clients, particularly large corporations and government departments, are making possession of adequate computer capability part of the qualification criteria in design firm selection. Also, many large organizations have, or would like to use, computer-based facilities management systems. A firm that can offer or can interface to such systems, both to obtain data on existing facilities and provide machine-readable descriptions of new facilities, has a clear competitive advantage.

Smoothing Out Peaks and Valleys

One of the most conspicuous facts of life in a design practice is workload peaks and valleys, to which the firm's staffing must adjust. These fluctuations make it difficult to maintain staff continuity. But computer methods may smooth out his effect. Staff not working on projects during an economic downturn can be reallocated to database development and software research and development. The benefits from these activities show up on billable project work at a later date.

Building the Worth of the Firm

A very large part of the worth of a design firm consits of the technical and design knowledge residing in its principals and staff members. This is difficult to protect and retain. When people leave the firm, their knowledge leaves with them.

But databases and software developed within a firm can encode that knowledge in a tangible, protectable form. So an important, long-term effect of computer use is to build the worth of the firm through the accumulation of intellectual capital: valuable data bases, software libraries and procedures.

Analyzing the needs of a firm may lead to the acquisition of an inexpensive small computer or one capable of sophisticated design functions.

Assessing the Benefits

An important first step in assessing the benefits of computer technology is to determine the tasks that may benefit from automation. A simple, yet thorough master plan for computer development can help you avoid problems and deal realistically with the key issues in applying computer technology in your office.

A well-conceived master plan for computer capability development does not need to be extensive or elaborate, but it does need to deal realistically with the key issues. It is helpful to develop an immediate plan, covering a few months of start-up, with precise objectives and a detailed task list; a one year plan, with some broader objectives; and a five year plan, dealing with general long-term goals. All of these plans will have to be adjusted as you go along, but even a provisional plan is a better guide to action than no plan at all.

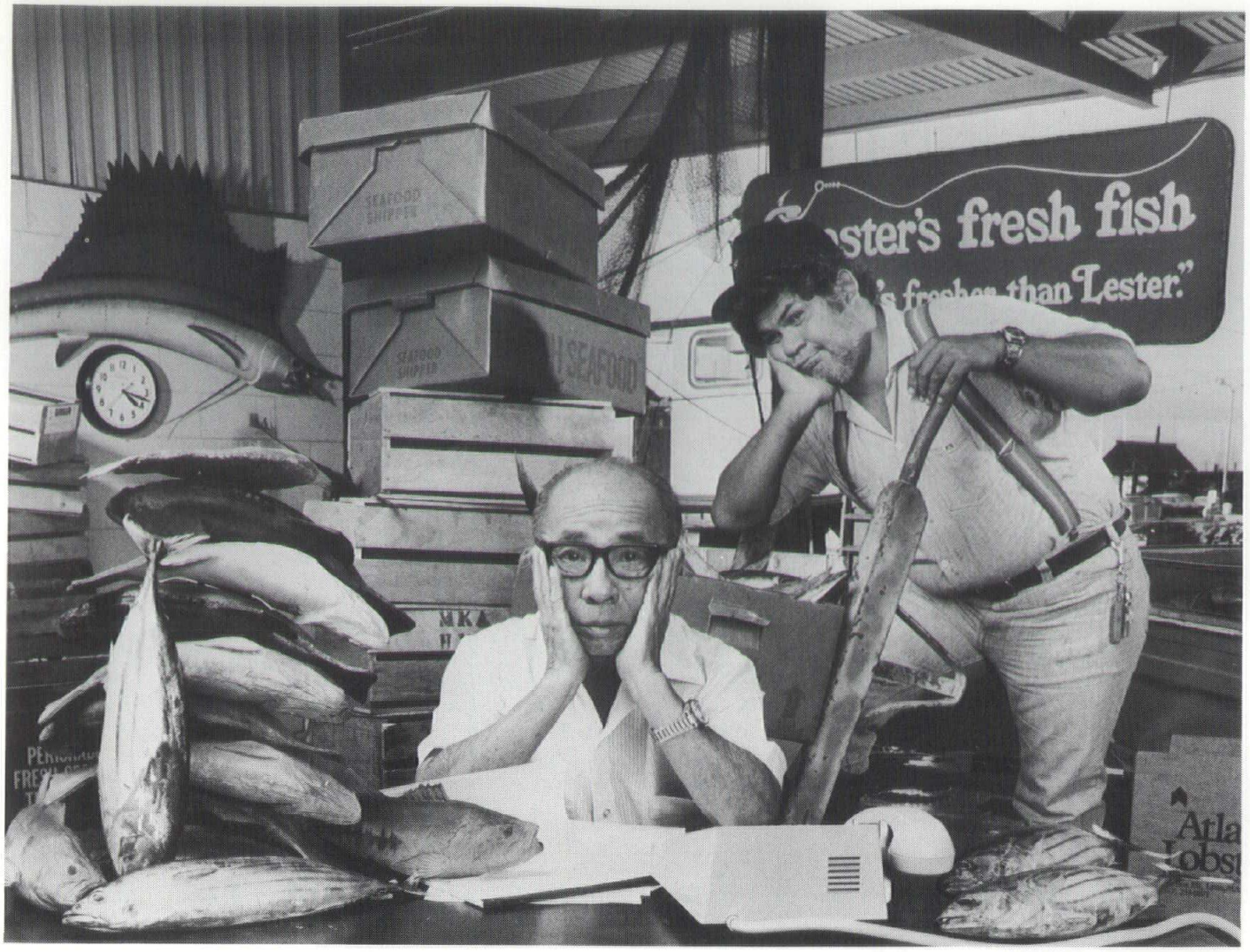
Examine Your Firm

The starting point for planning is a careful look at the firm itself. Who does what job? What tools are used to achieve a job? Where do bottlenecks exist because your staff lacks the correct tool or information? What information has to flow between staff members in order to complete a task? What does each task produce—a report, a drawing? How long does it take to produce this? Where does your staff spend too much time getting too little done?

Take the time to identify how your office works, outlining the firm's size, volume of work, and growth projections; building type and scale specialization (i.e., what sorts of projects are typical?); degree to which related functions such as structural, civil, mechanical and electrical engineering, space planning, and interiors are integrated within the firm; organizational structure (i.e., a "vertical" structure of specialist departments or a "horizontal" structure os teams that carry projects through); established office standards and procedures; staff resources; and financial situation, plans and policies.

Track a few typical projects through the office, to see how various tasks are handled, how schedule and manpower allocations are set, and where the time and effort really go.

Examinations of your firm will yield a list of functions that could



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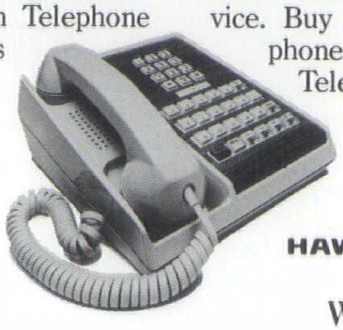

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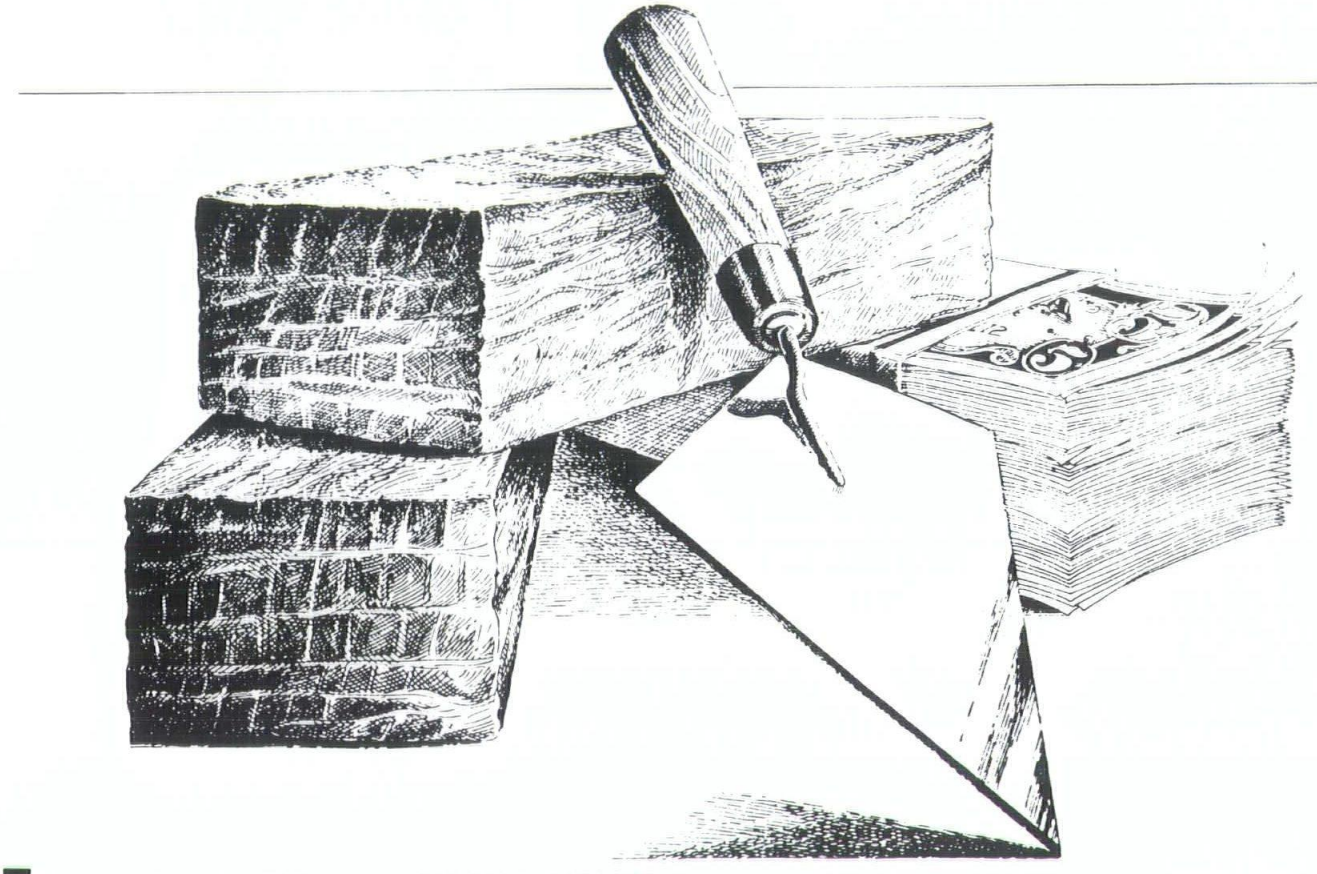

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be automated, such as job cost accounting, payroll, specification production, or drawing. Familiarize yourself with the automation options available in the marketplace by reading computer advertisements and talking with consultants and company representatives.

A cost/benefit analysis will help to develop a list of potential applications and to place them in a priority order. The goal here is to identify those applications providing the greatest return on investment, looking at the ratio of all the benefits (return) to all of the costs (investment) for a given application. This generates a list of applications ordered by the value of this ratio.

Applications having a high cost but also a large benefit (such as CAD) would show up relatively high in the list. Applications having low cost and low benefits (such as some database functions like word processing and data management) would show up in a similar place. At the top of the list would be the items with a high benefit and low cost.

