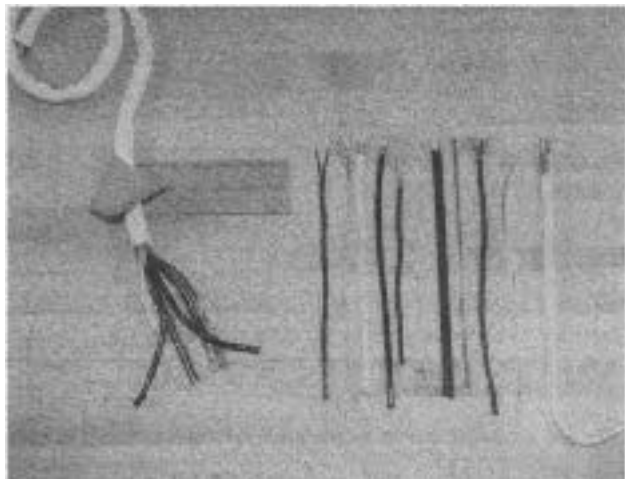# SMART HOUSE

Sweepstakes

The Smart House hybrid cable (left) will deliver power, control/data signals, and audio/video/telephone signals to every outlet in the house. Its simplicity should appeal to today's electrician, who currently must install most of the wiring shown on the right.

As competitors slug it out over systems and standards, most buyers wait at the sidelines

by Kate O'Brien

The promise of an electronically controlled home has intrigued some of us for years, and threatened others. But like it or not, electronic automation is taking shape in today's homes—and builders should take notice—particularly custom builders serving the upper end of the market. A conservative estimate of the market for "smart homes" would be "about one-third of the home-buying public, depending on demographics and location," according to Michael McGrath, Director of Customer Programs for the Edison Electric Institute, (EEI). EEI is the trade association for electric utilities, and a member of the Smart House Advisory Council.

Up to now, home automation has come in pieces—remotely controlled TVs or garage doors, burglar and fire alarms, programmable thermostats, and lamp timers, for example. Practically all household activities—heating, cooking, entertaining, etc.—can be electronically controlled in some way. And recently, several "home-control systems" (see list at end of article) have attempted to combine the controls for many of these tasks.

But the idea of a thoroughly smart home—one that allows communication between you, it, and the appliances within—and doesn't require acrobatics on the part of the electrician or the homeowner, is still only a promise. How close is the home automation industry to these goals?

Smart Schedule

Technologically speaking, pretty close. Most builders by now have heard of the Smart House project. Developed by the National Association of Home Builders (NAHB), and a consortium of electronics and appliance manufacturers, it has been touted as a "revolutionary" concept for two years now. The concept is basically a new way of wiring. In conventionally wired homes, we have ac power cables, low-voltage wiring for such things as doorbells and exterior lighting, thermostat wiring, alarm-system wiring, TV antenna or cable wires, audio speaker wires, and telephone wires. All of these are strung like so much spaghetti behind the walls (or under the rugs). And none of them communicate with each other. In fact, they don't even know they have company, electronically speaking. The Smart House, on the other hand, is wired with a single cable (see lead photo) which will deliver power, control/data signals, and audio/video/telephone signals to every outlet in the house. That means that a homeowner could plug not only the hair dryer or lamp into any outlet, but could also plug a telephone, security sensor, smoke detector, TV screen, TV antenna, and stereo speaker into that same outlet. And because it is electronic and not electrical, the outlet will not be "live" to anything but the item it's being instructed to operate—not to the child with a screwdriver, for example. Some benefits are obvious: simpler installation, safety, convenience. Others promised are energy efficiency, comfort, and communication capabilities.

The first demonstration of the basic technology was at the January 1986 NAHB Annual Convention in Dallas, when two vans (one gas-oriented, the other electric) were used to promote the concept. Since then a lab home has been built in Bowie, Maryland. Built conventionally, the home will be a testing ground for what's called the "breadboard core" system. The building will be uninhabited and full of instrumentation. The Smart Home is not expected to be in full production until 1992. Between now and then, the idea will go through several levels of testing, including prototype testing, demonstration-home testing, and selected production testing. At this last phase, plans are to equip about 5,500 new homes with the system, and sell them to people who like to be on the cutting edge and don't mind being guinea pigs. According to McGrath, the team is right on schedule, and may even beat it. But there are some possible hang-ups, the most important of which is competition.