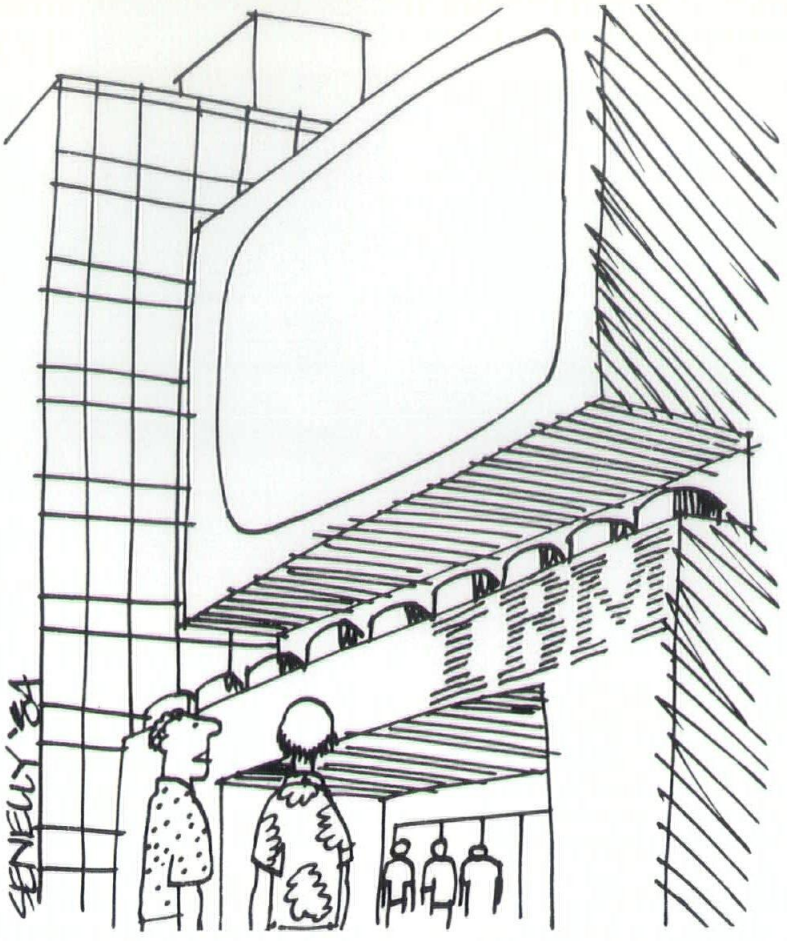
Establish Possible Cost Savings

The final step is to determine whether each function that was identified as being capable of automation will result in a savings. Using the list of possible benefits gained from automating the function, determine the percentage gain in efficiency. For example, are you paying a project architect to do a task a clerical could do with a computer?

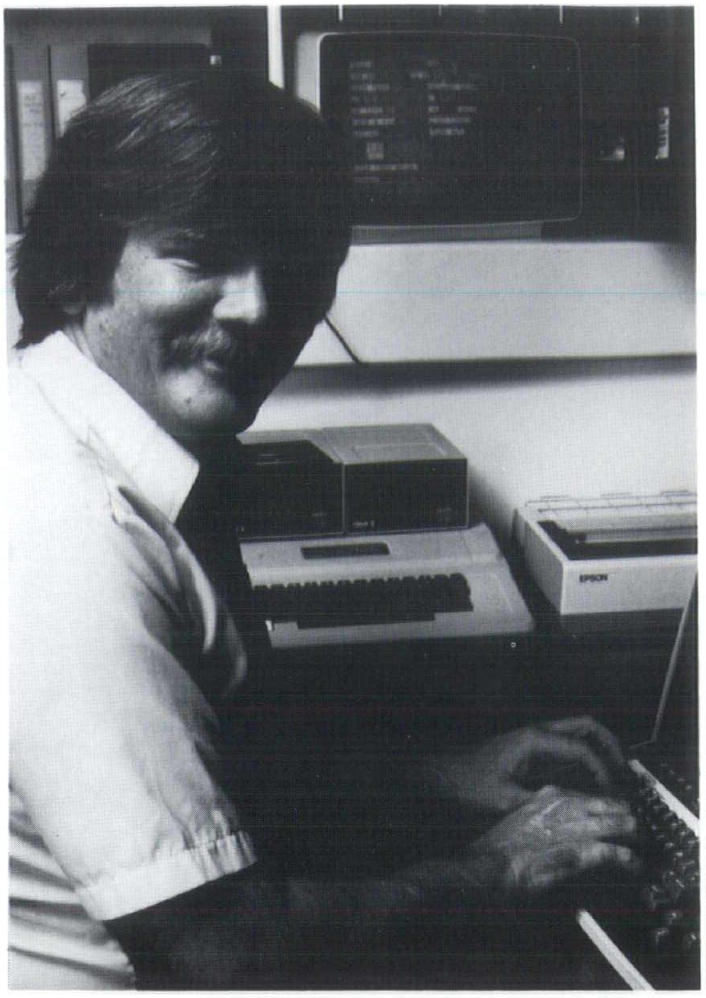
Determine the time taken per year, per function. Does staff time for revising specs, for example, cost more or less than acquiring a word processor?

Then calculate the automatable time per year, the total time multiplied by the automatable percentage. The difference between this and the cost of automatable time will give you the amount of cost savings a computer provides.

Once you have identified potential applications for automation, and have assigned numbers to the possible benefits obtained from automation, the costs of automating these applications will rank them in terms of their return on investment.



"IS THIS WHAT THEY MEAN BY COMPUTER DESIGN?"



Peter Jordan is an associate of Media Five Limited where he is Specifications Department manager.

The Computer as a Risk Management Tool

by Peter Jordan, AIA

In some offices the revolution is more of a slow evolution.

There is a revolution taking place in architect's offices. Early reports began more than ten years ago when a few pioneers made glowing claims that few could believe about obscure computer systems. Today it is clear that computers are here to stay. Any architectural office that does not have at least word-processing capability is somewhere between five and ten years behind in implementing applications in the practice of architecture.

The new technology is impressive. High-speed terminals with high-resolution, multi-color displays dazzle designers with animated figures and buildings. High-speed plotters draw accurate plans at any scale faster than the eye can follow. Digitizers, joysticks, and lightpens enable nimble fingers to edit architectural graphics in less time than it takes them to find the right circle template.

In a few offices the revolution is more of a slow evolution; at other firms, many professionals are enduring a gut-wrenching transition into a new way of designing. Still other architectural practices are unaware that anything of significance is happening or are choosing to ignore the events around them, confident the profession will soon settle back into business as usual.

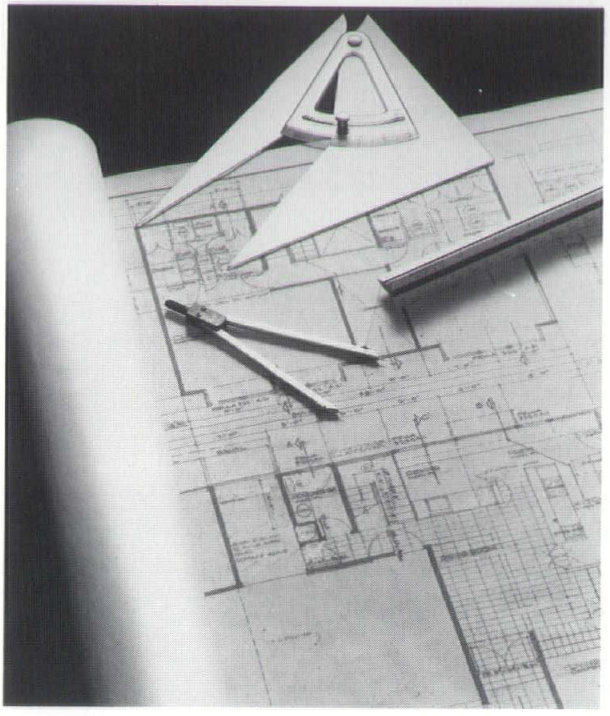
What is the nature of this revolution and how will it affect the practice of architecture? To answer that question, we must understand both the technological developments and the nature of the professional practice itself.

The Technology

An advertisement in a 1975 issue of *Popular Electronics* for a microcomputer in kit form was the first hint of the coming revolution. The company, which had expected to sell only a few of its kits, was swamped with orders. They found a huge pent-up demand among electronic hobbyists for an inexpensive computer, even if it had to be built from a kit. Within three years there were a host of firms selling small computers for a few thousand dollars which could perform limited but useful tasks. You had to cope with instructions written by and for electronic nuts, and there was an incredible feeling of accomplishment when you got anything to run predictably.

Two of the survivors from those years are Radio Shack and Apple. Their computers were not kits, but packaged units that anyone could purchase, take home, and start using right away. In 1979 the program "VisiCalc" was introduced for the Apple II, and some experts credit this with Apple II's success. Many dealers sold Apple II's as VisiCalc accessories. It was IBM's entry into this market in 1981, however, which legitimized microcomputers and pushed the industry from the home into the office.

Talk To The Gas Company Before You Raise The Roof.



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The Best Is Yet To Come.™

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Computers are no longer the province of data-processing departments with their over-cooled rooms, raised floors, and strange personnel. Today it is possible to purchase for less than $10,000 a reliable computer system with a capacity and speed unavailable to all but a select number of large computer installations twenty years ago. In addition, the growth of computers in our educational institutions means that the next generation is likely to regard the presence and capabilities of computers in the same way we look upon automobiles.

Design as Risk Management

How, then, is this technology best applied to the professional practice? We must first arrive at a common understanding of the service that architects provide.

Many architects are not prepared to seriously (or concisely) define what it is that they do. Everyone knows that architects design buildings. They also design furniture, subdivisions, parks, and mobile homes. Many also provide space-planning, graphic-design, and interior-design services. In fact, the profession is generally confident of its ability to provide almost any design service.

Few within it see "risk management" as one of their services, but an insight into the nature of design service may be gained by examining the risks associated with an architectural project.

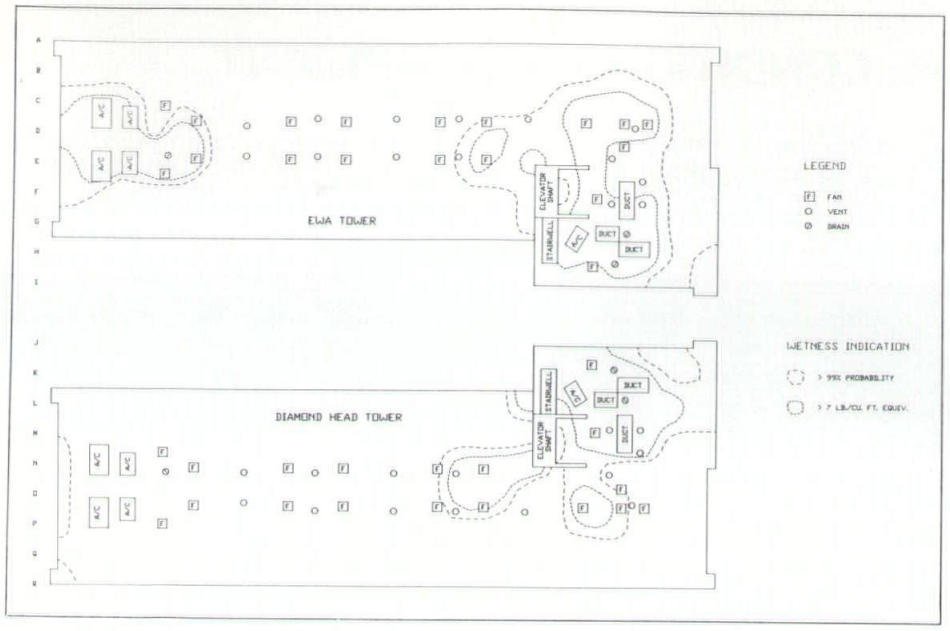
What is risk and why should architects be concerned about it? What does it have to do with design services and computer technology? Consider the following situtation: the owner of a small business decides to take a big step and build a building to house his growing business. He does not wish to run the risk of winding up with a building which hampers his operations, leaks, and whose appearance is the laughing stock of friends and business associates, so he immediately takes certain steps toward reducing the risks associated with his project. He hires an architect.

"What does risk have to do with design services and computer technology?"

The Architect's Responsibility

The businessman may have only a vague idea of the potential failures in the building program—leaky roofs, faulty structure, poor functionality, an ugly building—but he believes that retaining an architect will be an action which will significantly reduce the risk of building failure. This small business, perhaps without being conscious of it, is attempting to manage its risk by hiring a professional.

As more and more activities become highly specialized, organizations are becoming more likely to turn over a specialized task to a firm with expertise and experience in executing those activities. Architects have long taken the position that licensed



This moisture-survey plan was generated by a computer. Courtesy Gamma Corporation.

architects are uniquely qualified by education and experience to provide design services for buildings, and many states have laws which forbid a person to practice the profession of architecture without a license.

Obviously, then, architects are obliged to exercise their professional duties within a reasonable standard of professional care. (Legal processes have held that standards of professional care are somewhat higher than normal standards of care.) It can also be expected that this small business client may have a very high expectation of the level of professional care that an architect will take with his project. (A recent survey in Hawaii showed that the general population had a higher regard for architects than for any other profession.) The client wants protection from risks that can only vaguely be imagined and believes that the architect is uniquely qualified to reduce and manage those risks for his project.

Too often, though, the architect's response is to limit architectural liability rather than reduce the client's risk of failure, which action may directly conflict with the client's expectation of the architect's services. In retaining professional design services, the client may reasonably expect that his risks are the ones being managed, not necessarily the architect's.

Increased Options

Historically, architects have designed with quantities of pencil and paper. Design could spark directly from imagination at the first stroke of a fat pencil, but more often good design was the product of trial and error sharpened by experience. One overlay shifts a wall here, the next articulates the fennestration a bit more. By an iterative process of experimentation and analysis, the design moves forward toward a satisfactory solution; one more option may produce a solution which will be just that much more satisfactory.