Going By Bus

It shouldn't surprise anyone that the Smart Home project faces competition from the Japanese. Mitsubishi, for example, is currently working with Cyberlynx (Boulder, Colo.) on a home-automation system. Several homes in California are currently being tested using the system, and commercial introduction is expected soon.

But the strongest challenger is CEBus (or the "Consumer Electronics Bus"). Those familiar with electrical systems will be familiar with the term "bus"—a connector module or interface that distributes power among appliances. That might lead you to think that CEBus itself is a product, but it's not. CEBus (soon to be promoted under the name "Home Products Link," or HPL) is simply a new electronic standard that will make complete home automation possible using conventional wiring. It could have a tremendous effect on the way homes are automated. At least that is the intent of its drafters, members of the Electronics Industries Association (EIA), who have spent almost five years developing it.

CEBus does not require changes in the wiring network itself. Instead it provides directions to electricians, and to manufacturers of appliances, electronic devices, and integrated home-control systems, regarding the signals that will be sent over that network. CEBus offers a common standard (or language) for those signals. Without such a standard, the home automation buyer is faced with purchasing a host of independent systems (separate security, fire, heating, timers, etc.) or waiting for NAHB's Smart House. In short, by providing some electronic rules of the road, it will enable a house to be "smart," with no special wiring and no expensive "core" system. It does allow for a central controller, but it does not require one. Its one shortcoming, compared with NAHB's Smart House, is that it does not offer safety from shock. This is an important factor, since safety ranks high as a feature motivating homebuyers to buy a Smart House.

The CEBus standardization effort began in April, 1984, by members of the Consumer Electronics Group of the EIA, mostly manufacturers of home entertainment products. According to Timothy Schoechle (CyberLYNX), CEBus doesn't attempt to define specific applications, but is an open system, "accommodating any and all likely users for the present and well into the foreseeable future." It isn't restricted by any particular hardware or software, and "leaves as much as possible to the commercial marketplace."

This is not the case with the Smart House system, which is proprietary. The Smart House Limited Partnership
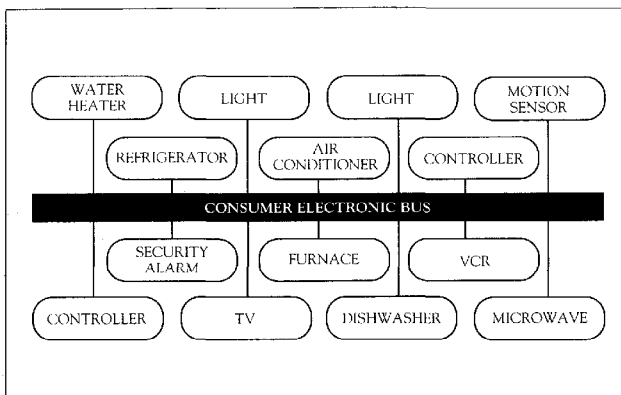
By providing a standard electronic language for common power lines, the CEBus or HPL ("Home Product Link") will provide a way for all of a home's appliances and electronic devices to communicate with each other.

(SHLP is a wholly owned subsidiary of NAHB) intends to charge royalties to people who hook into it. But according to McGrath, "the decision to be proprietary is a management one, not a technical creature of the Smart House, and the group could change its mind."

SHLP may have to seriously reconsider its decision to be proprietary very soon. The first completed draft of the CEBus standard will be released in early 1989, and several brand-name representatives of the electronics industry will be showcasing their new CEBus compatibility at the 1989 Consumer Electronics Show in Las Vegas, and the annual NAHB show in Atlanta (both in January).