This iterative process can significantly reduce the risk of project failure on the part of the architect, but there are often time or budget constraints which limit the process. One or two major options are usually examined and the "better" solution is selected for refinement. Under these constraints, then, is the architect maintaining a reasonable standard of professional care. Is the design selected the best solution for the client or merely the best under the circumstances and is that good enough?

Historically, such procedures have generally been adequate, but the new technologies relieve the professional of the burden of the mechanical and iterative process and allow him to concentrate on the creative end.

Once programed to perform a certain task, the computer will execute that task quickly and will cheerfully (if that term can be applied to a machine) repeat the activity with new data until instructed to stop.

A tedious set of calculations which might take a careful person a day to perform and document can be done in less than a minute and printed in less than five.

With the right system and a capable user, the speed of the design process can be radically increased. Architects may use the system to produce projects in less time or to produce projects of a higher quality. This advantage when used properly can significantly contribute to the reduction of risk not only on the part of the architect but on behalf of the client as well. The architect can enhance the quality of design services by increasing the number of iterations which can lead to a higher quality of design solution.

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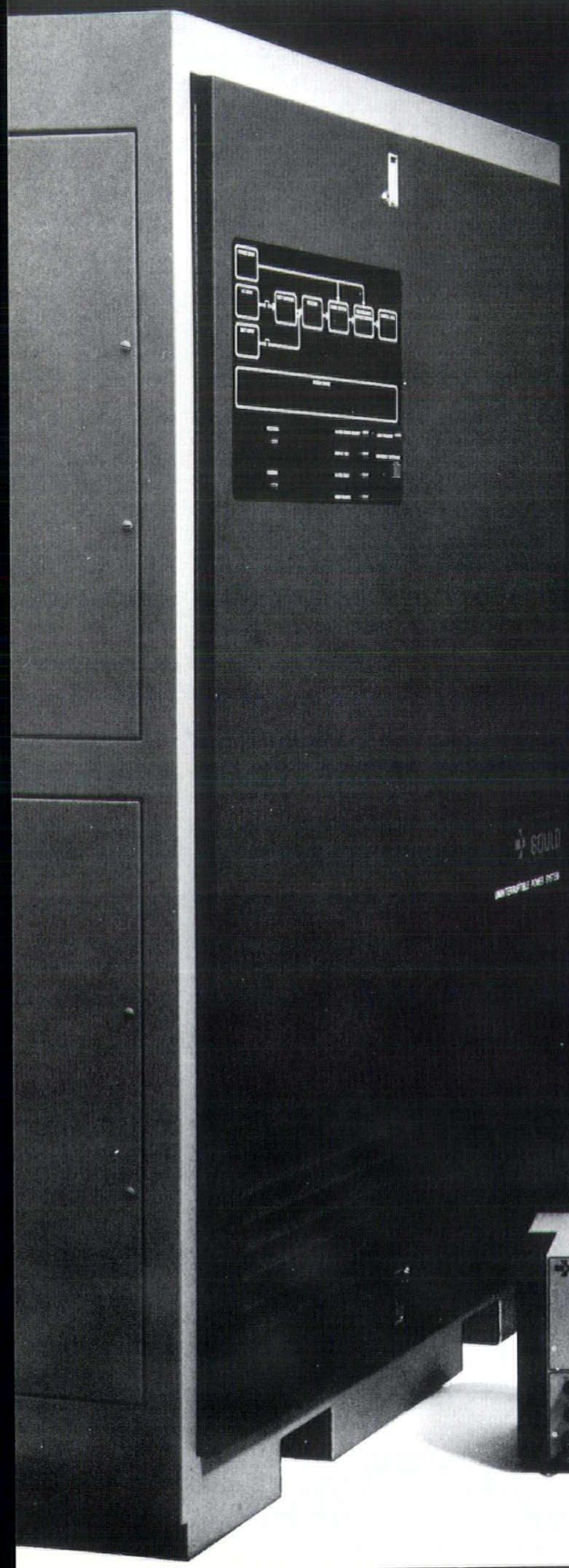

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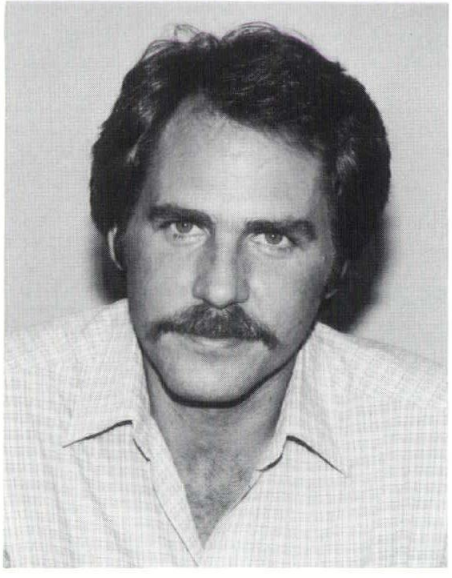
General Manager

CAD can accomplish repetitive tasks with consistently high quality much faster than manual drafting.

Implementation and Management of a CAD System in an Architect's Office

by Roland D. Libby, Jr., AIA



Imagine preparing a presentation site plan for a 200-acre project. Freehand rendering of extensive grassy areas could easily take days. With the right computer and the right software, you can call up an "area fill" and complete the job in four minutes.

Since the production of contract drawings for most projects represents the largest portion of the architect's fees, expenses and professional liability exposure, it makes great sense to examine CAD (computer-aided design and drafting) as a method to increase productivity, profitability, and quality control. CAD can accomplish repetitive tasks with consistently high quality many times faster than manual drafting. Once an office transfers its drafting and calculating to the computer, design and think time can be maximized. Options and alternatives can be explored easily; concepts can be fine-tuned and additional proposals developed. As a step further, consultants can be linked by a common CAD system. This will make the transfer of drawings and information instantaneous and will promote the concept of a true A-E team.

Best of all, from the client's standpoint, CAD permits rapid revisions, allowing more alternatives to be studied and explored.

To take advantage of such capabilities, Aotani & Associates has recently expanded its computer applications to include graphics and drafting. The packaged system acquired by the firm, Hewlett-Packard hardware and Holguin & Associates CAD software, consists of two terminals, a central processing unit, a hard-disk drive, a plotter, and a digitizer. Holguin periodically updates the program and provides on-call trouble-shooting; any problems encountered in the system may be duplicated, via modem, with Holguin's service department for immediate resolution.

The H-P Holguin CAD system was selected after much investigation for its technical sophistication, ease of operation, and quick learning cycle. Additional considerations included the compact area required for the work stations and hardware, and an attractive price. While there are far less costly systems on the market, they were determined to compromise speed, versatility, memory, retrieval, and drawing quality. The entry cost for the system—about $100,000—is a staggering lump sum. However, when you think of it as a five-year investment of $1,700 per month,

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Roland Libby was recently promoted to vice president at Aotani & Associates, Inc. He serves as senior project manager, handling client relations and managing the firm's new computer graphics section.

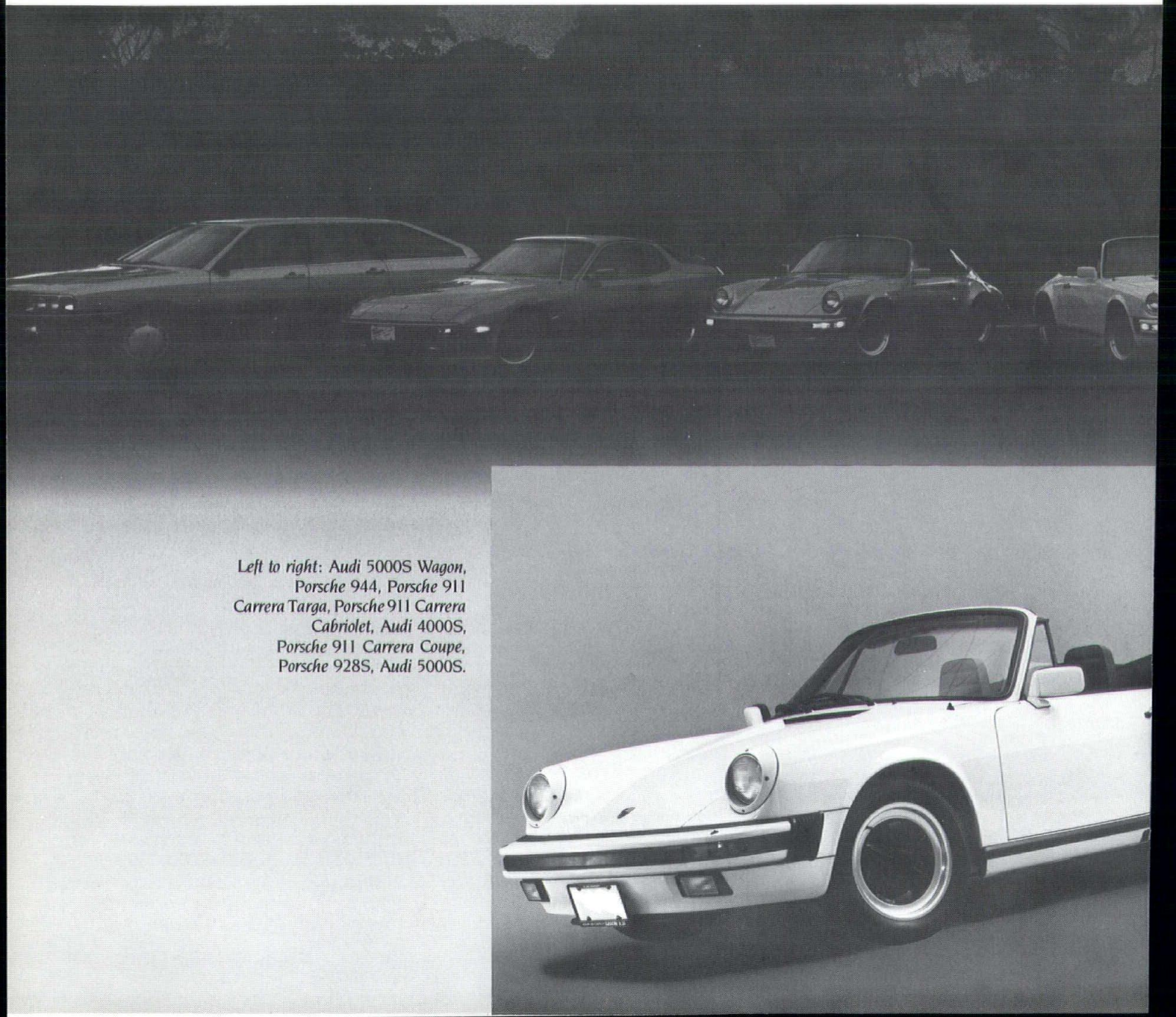
the cost of the system compares quite favorably with the cost of hiring a draftsman at a starting salary of $1,000, plus fringe benefits and raises. There are also significant investment-tax-credit and depreciation benefits.

Implementing the CAD system requires planning, scheduling, distribution of work, quality control and, above all, teamwork. Staff must be evaluated first for professional competency, then cycled through a training program with exact goals and assigned responsibilities. Experience has shown that a good draftsman will most likely be a good CAD operator; a computer whiz without manual drafting skills would be a poor candidate. You don't need to be a computer specialist to use CAD—you only need to know how to operate it.

The drawings to be done must be carefully classified and assigned priorities to determine the optimum flow of information during the assembly process. Planning a set of drawings at the onset of a project goes beyond the "cartoon" or mini-set stage to which many firms are accustomed. Every task within each drawing should be diagrammed with necessary instructions and all modules and derivatives identified.

"You don't need to be a computer specialist to use CAD . . . ."

A senior designer or draftsman should be appointed system manager and team leader to control the investment. Among the responsibilities to assure timely completion and accurate work the single most critical task is to maintain, perpetuate, and protect the data base or library. The library becomes more extensive and valuable the more the CAD system is used. The manager must be the only one with access to security codes to alter modules: changing a module will change every drawing



Left to right: Audi 5000S Wagon, Porsche 944, Porsche 911 Carrera Targa, Porsche 911 Carrera Cabriolet, Audi 4000S, Porsche 911 Carrera Coupe, Porsche 928S, Audi 5000S.

containing that module. The manager must decide how and which drawing components should be saved as modules, which modules should be modified, how often to back-up or duplicate data for safeguarding, and what data should be be kept active or archived.