Tom Mock, EIA's director of engineering, admits that CEBus may be a threat to the Smart House project, but how much of a threat is unknown. As pointed out above, CEBus will not provide the safety feature which the Smart House promises. In addition, McGrath believes that there will be reliability problems with CEBus. According to him, using the regular power line carrier (not a dedicated line as you would in the Smart House) will lead to mixed messages. With the regular power line "you inject the [communication] signal into the electrical system of your house and hope it gets where you want it to. But suppose a signal is injected at the same moment you turn on the vacuum cleaner...the original signal may never get there. Or something else may get there. This can't happen in the Smart House." McGrath also wonders about apartment dwellers: "Let's say that you and I are living next door in an apartment building, and we share the electrical system. My smart system sends a signal to my coffee pot...what's to keep it from turning yours on?" Although Mock says that the standard provides enough information (by differing frequencies, data rates, signal levels, etc.) so that this kind of problem is "unlikely," McGrath predicts that as many as 15 percent of CEBus-based systems will experience such crossover and interference.

More Smart Problems

Besides direct competition, NAHB's Smart House must jump two other major hurdles if it is to succeed: It must convince appliance manufacturers to "smarten up" their products—soon, and it must educate (or re-educate) those who will use, install, or repair the smart systems.

According to McGrath, the "number one problem with the Smart House Partnership and its outlook for success is the fact that the appliance manufacturers have not jumped on the bandwagon. To make the Smart House really different," says McGrath, "and achieve the home builders' objective of differentiating new homes from existing homes, that's got to happen, and so far it hasn't."

At this point, appliance manufacturers have little incentive to change their production. The new home market represents a fairly small share of the appliance market on the whole and "the idea of building a production line for fairly specialized appliances for a fairly small market has no interest for them," says McGrath.

It's important to note that this is a sticking point for those promoting the CEBus approach as well. According to McGrath, CEBus promoters do have the electronics industry solidly behind them (entertainment, security, etc.) but like the Smart House, it must convince household appliance manufacturers to modify their products. Actually, because CEBus can help automate existing homes, it may be in a

slightly better position than the Smart House to persuade manufacturers to come aboard. At any rate, for both, cooperation from the manufacturers is necessary if the concept of home automation is to be made real.

The switch would not be difficult for some appliances. For example, according to McGrath, the digital Whirlpool refrigerator is already "smart" and would just need a communication chip. But this hasn't happened yet. Only one member of the Smart House's consortium of manufacturers (Lennox) has produced a fully-operable "smart" product so far. McGrath is optimistic, but adds "If a year-and-a-half from now it's still only Lennox doing the heating and air conditioning, and no other manufacturer has come through, then we're in trouble."

The final obstacle is the question of the "human interface." Who is going to fix the Smart House, or properly install the system? Is it going to take a special technician? And will the average consumer want one? The system is not easy to work with yet, but steps are being taken to make it foolproof: such as making it modular, and having connectors that only fit together properly. In addition to simplifying the system, the Smart House project is addressing the problem through education, and is already working with the National Electrical Contractors Association to set up classes to train electricians to work with the new system.

The Smart House market is pretty specific. Although the cost of the system is still not determined, the figures discussed now range from $7,000 to $10,000. Most players agree that that means an upscale market-a market that's already proven its interest in amenities such as security, safety, and convenience, all of which are features of the Smart House system. A survey conducted by Yankelovich, Skelly and White/Clancy, Shulman, Inc. (paid for by the American Gas Association) showed that new homebuyers with computer experience were much more willing than others to buy a Smart House. Like the personal computer industry, the Smart House will have to portray itself as—and become—user-friendly. The project will use its prototype and demonstration homes to determine how best to do that.

What's Going For It?

Despite all these potential snags, the Smart House project does enjoy the advantages over its competitors of built-in safety and greater reliability. In addition, its association with NAHB may make it more acceptable to the average builder and his customer.

Beyond its technological benefits, the main goal of the system is to persuade a home buyer, whether first-time, or move-up, to buy a new home. Builders may choose Smart House because its "brand-name" could provide them with a marketing edge. At this point, it's fair to guess that home buyers will be enjoying some degree of "smartness" in their new homes soon. Whether it is the NAHB's brand or another model will possibly depend more on a number of management decisions (both SHLP's and its competitors) than on the technological merit of the electronically-controlled home. ∎

Kate O'Brien is managing editor of The Journal of Light Construction.

Home Control Systems

The products listed below represent some of the most advanced hardware and software in the home control field. They go far beyond the single-minded garage door opener or lamp timer, and attempt to "smarten" the home without turning it inside out. Some require special wiring, and some none at all. They vary widely in price, capacity, and configurations. We've included some basic information, but for details, please contact the manufacturers directly. Other resources: Home Automation Association, 7315 Wisconsin Ave., Suite 400A-North, Bethesda, MD 20814, 301/961-6533; and *The Electronic House: The Journal of Home Automation,* 56477 Elm St., Mishawaka, IN 46545 ($14.95 per year/bi-monthly).