Perhaps the most difficult aspect of CAD to accept is that the total drawing can only be displayed at a practically illegible size on the 13-inch terminal screen. CAD does not simulate the drafting board. In fact, the computer does not memorize a completed drawing: the computer remembers the components, or family tree, of the total drawing and assembles the parts each time the drawing is recalled. Precise two- and three-dimensional mathematical models are remembered by coordinate points. The principles of CAD are akin to the overlay and "cut-and-paste" photographic drafting methods. Layers of information are created for each drawing from "modules" and their derivatives stored in an electronic filing cabinet. Sets of program functions—construct, draw, edit—are contained in the "menus" that allow the data to be manipulated and tailored to each project. Several draftsmen are able to work on the same drawing at the same time by creating parts that are later assembled to make the whole.

Is CAD a threat to designers and draftsmen? Will they be replaced by operators and machines? The answer to both questions is no, unless professionals choose to ignore the potential of this tool. In the very near future, we can throw away the pencils and the triangles, and let the computer produce perfect drawings at unmatchable speed. CAD is an extension of our practical skills and experience, and can dramatically increase production efficiency, yet it will not supplant human judgement in architectural design, aesthetics, or creativity. Nor can a machine provide the thought, attention, and coordination necessary to manage a project successfully.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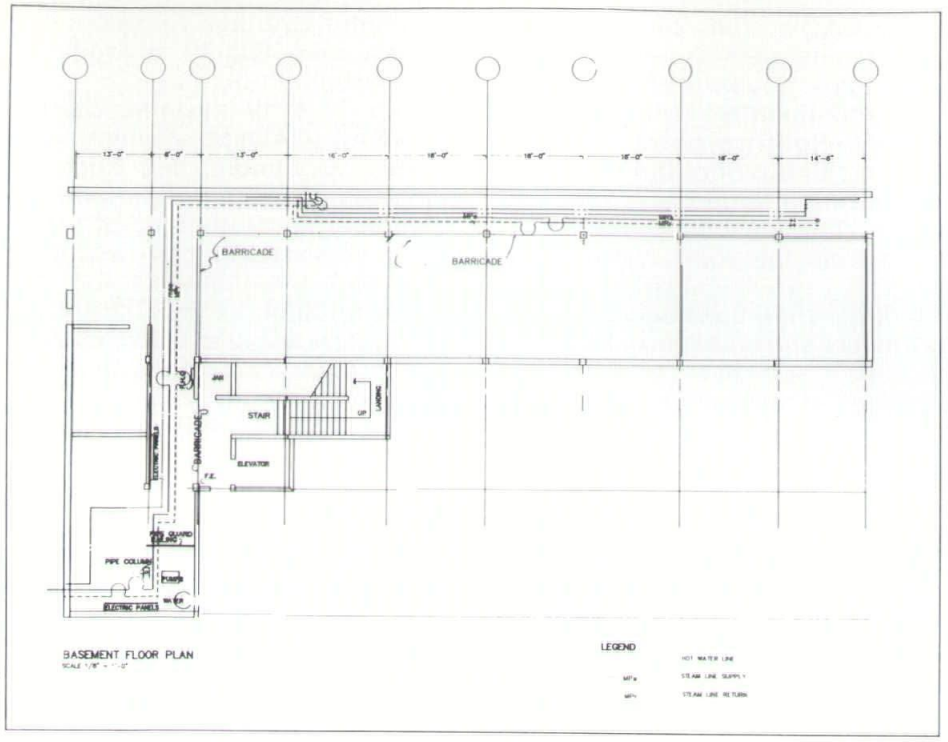


Steam line drawings using AutoCAD by AutoDesk were generated by Clarence Fong, AIA, on an IBM PC.

Low-Cost Computer-Aided Design for Architects

CAD systems are now available for as little as $15,000.

by Ray Tsuchiyama

Computer-aided design and drafting (CAD) is especially useful for architects for first drafting, repetitive symbol insertion, and quick drawing retrieval. However, until recently, CAD has been viewed by architects with what can best be described as a "wait and see" attitude. With a hardware-and-software package from CAD turnkey companies such as Intergraph, Computervision, and generally costing $100,000, or even double or triple that, this hesitance is understandable. Most of the CAD market ($1.2 billion in 1983) has been firms with gross yearly revenues of $50 million, and this kind of investment is beyond the reach of Hawaii's typical small architectural firm.

Within the past six months, however, a startling amount of powerful CAD software for personal computers has been released. Prices range from $250 to $2,000. Owners of general-purpose personal computers (IBM, Columbia, DEC Rainbow, Apple II) can now buy CAD software separately without having to pay for hardware "bundled" with it. This means that a total CAD system can now be bought for as little as $15,000.

Ray Tsuchiyama has recently been appointed marketing manager for Oceanic Properties, Inc., responsible for the Mililani High Technology Park. He formerly was in product development at Island Computer Services, Inc. He spent over four years with Digital Equipment Corporation in Maynard, Mass., consulting on CAD/CAM for architectural and engineering firms.

The System

A typical CAD personal-computer configuration consists of a personal computer, an input device like a Sun-Flex light pen, a Houston Instruments digitizer tablet, or the Mouse Systems "mouse") and a output device (a pen plotter or printer). A graphics processor board is sometimes required to enhance the quality of images on the monitor screen.

The personal-computer keyboard and/or input device can be used to "draw" on the screen. Editing commands allow drawn objects to be moved, copied, modified, erased, rotated, and scaled vertically and horizontally. Repetitive patterns such as lanais and hotel-room beds can be generated automatically. Some CAD packages can retrieve images from a library of drawing parts that have been drawn once and stored. A variety of output devises—from low-cost dot-matrix printers (Epson MX80) to expensive pen plotters (Hewlett-Packard HP-7585)—can be used.

Which One?

CADplan from Personal Cad Systems, Inc., runs on the IBM, Columbia and Eagle personal computers, and has an extensive list of drawing "primitives" (basic elements like lines, arcs, circles, and rectangles). CADdraft, an entry-level CAD package, is a scaled-down version of CADplan available at about half the price.

An especially powerful system is AutoCAD from AutoDesk, Inc., which runs on the IBM, NEC APC, Zenith, and DEC Rainbow 100 personal computers. Ford and Bechtel have bought this package for hundreds of their design engineers, who can now use CAD

at their desks without tying up the department computer. AutoCad is suitable for a wide variety of applications, including architectural and landscape drawings and drafting for mechanical, electrical, structural, and civil engineering. Its ability to create user-defined screen menus via ordinary text files and to define parts libraries simply by drawing them allows it to be easily tailored to each user's specialized requirements.

AutoCAD's full bi-directional zoom facility permits users to work drawings at any level of detail. The programs maintain data internally in full floating-point format, allowing a ratio of over a trillion to one between largest and smallest object. (This means that a user can zoom from the solar system to a desk in the Empire State Building—then back again.) Up to 127 layers and colors may be used, allowing selective viewing or plotting of drawings as if on transparent overlays. An automatic dimensioning facility is available as an option.

From T & W systems comes VersaCAD (CADapple) which runs on IBM, Columbia, and Apple II machines. It has a unique Bezier-curve feature, the method of curve fitting (smoothing) by manipulating two line segments and the curves tangent to their surfaces. This system requires two monitors, one to enter commands and the other for screen display. The Benchmark CAD package (Metasoft Corporation) runs on the IBM PC and the Victor 9000 and allows program customization for architects.

Are You Ready for 3-D?

A few three-dimensional CAD packages have been released, but they are relatively expensive and still not fully mature products. The Micro Control Systems, Inc., MCS 3-D CAD system for the IBM PC and IBM-compatible machines is suited for sketching an idea quickly using a digitizer, cursor control, and/or keyboard. Then the architect can scale, rotate or move the 3-D wire-frame model about any axis. The model can be sectioned along several planes or joined with other components; dimensions are computed and changed automatically.

One question that architects should ask about a potential CAD system is whether the drawings done on a personal computer can be transferred to a larger CAD system. Also, can drawings previously done manually be transported through a digitizer to personal-computer disk storage? A long-running issue is of standardization of symbols so that architects can understand floor plans generated by different systems without first memorizing lists of symbols each time.

Ultimately, the stereotype of the $200,000 CAD system will disappear from the minds of architects. Some features, such as multi-user systems and super-sharp resolution, will be available only on larger computers, but the benefits of microcomputer CAD—increased productivity, faster results, and less overhead are already within reach of every architect in Hawaii.

Advanced CAD Systems

Computers that generate, manipulate and color three-dimensional architectural models.

by Dennis Hirota, Advanced Abacus, Inc.

Advanced digital technology is continuing to help architects in all phases of design work.

Three dimensional views of buildings, landscape and interiors can be generated automatically. The design professional can now have virtually a limitless capability for creating and manipulating complex, shaded surface color building and terrain models.

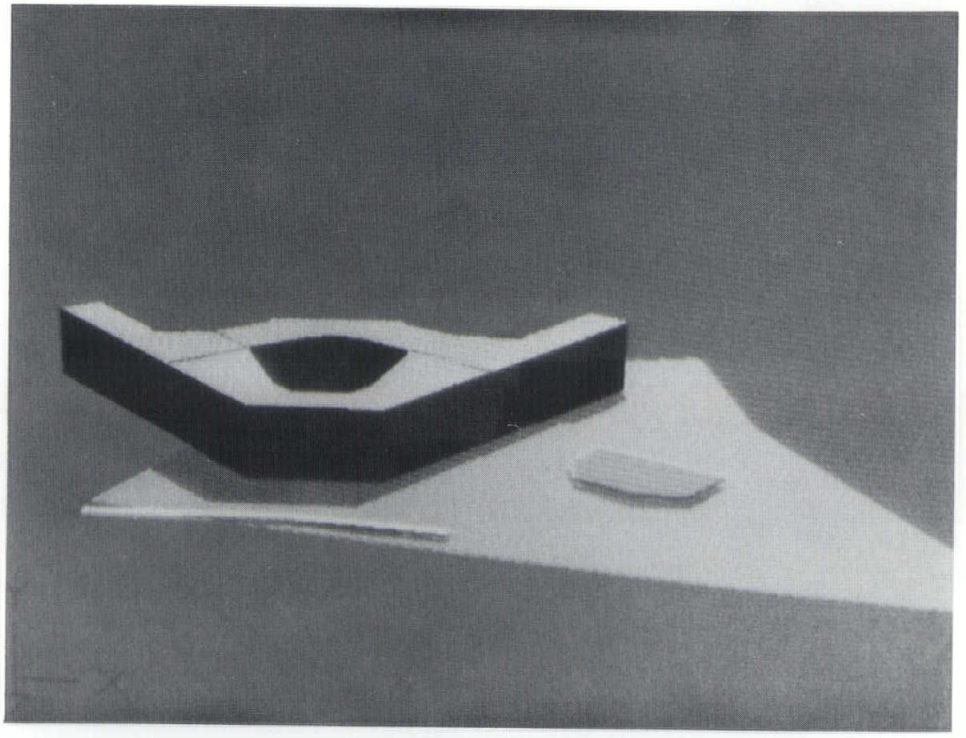
The information for these models is obtained either manually from design drawings or automatically from CAD information. The output is automatically electronically rendered or used directly with the hidden line, surface removal, smooth shading of surfaces and shadow generation by multiple moveable light sources. User input controls the material type such as a 'glass' to create transparent glass walls and partitions.

The advantage of this technique is the automatic generation of surface shading/smoothing, hidden line/surface removal and shadows for many different views once the basic geometric information is stored. The major problem with these types of programs is the requirement for usually a large, fast computer system to process the information in a reasonable time frame.

Typical applications for solids modeling are 1) effects of shadows on adjacent buildings and landscaping; 2) effects of shadows on siting different uses such as sun bathing; 3) realistic view channel evaluation; 4) siting of new projects in an existing setting.

Currently Sam O. Hirota, Inc. has an electronic painting program which is able to use two and three dimensional drawing files directly from CAD software, such as the A. C. Martin ARCAD program, and electronically add continuous tone color to produce finished renderings. The system is a creative tool which uses an electronic stylus rather than an air brush, pen or magic marker. The system can display on a 19 inch CRT screen, 256 different colors mixed and selected from a palette of 16.7 million possible color values. The colors are selected, modified and mixed interactively. This allows the continuous tone shading effects which are not available on less expensive systems.

The value of the technique is in the flexibility and ability to mix and change color composition instantaneously as well as move different areas on the drawing to



Shadow studies done on the computer allow architects to quickly explore multiple options. Here a computerized shadow study aids in locating a hotel swimming pool. Photo courtesy of Dennis Hirota, Advanced Abacus, Inc.

other locations without the problem of erasing.

Typical applications are 1) all phases of graphic arts design including logos and signage; 2) interiors; 3) finished renderings; 4) color selection. Output from the system can be placed on video tape recorders for walk-through project animation, 8 x 10-inch Poloroid prints and transparencies, 35 mm slides, and ink jet continuous tone plotters.

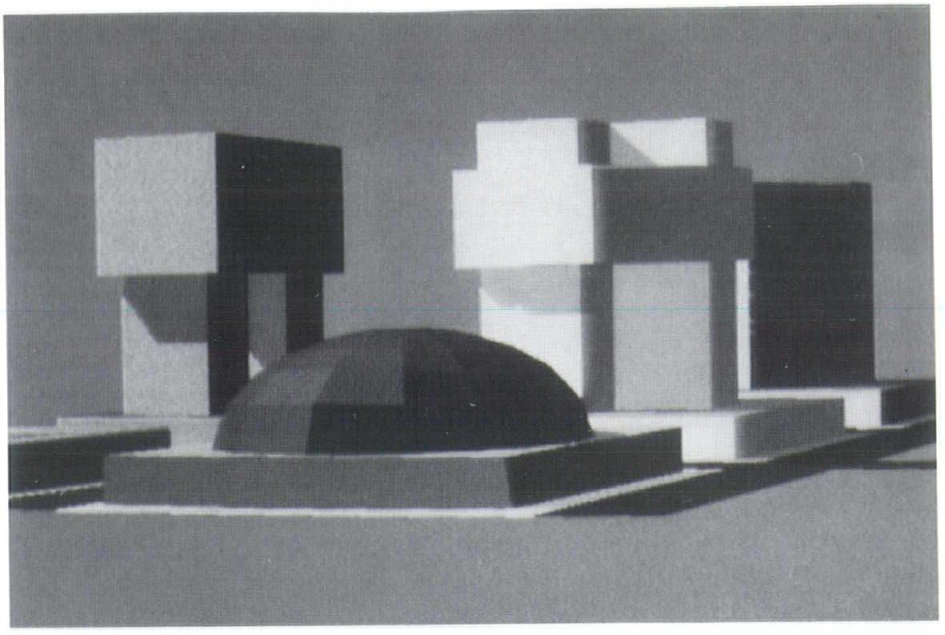
For several years we have had the capability of automatically dialing and transmitting documents by facsimile. Recent introduction of personal computers has allowed the generation of documents locally and the transmission of electronically readable information for proposals, interoffice communication and memos to other local and mainland offices. This has overcome occasional problems with the mail service and the cost of courier service.

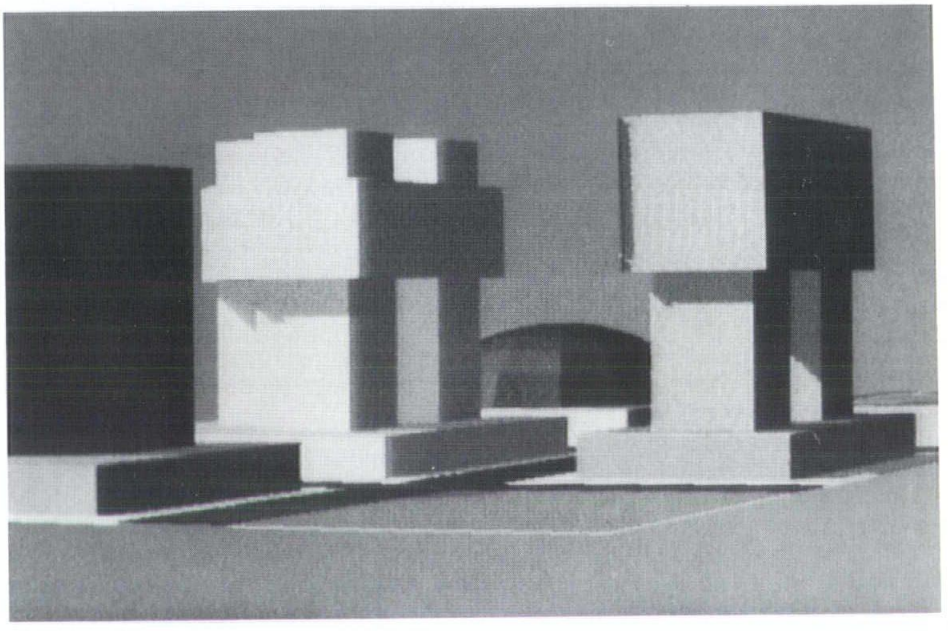
We currently have established the capability of transmission of vector line drawings and color raster renderings over voice-grade asynchronous dial-up phone lines.

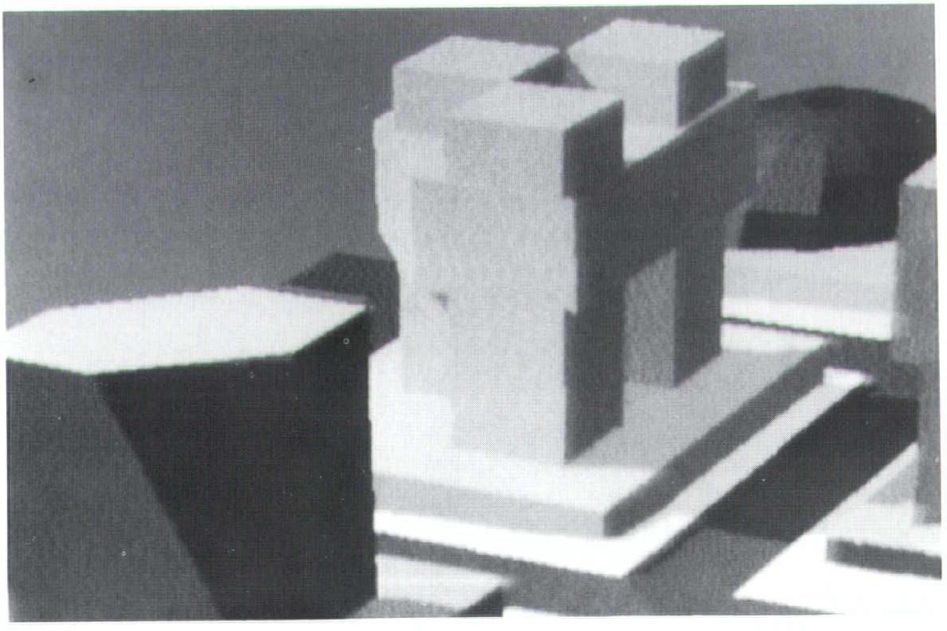
This requires graphic devices at both ends, modems, and preferably intelligent storage devices for unattended transmission. Vector plots of E sized working drawings have been transmitted from Los Angeles to Honolulu. These were generated on a Prime computer system and received unattended by our auto-answer modem on our Digital Equipment VAX system in Honolulu. The plots were sent in approximately 15 minutes using the less expensive night phone rate.

Color raster painting images can be transmitted over the phone lines in about eight minutes.

Computers enable the architect to explore alternatives in seconds instead of hours. High technology allows the design professional to create, illustrate, animate and transmit visual material in minutes.





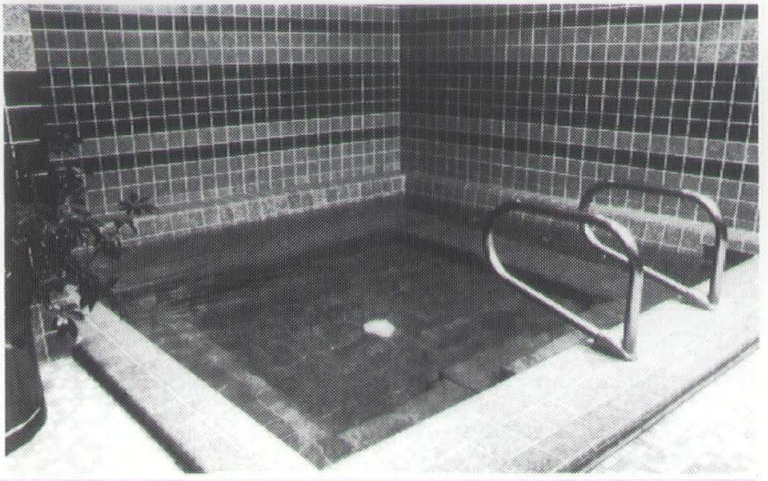


Computerized building massing studies are used for looking at view channels and shading. Buildings can be viewed from various angles. Photos courtesy of Dennis Hirota, Advanced Abacus, Inc.

TWO GREAT IDEAS FOR BETTER LIVING IN HAWAII WITH CERAMIC TILE

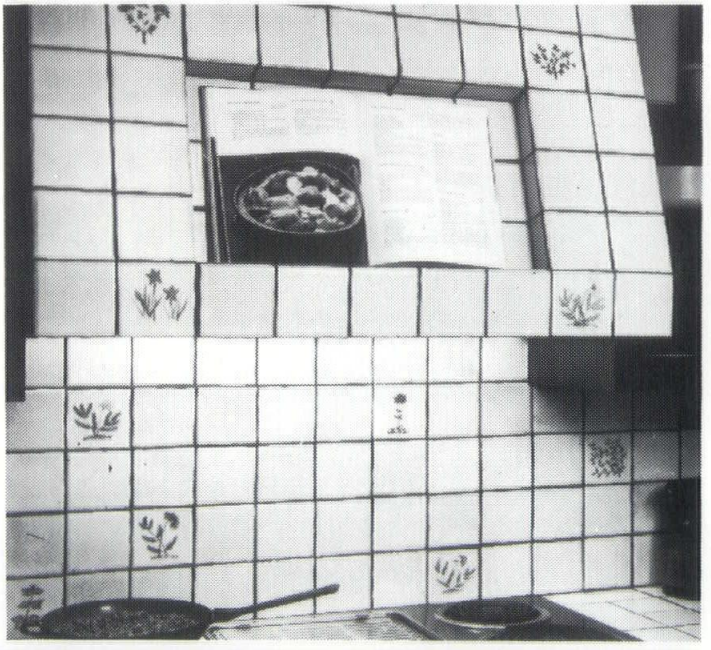
Idea No. 1—Totally Tiled and rated as home pool

This luxury bath with Ceramic Tile in large sunken tub, tub surrounds, floors and walls is small enough for the home yet, with handrails, large enough to classify as a pool — Hawaii luxury living to be sure! Your architect or designer or Ceramic Tile contractor — or all three — can make this Hawaii reality!



Idea No. 2—In kitchen work center, a very special recipe place

Here in country-American style Ceramic Tile covered backsplash and range hood are in the best Provencale tradition, but the idea is American. Note the range hood's built-in nook that keeps the cookbook at eye level and out of splutter's way.



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Teamwork.
Our Motto. Our Method.

THE PROJECT: ***Burger King, Fort Street Mall.*** A fine example of working together to achieve on-time, at-cost results—and in this instance, overcoming the lack of any existing floorplans. This meant reintegration of plumbing and A/C systems. Blending of old and new elements was another challenge. The floor was raised in portions, ceiling lowered and partitions set up to lend intimacy and warmth. Finally, the sidewalk section had to function both as a transition from the inside and as part of the mall proper.

The Team: Rick Conroy—Director of Development of Burger King, Charles Serikawa—V.P. of Production of Allied Builders, Milton Sher—Architect of Milton Sher & Associates.

Allied BUILDERS SYSTEM

We build our buildings just like we've built our reputation. On teamwork.

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Manufacturer of
Solid Oak Parquet Flooring

Hartco The Quality Wood Flooring

Other wood floors are manufactured. Hartco is engineered.

Every Hartco® Solid Oak Parquet 6" x 6" tile is painstakingly engineered to be square within 9/1000". About as square as a square can be. And as square as a floor must be to install quickly and look straight.

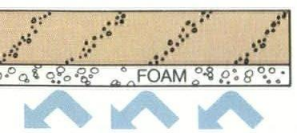
Tongues and grooves are very accurately machined into every Hartco parquet, so the squares lock together tight and hold each other down. And so Hartco won't just pop up the way beveled floors sometimes do.

These tongues and grooves are even precision tapered, so they'll adjust inside the grooves just a little—just enough for the floor to look smooth even when laid over a subfloor with slight undulations.

Tapered tongues and grooves make installation easy.

And every Hartco parquet is available with a special closed cell foam back to protect the wood from the moisture that so often condenses between a warm room and a cold subfloor. The moisture that can cause squares to swell, buckle, and pop loose.

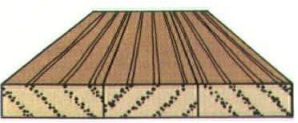
Plus this foam deadens sound, insulates and adds comfort underfoot.