ADC-1 Data Acquisition and Control System
Remote Measurement Systems, Inc.
2633 East Lake Avenue, Suite 200
Seattle, WA 98102
206/328-2255
Contact: Olinda Turner
Controls security, fire, energy, lighting and selected appliances, and some entertainment (on/off). Equipment includes an ac/dc converter, appropriate sensors, and user's PC (any type). Requires relays for controls (not for monitoring). Costs $449 including the lighting and appliance option.

Butler-In-A-Box
Mastervoice
10523 Humbolt St.
Los Alamitos, CA 90720
213/594-6581
Contact: Linda Zazueta
Controls security, fire, energy, lighting and selected appliances, and entertainment. Equipment includes the controller ("butler"), X-10 modules, and a phone jack. No prewiring, but the "butler" needs to be plugged in. Costs approximately $1,575.

Champ Package
HyperTek, Inc.
P.O. Box 137
Whitehouse, NJ 08888
201/534-9700
Contact: Dan Kehoe
Controls energy, lighting, selected appliances, security, fire, and flood. Equipment needed includes the Homebrain microprocessor, and sensors. Some additional wiring may be required. Cost ranges from $5,000 to $6,000.

ES 1400
Enerlogic Systems, Inc.
4 Townsend West, Suite 3
Nashua, NH 03063
603/880-4066
Contact: Jan Tardiff

Controls energy, lighting, appliances, security, fire, and flood. Equipment includes controller, sensors (X-10) and software for user's PC (IBM or compatible). No additional wiring, but controller needs to be plugged in. Costs $395.

Home Manager
Unity Systems
2606 Spring St.
Redwood City, CA 94063
4151369-3233; 800/558-6489
(800/858-6489 in Calif.)
Contact: Diane Ewald
Controls energy (room by room), security, lighting, and appliances using a touch-screen, a main control unit, and X-10 modules. Some additional low-voltage wiring may be required. Costs $6,500 to $15,000 installed.

Honeywell Inc.
Honeywell Plaza
Minneapolis, MN 55408
612/870-2862; 800/328-5111
Contact: Mary Nelson
Honeywell sells System 2000e, a security system, and is very involved in developing interfaces for an integrated system. They are contenders for creating the interface to be used with the Smart House project.

Magic Mansions 2000
Magic Mansions, Inc.
2501 East Oakton
Elk Grove Village, IL 60007
312/364-5257
Contact: Roxanne Harter
Controls energy, security, lighting, appliances, and entertainment. Equipment includes main processor, remote intercom. Requires pre-wiring with special cable. Uses regular phone, intercom, or user's PC for programming. Will be voice-activated in the future. Costs $5,000, up to $60,000 (installed, all options). Available late December, 1988.

Maxon Systems
10828 N.W. Airworld Drive, Suite 218
Kansas City, MO 64153
816/891-1093;
Contact: Jim Smith
Product is under development and still unnamed but will control security, lights, and selected appliances. Wireless. Available June 1989. Cost not released.

Mitsubishi Home Automation System
Medama, Inc.
P.O. Box 6007
Cypress, CA 90630
714/220-4609; 800/421-1132
Contact: Bruce Abraham
Controls energy, lighting, selected appliances, security, and communications. Equipment needed includes a console, individual room interfaces, and a touchtone phone. Wireless for retrofit, or prewired. Cost ranges from $1,200 to $12,000 (the "Premier" model plus all options). Available Fall, 1989.

X-10 Home Control System
X-10 (USA) Inc.
185A LeGrand Ave.
Northvale, NJ 07647
201/784-9464
Controls lights, appliances, energy, security, and communications. Equipment needed includes controllers and modules. Also sells special outlets, and a computer interface that works with most computers. Most houses can be equipped for $150. X-10 controllers are used in many home-automation systems, including some of the ones listed above, and X-10 technology is the standard for home automation. (Sears, Radio Shack, and Leviton sell home-automation devices which use X-10 technology.)