Foam back acts as superior moisture barrier.

Hartco saves time and money at installation because we spend more time at the factory.

Always we use 100% Appalachian oak, an oak prized for its exceptional strength and distinctive grain pattern. Before milling, this oak is kiln-dried and moisture equalized to eliminate uneven expansion and shrinkage. Then, at least 80% of the oak slats are quartersawn for a better wearing surface, even less expansion and more beautiful grain.



At least 80% quartersawn for better wear and less shrinkage.

finishing eliminates costly on-site sanding, staining and sealing—jobs that can really slow you down. And run up labor costs. And Hartco's specially formulated finishing materials and techniques add durability, enhance the wood's natural grain and guarantee the quality, uniform product your clients expect.

Solid oak makes Hartco beautiful. Solid engineering makes it the best wood parquet you can specify.

Hartco Impregnated Flooring with wood back meets the requirement for a Class B Flame Spread Rating (ASTM E-84) and has a Class I Rating for the Radiant Panel Test (ASTM E-648).

This flame retardant product is available immediately at no premium price and does not require special ordering. Like all Hartco Flooring it is completely factory-finished. And available with or without a special closed cell foam

Impregnated, Cambridge color

Heritage Finish, Wheat color

Impregnated Hartco Solid Oak Parquet

Hartco Impregnated Flooring is made to endure, even in the highest-traffic commercial installations. Tough acrylic is forced throughout the pores of this oak, and Hartco's specially formulated stains go all the way through it. So the protective acrylic and color can't wear away. Ever.

And so it's easy to maintain. Just spray regularly with Hartco Professional

back to act as a superior moisture barrier, deaden sound, insulate and add comfort underfoot.

Specify Hartco Impregnated Solid Oak Parquet Flooring when your design calls for oak that's more durable than oak. It comes in Camden, Cambridge and Chesapeake colors.

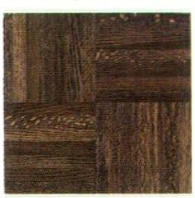
Heritage Finish Hartco Solid Oak Parquet

Hartco Heritage Finish looks like

Impregnated Hartco Solid Oak Parquet Flooring

Camden

Cambridge



Chesapeake

Heritage Finish Hartco Solid Oak Parquet Flooring

Wheat

Bran

Barley

Rye

bare wood, handrubbed to a rich, satin finish.

Specially-formulated low-gloss sealers make this floor exceptionally durable—durable enough for light commercial as well as residential use.

Routine cleaning and polishing is the only maintenance required. Color can be renewed in worn or scarred areas easily with Hartco Professional Color New, an exclusive touch-up stain in colors to match the factory-applied finish. And, after extensive wear, the original beauty can be restored by sanding and refinishing.

Hartco Heritage Finish is available with regular wood back, foam back, or with Par-K-Stik®, a foam back with factory-applied adhesive.

It comes in Wheat, Bran, Barley and Rye colors.

Urethane Finish, Windsor color

Urethane Finish, Old Brown color

Urethane Finish Hartco Solid Oak Parquet Flooring

Hartco Urethane Finish is beautiful, genuine oak made easier than ever to maintain.

After sanding and staining, two coats of tough moisture-cured polyurethane are applied, to protect the wood and to allow for easy care.

The only maintenance required is routine cleaning and waxing. And color can be renewed and refreshed periodically with Hartco Professional Easy Tone, to match the factory-applied stain.

Recommended for residential use only, Hartco Urethane Finish is available with regular wood back, foam back, or with Par-K-Stik, a foam back with factory-applied adhesive.

It comes in Standard, Windsor and Old Brown colors.

Hartco Floor Care Products

Hartco has a complete line of products specially formulated to maintain and enhance the beauty and durability of all Hartco Flooring.

Hartco Moldings

Hartco produces a complete line of moldings, factory-finished to eliminate on-site sanding and staining. Available in colors and finishes to match Hartco Floors.

Hartco Adhesives

When installing Hartco with regular wood back, specify Hartco Professional Wood Parquet Adhesive 80 spread with a Hartco 3/32" x 3/32" x 3/32" square notched trowel.

For foam back Hartco, specify Hartco Professional Wood Parquet Foam Back Adhesive 201 spread with a Hartco 1/16" x 1/16" x 1/16" square notched trowel.

Hartco parquet should be laid immediately after spreading adhesives.

Available in 5, 3½, and 1 gallon containers.

General Installation Instructions

Detailed installation and maintenance instructions are provided in each carton of Hartco Solid Oak Parquet Flooring. Or are available from Hartco's Technical Service Manager.

- Install over:
  - Concrete slabs
  - Plywood or particle board
  - Resilient tile
  - Terrazzo
  - Strip Flooring
  - Sheet goods
  - (without foam backing)
- Leave a ½" expansion space around perimeter and all fixed objects to compensate for possible expansion of the wood. (Large flooring areas may require more expansion space.)
- Cover expansion spaces with Hartco factory-finished moldings.
- Hartco Parquet Flooring can be trimmed with a handsaw, sabre saw, band saw or table saw.
- Install Hartco factory-finished moldings for doorways, fireplaces, sliding glass doors, stair landings or as a transition to other floor coverings.

Urethane Finish Hartco Solid Oak Parquet Flooring

Standard | Windsor | Old Brown

Three Types of Backing

Foam Back | Wood Back | Foam Back with Par-K-Stik

Product Availability

The Hartco brand of Solid Oak Parquet Flooring is manufactured by Tibbals Flooring Company, Oneida, Tennessee, with distributors and distribution points located throughout the U.S.A. and Canada. Hartco's professional national sales staff will help with technical details and specifications. For further information, or for the names and phone numbers of distributors, distribution points and sales people nearest you, please call (615) 569-8526.

Short Form Specifications

Finished floor shall be Natural and Better grade, (state finish), (state color), (state size: 5/16", 3/8", 7/16", x 12"x 12"), (state type of backing), Hartco Solid Oak Parquet as manufactured by Tibbals Flooring Company, Oneida, Tennessee. Parquet to be installed in adhesive recommended by Tibbals Flooring Company, and according to the installation instructions in each carton of flooring.

Available from your Hartco distributor are complete Spec-Data® and Manu-Spec® Sheets for Hartco Solid Oak Parquet Flooring.

Specifier's Technical Kit

Hartco's Specifier Kits are available free to all specifiers. Included in these kits are (1) a 6" x 6" sample (please specify color and type of surface), (2) general product literature and (3) specification sheets.

Technical Service Manager

Hartco encourages and invites your questions about product, specification or installation of our Solid Oak Parquet Flooring and other fine Hartco products. Please call or write:

Hartco
Technical Service Manager
Oneida, Tennessee 37841
(615) 569-8526

PRODUCT COMPARISON CHART

	Hartco Solid Oak Parquet **IMPREGNATED**		Hartco Solid Oak Parquet **HERITAGE FINISH**			Hartco Solid Oak Parquet **URETHANE FINISH**		
COLORS	CAMDEN, CAMBRIDGE CHESAPEAKE		WHEAT, BRAN, BARLEY, RYE			STANDARD OAK, WINDSOR OAK OLD BROWN OAK		
SIZES (inches)	12x12x5/16	12x12x3/8	12x12x5/16	12x12x3/8	12x12x3/8	12x12x5/16	12x12x7/16	12x12x7/16
TYPE OF BACKING	Wood	Foam	Wood	Foam	Foam w/ Par-K-Stik	Wood	Foam	Foam w/ Par-K-Stik
TECHNICAL INFORMATION								
RESILIENCE	Not Applicable	Excellent	Not Applicable	Excellent	Excellent	Not Applicable	Superior	Superior
SOUND DEADENING	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Superior	Superior
SMOKE DENSITY*	65 Class B	30	45	275	275	60	170	170
FUEL CONTRIBUTION*	50 Class B	75	130	155	155	85	95	95
FLAME SPREAD RATING*	70 Class B	95	100	100	100	70	90	90
RADIANT PANEL TEST***	Class I 0.568 W/CM²	Class I 0.630 W/CM²						
FOAM DENSITY (lb. per cu. ft.)	Not Applicable	6	Not Applicable	6	6	Not Applicable	3	3
RECOMMENDED USES								
RESIDENTIAL	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LIGHT COMMERCIAL	Yes	Yes	Yes	Yes	Yes	No	No	No
HEAVY TRAFFIC AREAS	Yes	Yes	No	No	No	No	No	No
FINISH INFORMATION								
APPEARANCE	SMOOTH, SATIN FINISH		SMOOTH, SATIN FINISH			SMOOTH, GLOSSY FINISH		
EASE OF MAINTENANCE	EXCELLENT		VERY GOOD			SUPERIOR		
CIGARETTE BURN RESISTANCE	EXCELLENT		VERY GOOD			SUPERIOR		
EASE OF REPAIRABILITY	SUPERIOR		**EXCELLENT			GOOD		
DURABILITY	SUPERIOR		**GOOD			EXCELLENT		
FADE RESISTANCE	SUPERIOR		VERY GOOD			VERY GOOD		

TEST METHOD: *ASTM E-84, ***ASTM E-648
Hartco Rating — Superior
Excellent
Very Good
Good

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Computers: The Hidden Costs

by Eric Schreuder

Hardware costs are likely to loom large in the mind of anyone about to make a major outlay for computer equipment. But hardware represents only the tip of the iceberg of total costs. The total cost of a computer installation, no matter what scale, is comprised of many items. The relative contribrution of these subcosts to the total usually comes as a surprise to those unfamiliar with the actual costs of acquiring and maintaining a viable computer installation.

Rank ordering the costs in order of their relative contribution to the total cost produces the following list:

- Data Preparation 45%
- Software 24%
- Hardware 16%
- Operations 9%
- Education 6%

Hardware Costs

Hardware costs take the form of rental, leasing or purchase costs of in-house equipment, or are a component of time-sharing or service bureau fees.

Software Costs

Software costs are less obvious to those who are not closely familiar with computer operations, but they may greatly outweigh hardware costs in the long run.

These costs are structured in a variety of ways, depending upon how the software is acquired and from what source. some major options are:

- Purchase costs;
- Royalties and surcharges for use of software;
- Research and development costs;
- Maintenance costs; and
- Introduction costs.

The distribution of these costs varies considerably according to the source of the software. Public domain software is normally available at little or no purchase cost, but maintenance is often poor or nonexistent, and introduction costs are often high. Computer manufacturers' user groups such as DECUS (Digital Equipment Corporation User Society) are excellent sources of this software, making it available to members at the cost of a computer tape.

To keep costs relatively low, consortia can be used to spread purchase and maintenance costs over a number of member organizations. A well-known consortium is CEPA (Society for Computer Applications in Engineering, Planning, and Architecture), which provides excellent software to its members.

Prices for commercially-available software suitable for architects' use is rather high at the moment due to the historic lack of demand and nonexistent competition among vendors. But the A/E market has been targeted by hardware vendors as their fastest growing market, and they no doubt will respond to this by providing more software at lower cost to meet the increasing demand.

Data Preparation Costs

Costs are incurred in getting data into a computer and keeping it current. The first-time entry of data onto a new computer always will involve great expense, and this must be budgeted in any new acquisition.

Education Costs

Education and user liaison costs involve training staff within the firm to use equipment and software, prepare data, and interpret output.

Operation Costs

Operations costs are those associated with people who attend to the computer equipment, enter and edit data, consult to users, and provide general programming support.

Intangible and Hidden Costs

Some costs are not immediately obvious and are difficult to quantify. All computer systems have the potential to go down due to hardware and software failures. Where the entire design process is heavily dependent upon a major computer system, this can be particularly costly since work on a project may come to a halt when the system is down. Costs from this source can be minimized by: carefully selecting and implementing a system; assuring effective and quickly-responsive vendor support for hardware and software; and providing backup systems where appropriate.

Functional Obsolescence

Most hardware becomes functionally obsolete long before it wears out. This means that you should plan to achieve payback on computer equipment investments in a relatively short time—typically three to five years.

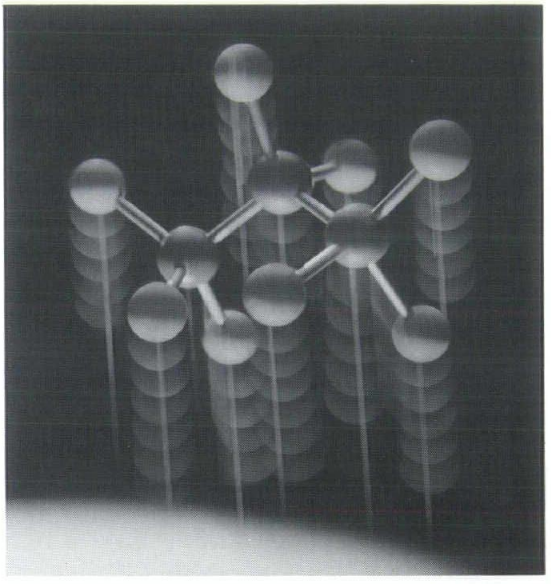
The only safe way to go, from a functional obsolescence point of view, is to consider only equipment from reputable manufacturers who have a proven commitment to the upward compatibility of their products.

Growth Management Strategies

Developing too much computer capability too quickly is not economical. Also, it is very risky to make a large investment before you have very much actual experience using computers. On the other hand, almost any well-conceived, successful computer operation can be expected to grow rapidly. So a strategy of "start small and think big" is in order.

This strategy has two major implications. First, you should not think in terms of a one-time investment in computer technology. Instead, you should develop an ongoing, carefully staged strategy for incrementally building up capacity, and for keeping capabilites current. Second, you should pay particular attention to upward compatibility of hardware and software, so that growth can be accommodated without major upheavals.

When You Come to PRI Energy Systems, The Best Is Yet To Come.



With PRI Energy Systems the best is yet to come because we provide more than just the latest and the best energy equipment available in Hawaii.

We also bring 80 years of energy engineering and experience to all the energy equipment and advice we offer.

PRI Energy Systems includes three divisions to custom tailor our services and equipment to commercial, industrial or residential projects.

Here's how we can help:

1. Residential and Commercial Sales Division

PRI Energy Systems Residential and Commercial Sales Division is Hawaii's leading solar company. A PRI Solar System, with its exclusive SUN-LOK™ solarpanel design, is built to last and can cut water heating bills up to 90%. Another way to dramatically cut water heating costs (by up to 65%) is to install an E-Tech water heating heat pump. We have a full line of commercial and residential heat pumps, including retrofit and integral units.

2. Energy Products Division

The Energy Products Division is the only wholesale energy products company that serves all the Hawaiian Islands. We can provide the variety of products, value and service you can depend on . . . now and in the future. Among our products: Hardwick and Roper gas and electric ranges and microwave ovens . . . State gas and electric water heaters for residential or commercial use . . . Jetglass commercial gas water heaters . . . E-Tech heat pumps, heat recovery units, and swimming pool heaters . . . solar and photovoltaic products . . . and many more.

3. Energy Services Division: Cogeneration

Cogeneration is the simultaneous production of electricity and heat from one fuel source—synthetic natural gas, propane, or diesel—at or near the user's site. Cost-effective and fuel-efficient, it can be a practical alternative for medium-to-large size operations that use electricity, hot water or steam, or air-conditioning. Cogeneration is especially suited to restaurants, hotels, factories, hospitals, condominiums and many other users.

The One Source You'll Need

As a part of Pacific Resources, Inc., PRI Energy Systems has over 80 years of experience in supplying energy for Hawaii. We know Hawaii's unique energy requirements.

No matter the size or type of project, PRI Energy Systems is the one source for all your energy system needs.

Phone 547-3525 for Residential and Commercial Sales Division.

Phone 547-3522 for Energy Products Division.

Phone 547-3357 for Energy Services Division: Cogeneration.

The Best Is Yet To Come.™

PRI Energy Systems, Inc.
A PRI Company

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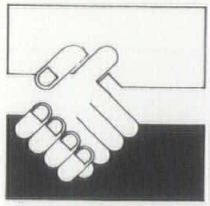


New Members

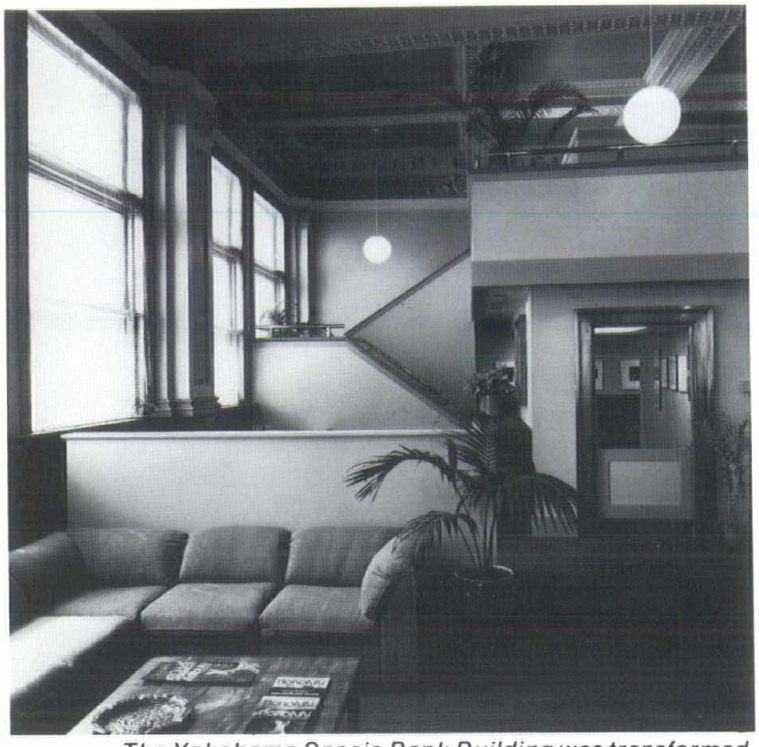
HS/AIA Welcomes Four New Members

DENNIS S. KODAMA, Associate Member, is employed at Boone and Associates, Inc. Born and raised in Honolulu, he received his B. Arch from the University of Hawaii in 1981. His special interests include graphics and logo design, which he does for friends. He also enjoys papermaking, tennis and jogging.

KURT HAUOLI MITCHELL, AIA, received his B. Arch from the University of Oregon. He is currently employed at Gale Kober, Associates. Born in California, he grew up in Hawaii. His wife's name is Peggy. His hobbies include water sports, autos and animal conservation.

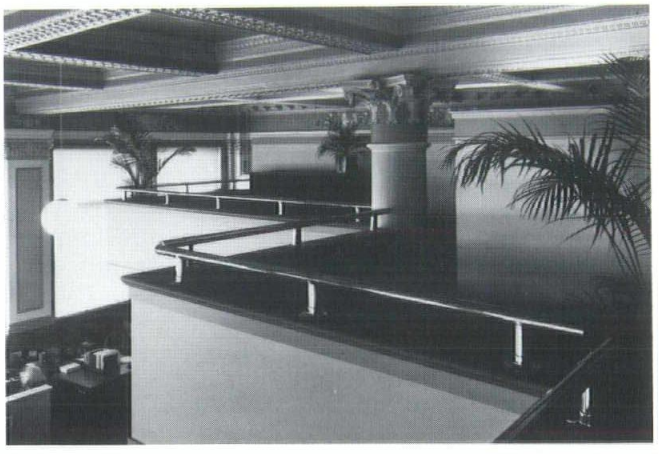
NICK HELMERS HUDDLESTON, Associate Member, received his Masters in Architecture from the University of Hawaii. He also has a B.A. in Geophysics from the University of California in Berkeley, and an M.S. from the University of Oregon. He is currently employed by Elmer Botsai. He and his wife, Pamela, have a teenage son, Matthew. His hobbies are carpentry and remodeling, furniture making and photography.

JOSEPH FERRARO, Associate Member, is in charge of the Interiors Section of the CJS Group Architects. Originally from New York City, he came to Hawaii two years ago. He received his BFA from Pratt Institute. He enjoys flying and has a private pilot's license.



Honolulu Publishing Co. Offices

Spencer Limited



The Yokohama Specie Bank Building was transformed to accommodate its tenant, Honolulu Publishing Co. Ltd. A mezzanine was added and ornamental plaster and other decorative elements were repaired. Photos by David Franzen.

The transformation of the main banking space of the Yokohama Specie Bank Building into offices for Honolulu Publishing Company, Ltd. won a 1983 Hawaii Society/AIA Award for Excellence in Architecture for Extended Use.

The main, first, and basement spaces of the building had been vacant for more than five years because of (1) the high rent required by the excellent location and (2) the poor efficiency of the basement space due to thick vault walls. The spaces had also suffered significant fire, flood, and use-related damage.

The tenant required more space than was in the building and many individual work areas. At the same time the functions had to be integrated despite floor separation. Other requirements included repairing decorative elements (ornamental plaster, copperwork, Italian marble, and ceramic tile) and air conditioning. At least as important was the client's desire to build an association between the Honolulu Publishing name and the pleasant appearance and established image of the building. The budget was limited and project completion was required within five months of the initial client meetings.

The spatial problem was solved by creating a usable basement area, adding a 2,000 square foot mezzanine, and using the courtyard as the employees' lounge.

The basement plan was organized around the old vaults, and a new central stair connecting the basement, first, and mezzanine levels. The areas on the first floor that required privacy were grouped beneath the new mezzanine. The limited head height below the mezzanine required that air conditioning be enclosed in soffited areas over credenza spaces. Lighting and air conditioning the main space was carefully studied to avoid detracting from or defacing the coffered ceiling. The edge of the mezzanine jogs to follow the line of the coffers of the plaster ceiling to minimize intrusion into the main space.

The Yokohama Specie Bank Building was built in 1908 as the Honolulu office of a Tokyo-based international banking firm. Architect H. L. Kerr designed the eclectic brick edifice with elaborate terra-cotta exterior decoration. The first floor interior was originally the main banking floor and was richly treated with ornamental plasterwork, marble, wainscots, and decorative copper doors and windows. When opened it was heralded as Hawaii's first fireproof building.

Architect:
Spencer Limited

Contractor:
Hawaii Western Construction, Inc.

Owner:
Richard Gushman, Gushman & MacNaughton

Tenant:
Honolulu Publishing Company, Limited

IMUA

BUILDER SERVICES LTD.

Artist: Vladimir Ossipoff, FAIA Architect: Ossipoff Snyder Rowland & Goetz General Contractor: Nordic Construction, Ltd

Artist or craftsman?

IMUA demonstrates the close relationship between artist and artisan in this outstanding interior at Honolulu International Airport. We take great pride in the fact that the soaring spirit of this fine design was brought to life through the skilled hands of IMUA craftsmen.

Devotion to quality is one of the many reasons IMUA serves as general contractor for Hawaii's leading architects and developers. Another reason is integrity. Our clients know the job will be completed on time and within budget. And perhaps even endure as a work of art, because we have imbued it with a spirit of our own.

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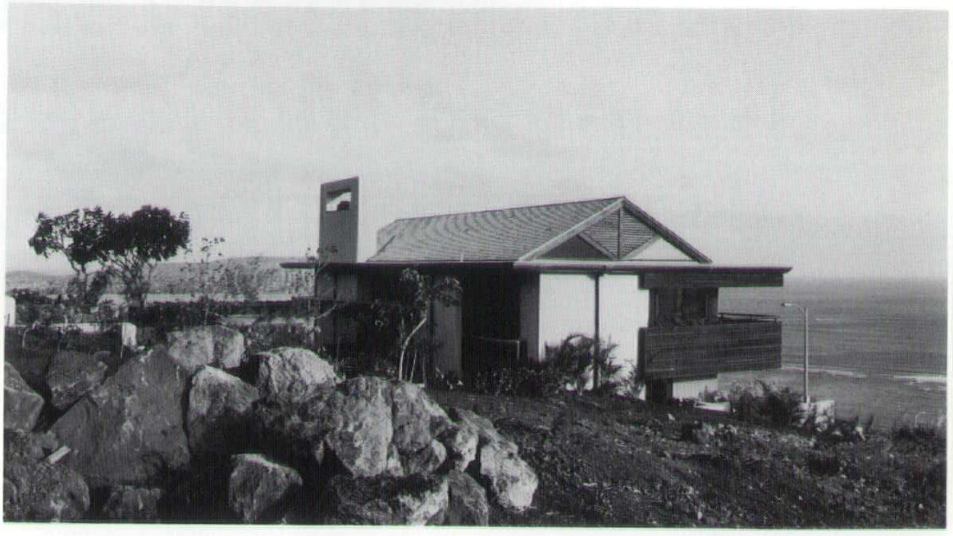
"Specialists In Quality Construction."

96-1282 Waihona Street / Pearl City Industrial Park / Phone: 456-4241

Hawaii Loa Ridge Home

Chip Detweiler, Detweiler/Architects/ Associates

Editor's Note: Our condolences to the family of Chip Detweiler who died on Feb. 4.



A magnificent view can be enjoyed from each room of this hillside residence. Deep overhangs protect against sun and rain.

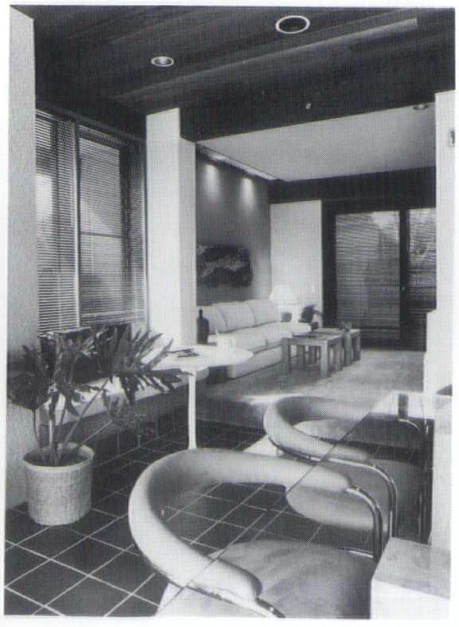
Project:
A single family residence on Hawaii Loa Ridge

Architect:
Chip Detweiler, Detweiler/ Architects/Associates

Interior Design:
Dian Cleve, Dian Cleve/ Interior Design

Owner:
HMF, Inc., James P. Ohlman, President

Photographer:
David Franzen



Space is articulated by changes in ceiling heights and textures and by changes in floor levels and materials.

This dramatic single-family residence was designed to reflect a traditional lifestyle and to take maximum advantage of a rocky uphill site with a magnificent 180° view of Maunalua Bay from Koko Head to Diamond Head.

The steepness of the site and a desire to limit excavation led to the design of a three-level house organized around a central stair tower. This concept minimized the amount of space dedicated to circulation and created a vertical traffic flow that connects all three levels and the terraced garden at the rear of the house.

Both the architect and the owner felt that each room should take advantage of the view, capture natural light, and be protected from sun and glare, so low ceilings and deep overhangs were used on the southwest/ocean side and high ceilings with clerestory windows on the north/mountain side. Louvered windows on the northeast side allow the tradewinds to flow through the house, and the deep overhangs on the southwest protect the living area from sun and winter rain.

The house is of wood frame construction, with vertical piers and concrete block walls finished with stucco. Stone from the site and stuccoed concrete block are used for exterior retaining walls. All the colors used in the house reflect the range of colors found in the field stone.

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Save them 60% to 80% on energy costs with E-Tech:

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- **Heat Recovery Units**
- **Swimming Pool Heaters**

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You're saving them money through lower water heating costs.

And you're making a good profit for yourself through volume sales of the best water heating equipment available.

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E-Tech is the largest water heating heat pump company in the U.S., and all E-Tech equipment carry the strongest warranty in the industry.

Combine this with PRI's 80 years of water heating experience, and the knowledge that PRI will be here to service the E-Tech products you sell today, and you've got the ingredients for a satisfied customer.

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Perfect for commercial or residential use.

E-Tech equipment is designed for residences, multi-family apartments, condos and townhouses, and a variety of other commercial water heating applications.

E-Tech heat pumps, heat recovery units and swimming pool heaters.

An E-Tech Heat Pump saves up to 65% on water heating costs by extracting heat from the atmosphere and using it to heat water. It also discharges cold air that can help with air conditioning.

An E-Tech Heat Recovery Unit uses waste heat from refrigeration systems to heat water and save money.

And an E-Tech Swimming Pool Heater removes heat from the surrounding air and uses it to warm the pool water, saving the pool owner up to 80% in pool heating costs.

Make money by saving them money.

Talk to PRI's Energy Products Division today about any of our E-Tech water heating equipment.

You'll be saving your customers' money tomorrow.

And you'll be making money for yourself today.

For more information, call Rich Johnston at (808) 547-3522, or write P.O. Box 3379, Honolulu, Hawaii 96842.

The Best Is Yet To Come.™

Energy Products Division
PRI Energy Systems, Inc.
A **PRI** Company

The long terrace of this informal vacation house overlooks the seashore.

Kahala Residence

John Hara Associates, Inc.

The problem was to design an elegant but informal vacation house to take maximum advantage of a relatively small lot fronting the seashore. The owner wished this leisure home to have a maximum of open living space, a comfortable master suite, two bedrooms for house guests, and quarters for a caretaker.

From a walled motor court, entry doors open onto a covered lanai between living and pool areas. The living room adjoins a long terrace that faces the shoreline.

Sets of sliding glass doors and screened wooden louvers provide privacy and protection from the weather. The materials used throughout are durable and weather resistant: terrazzo floors, plaster on concrete block, cedar ceilings and soffits, copper roof.

Project:
Kahala residence

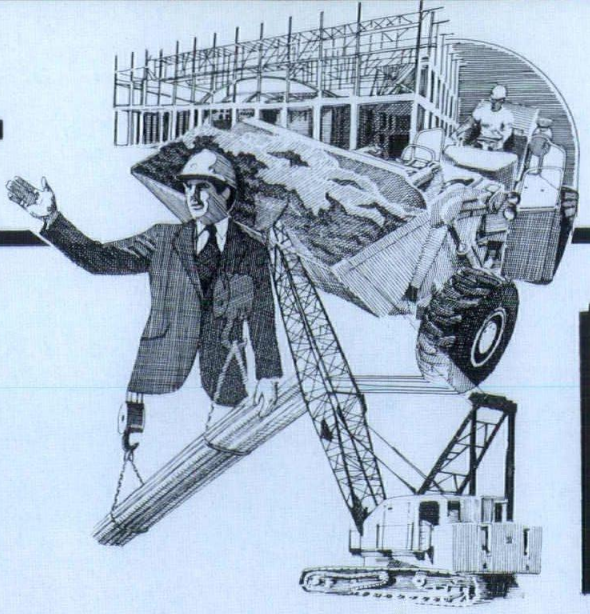
Architect:
John Hara Associates, Inc.

Contractor:
Stadium Carpenter Shop

Photographer:
David Franzen

Durable materials — terrazzo floors, plaster on concrete block, cedar ceilings, a copper roof — are used throughout.

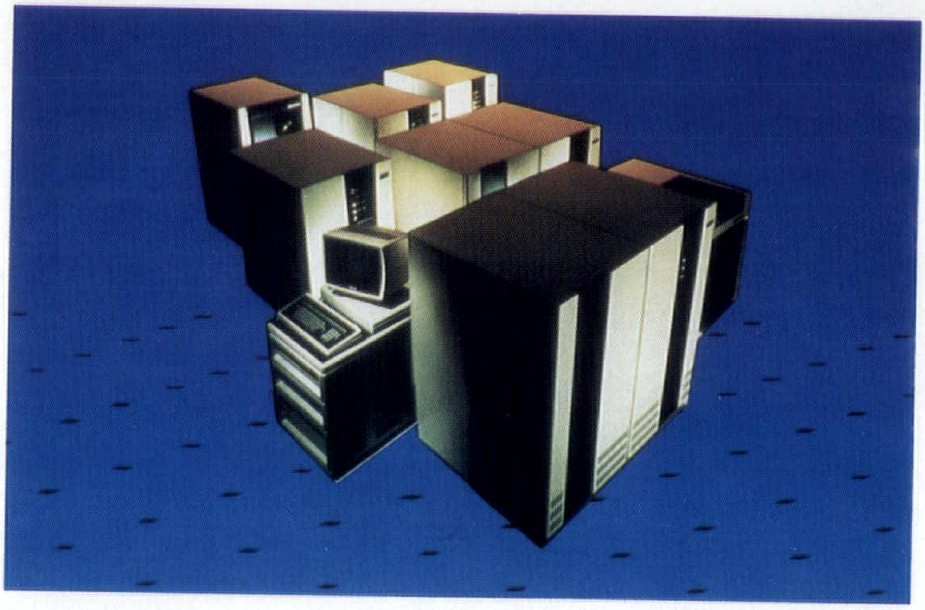
HAWAII ARCHITECT



Services Directory

FREE SEMINAR

Attention Architects, Engineers, Contractors: Novva Computer Systems, authorized Prime distributor, invites you to a free computer-products seminar.



Please R.S.V.P.
Mr. Cary Goldner

NOVVA

NOVVA
Computer Systems
Pacific Tower, Ste. 800
1001 Bishop Street
Honolulu, Hawaii 96813
Phone: 808-521-8011

SEMINAR AGENDA

Wednesday, May 16, 1984

9 a.m. CAD/CAM
Estimating
Project & job cost control
Demonstrations

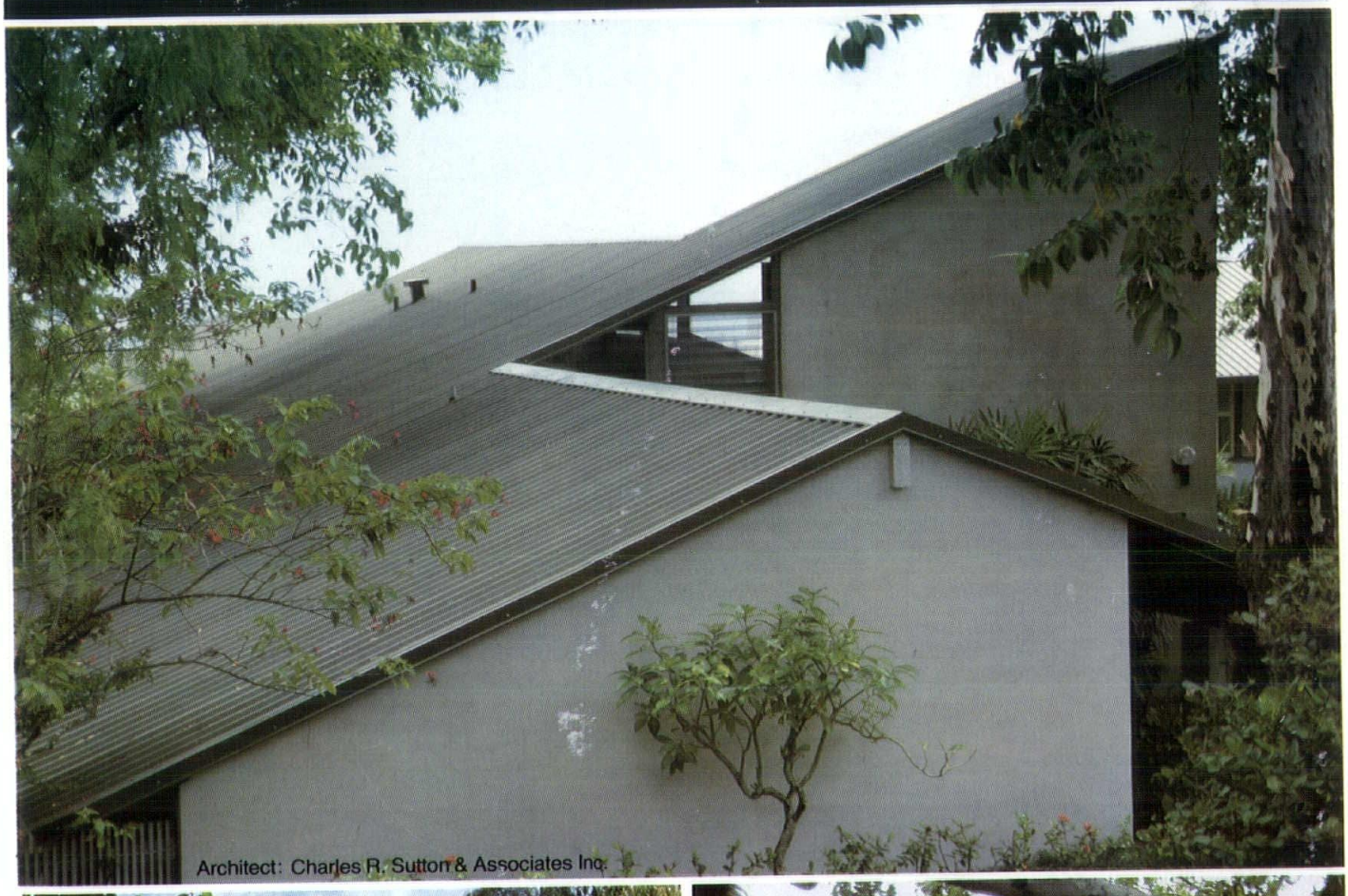
12 noon Complimentary Lunch

1 p.m. Automated Office Systems
Decision Support Systems
Demonstrations

PRIME IS PLEASED TO ANNOUNCE THE OPENING OF ITS OFFICES:
900 FORT STREET MALL
HONOLULU, HAWAII 96813

PRIME

JORGENSEN METAL ROOFING



Architect: Charles R. Sutton & Associates Inc.